

# LESSON 1.1

# **INFORMATION ORGANISATION AS A SYSTEM:**

# BASIC CONCEPTS, TYPES AND CHARACTERISTICS OF AN INFORMATION SYSTEM

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Information Organisation as a System
  - 1.3.1 Basic Concept and Definition of Information System
  - 1.3.2 Types of Information System: National and International/Global
  - 1.3.3 Characteristics of Information System
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- 1.6 Answers to In-text Questions
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# 1.1 LEARNING OBJECTIVES

After reading this lesson, you will be able to:

- Describe Information Organisation as a System
- Define Information System
- Identify various types of Information Systems nationally and internationally
- Describe the important characteristics of Information System

# **1.2 INTRODUCTION**

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In today's world of digital technology, providing the right and authentic information to the users from the ocean of information is a major challenge for library professionals.Moreover, information overload and its duplication are common issues in locating the right information in the suitable format at right time for the right user. Many such obstacles in providing the access to information to the users arose the problem of Information gap in the country. Various national and international organisations came forward to provide a solution to these issues by coordination, promotion, and growth of library and information services. These organisations include governmental entities as well as non-profit, professional groups(Arora, 2006b).Major national information systems and initiatives started by the Indian government in the fields of science, technology, social sciences, and humanities are included on the lesson. Technologies advancements, particularly in the areas of computer and communication technology, have greatly benefited contemporary information organisations. Technology applications have greatly improved the function of these organisations. Resource sharing, library collaboration, consortia, networking, etc. are important nowadays for solving service and information handling issues as well as for delivering information in diverse formats closer to users(Arora, n.d.).

Right information to the right user at right time is of vital importance in the present day context. The advent of computers has enhanced the possibility of creating electronic databases which has opened new opportunities for the development of international information systems. In this less, we bring you descriptive account of some of the international information systems also referred to as global information systems. These include United Nations governed International Nuclear Information System (INIS), InternationalInformation System on Agricultural Sciences and Technology (AGRIS), INFOTERRA, etc. among others.

### **1.3** Information Organisation as a System

Information is the need of the era and to provide this information to every users at right time is the major function of the libraries. Users require information in different domains for If we look at the total amount of money spent on education, research, and development across all disciplines or subject areas in the nation, we can easily see that science and technology receive a significant portion of these expenditures each year rather than the arts, social sciences, humanities, etc. It has been noted that a significant percentage of this investment in research and technology is used to establish and keep up effective libraries and information hubs.

A large number of national and international organisations are engaged in the development of library and information services, devoted to collection, processing and dissemination of information in various countries.



India therefore has well-developed library and information systems in the nation in the majority of the fields covered by science and technology, such as engineering and technology, medical sciences, atomic energy, and space sciences.

#### **1.3.1** Basic Concept and definition of Information System:

A system is an arrangement of parts/elements working together to perform a set of operations in the accomplishment of the purpose as a whole.

Properties of a 'System':

- The properties and behaviour of a system are affected by those of its components.
- Each component has an impact on its system but none can have an independent effect.
- Every possible sub-group of components has these two essential properties of its system.

According to ALA Glossary, an information system is "a complete system designed for the generation, organisation, storage, retrieval, and dissemination of information within an institution, organisation, or other defined area of society".

Information system refers to the methods, media, producers, and recipients involved in an organised way to effect information transfer within a specific field, activity or organisation.

An information system consists of a complex collection of

- Information messages;
- Persons who produce and use them;
- Institutions which process them, and
- A set of behaviour patterns, customs, and traditions by which these persons and institutions interrelate.

An information system or information grid is a network of information centre at different levels working in perfect harmony and close co-operation with each other with the objectives of storing and dissemination of information usually of a specific types or a specific community.

An information system is a method or a combination of methods for acquiring, classifying, recording and disseminating.

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#### 1.3.2 Types of Information System: National and International

# **National Information System**

If we consider the amount of money spent on education, research and development . activities in various disciplines or subject fields in the country, we can easily find that major portion of such expenditure goes every year to science and technology, rather than the subject fields of arts, social sciences, humanities, etc. It has been observed that major portion of this investment in science and technology is spent in building up and maintaining good libraries and information centres. India, therefore, has well developed library and information systems in the country in most of the disciplines covered by science and technology, like agricultural sciences, medical sciences, atomic energy, space sciences, engineering and technology, etc. To cover all the libraries and information centres in S&T operating in the country is beyond the scope of this Unit. In this lesson some of the information systems and programmes that are operating at national level have been covered(Arora, n.d.).

#### 1. Information Systems in Science and Technology

- a. National Information System for Science and Technology (NISSAT): NISSAT programme was launched by Department of Scientific and Industrial Research (DSIR), with the broad objective of interlinking and coordinating a large number of information sources, systems and services into an effective network under an overall coordinating agency. The NISSAT programme was formally implemented in September 1977.
- **b. Biotechnology Information System (BTIS):**To promote R&D efforts in different areas of biotechnology viz. agricultural, animal, environmental, medical and plant biotechnology in India, Ministry of Science and Technology, set up a Department of Biotechnology (DBT) in 1986 at New Delhi. The department through its several programmes, accelerated the pace of development of biotechnology in the country.
- c. Environmental Information System (ENVIS): Recognising the importance of environmental information for sustainable development and formulation of environmentai management polices, Government ofIndia set up ENVIS in 1982 under theMinistry of Environment and Forests (MOEF) erstwhile Department of Environmerit, as a decentralised system with a network of distributed subject specific centres to collect, collate, store, retrieve and disseminate relevant and timely environmental information to help in decision making in environmental planning and management.
- **d. INFLIBNET: Information and Library Network:**INFLIBNET Centre is an autonomous Inter University Centre (IUC) of University Grant Commission (UGC) of India with its headquarters in Gujarat university campus, Ahemadabad. INFLmNET is a major National Programme initiated by UGC



in 1991. Initially started as a project under IUCAA (Inter University Centre for Astronomy and Astrophysics), INFLIBNET became an independent Inter University Centre in 1996. INFLIDNET Centre is involved in modernising university libraries, connecting them as well as information centres, through nation-wide high-speed data network for optimum utilisation of information. It serves as an information centre for transfer and access of information, supporting scholarship, learning and academic pursuit') in universities, colleges and R&D institutions in the country.

- e. National Informatics Centre (NIC):NIC was set up in 1975 by Government of India, for developing computerised Management Information Systems (MIS) for Ministries and Departments of Central .and State governments to facilitate planning and decision making process inthe country. The Centre commissioned nation-wide online network system called NICNET in 1977 to enable efficient exchange of information between the Central and State Government Departments and between the States and their Districts. NICNET is one of the largest VSAT based network connecting the national capital, the state capitals and district headquarters to one another.
- f. National Institute of Science Communication and Information Resources (NISCAIR):NISCAIR came into existence on October 1, 2002, following the merger of two CSIR institutions viz. Indian National Scientific Documentation Centre (INSDOC) and National Institute of Science Communication (NISCOM). Activities and services of NISCAIR have been dealt in detail in UNIT 9 of this Block. In this Unit you will be acquainted with some of the important current National Level Projects of NISCAIR viz. TKDL and NSDL.

#### 2. Information Systems and Programmes in Social Sciences

- a. Indian Council of Social Science Research (ICSSR):Indian Council of Social Science Research (ICSSR) was established by Ministry of Human Resource Development (erstwhile Ministry of Education), Government of India, in 1969 to promote social science research in the country. ICSSR, an autonomous body, sponsors social science research programmes and projects in the country; administers grant to institutions and individuals; awards fellowship; sponsor and arrange technical training in research methodology and provide guidance for research; develop and support library and documentation centres for providing information services in social sciences; organises and support seminars, workshops and study groups andndertakes publication work in social sciences.
- **b. UGC-Inter University Centre for International Studies:**University Grant Commission has been establishing Inter University Centres (IUCs) to provide

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common state-of-the-art equipment and facilities to the researchers working in different universities, since heavy investment in infrastructure and input is beyond the reach of the individual university for research purposes. Till recently most ofthe ruCs have been established in the field ofS&T. The UGC now plans to establish the first ruc inthe fields of Humanities and Social Sciences by taking over academic and physical infrastructure available at Indo-American Centre for International Studies, situated at Osmania University Campus, Hyderabad.

c. UGC-Inter University Centre for Humanities and Social Sciences:UGC has established four National Facility Centres in selected universities. One such centre is IUCHSS, set up at Indian Institute of Advanced Studies, Shimla. The main objectives of the centre are to invite teachers from universities and colleges to the Institute asAssociate of the IUC, organise Research Seminars for researchers and young teachers in universities and colleges and to organise "Study Week" for discussing important problems of national and international interest.

#### Some other organisations that provide support to social science research are:

- a. Gokhale Institute of Politics and Economics
- b. Indian Institute of Public Administration
- c. SNDT Women's University Documentation Centre
- d. National Council of Applied Economic Research
- e. Tata Institute of Social Sciences

#### 3. Information Systems and Programmes in Humanities

- a. Indian Council for Cultural Relations (ICCR), New Delhi:It was established in 1950 for strengthening the ties of cultural cooperation and exchange between India and other countries. The objectives of the Council as defined in Memorandum of Association are to: • participate in the formulation and implementation of policies and programmes relating to India's external cultural relations; • promote cultural exchange with other countries and people.
- **b.** Indian Council for Historical Research (ICHR), New Delhi: It is an autonomous body established in 1972 by Government ofIndia, to promote and support historical research in the country. The Council promotes the study of historical methods to study the social sciences and humanities to achieve the goal of an interdisciplinary approach in historical perspectives. The Council provides financial assistance for holding seminars, conferences, workshops, etc. related to history. It also provides subsidy for publications of conference proceedings. The Council has brought out 900 publicationswhich fallinto



followingthree categories:i) Indianhistoryand allieddisciplines, ii) Reference books, iii) History of Asia and neighboring countries.

- c. Indira Gandhi National Centre for Arts (IGNCA), New Delhi:Set up by the Ministry of Culture, Government ofIndia in 1985, IGNCA is a premier institution in the preservation and dissemination of knowledge in the fields of arts, culture, lifestyle studies and folklore. The Centre aims to serve as a major resource centre forthe arts, especially written, oral and visual resource materials; undertake research and publication programmes of reference works, glossaries, dictionaries arid encyclopaedias concerning the arts, humanities and general cultural heritage; develop computerised National Information System and Databank on arts, humanities and cultural heritage and create a networks of communication with oilier national and international centres . of arts and culture.
- **d.** National Mission for Manuscripts, New Delhi:Manuscripts are a major source of art, science and culture of a nation. India with its rich cultural heritage has fairly large collection (about 30 million) of manuscripts located in different parts ofIndia and abroad. In India, manuscripts are located in a variety of places from university libraries to temples, maths, madrasas, monastries arl,1private collection. Majority of these collections are yet to be identified and catalogued. A large number of organisations are facing critical preservation problems due to lack of resources and technical expertise. The National Mission for Manuscripts (N1v!M)was launched by Ministry of Culture, Government ofIndia, in Feb. 2003 to locate, catalogue and ..preserve India's manuscripts; enhance their access, spread awareness and encourage their use for educational purposes.

# International/Global Information System

A large number of international organisations are engaged in the development of library and information services, these also include global information systems devoted to collection, processing and dissemination of information in various countries. Use of computers for location, collection, storage and processing of information has opened up the possibilities-of creating machine- readable databases which have led to the development of international/global information systems. This new development has been harnessed further by the very concept of decentralised input of information from the member countries of a participating system, where centralised processing of information is possible through computers, while decentralised dissemination of information is.again possible at the users' end. This principle is behind the success of the INIS, the International Nuclear Information System, which had paved the way for other similar systems like AGRIS, DEVSIS, INFOTERRA, SPINES, CAS, INSPEC, BIOSIS and APINESS. In all these systems, the



input to the system is made available by the member country from where information originates, leading to reliability,timeliness and comprehensibility. The input thus collected nationally is entered in prescribed standardised format, usually a machine-readable format to ensure compatibility(Arora, 2006a).

# Some of the Global Information Systems are:

- **1. INIS:** The acronym INIS stands for International Nuclear Information System. INIS sponsored by the International Atomic Energy Agency (IAEA), Vienna startedfunctioning in 1970. It is a cooperative, decentralised computerised abstracting and indexing system providing worldwide coverage of the literature on the peaceful uses of nuclear energy. It processes and merges input provided by its members and redistributes the information in machine-readable form as well as in print form. INIS, the International Nuclear Information System is appropriate for those who need information on the peaceful applications of nuclear science and technology.
- **2.** AGRIS: AGRIS, the International Information System for the Agricultural Sciences and Technology, was started in 1974 by the Food and Agriculture Organisation (FAO) of the United Nations. AGRIS became fully operational in 1975 with the first issue of AGRINDFX and was mode led on the INIS pattern to facilitate information exchange and to bring together the world literaturedealing with all aspects of agriculture. Presently, FAO's another programme, Current Agricultural Research Information System (CARIS) and AGRIS are functioning collectively.
- **3. INFOTERRA:** INFOTERRA is an information network of the United Nations Environment Programme (UNEP) established for facilitating global environmental information exchange. The programme is functionally successful because of an efficient system that operates through national focal points designated by various governments that are members of the United Nations. At present, INFOTERRA has 178 members in various Member States of UN. The INFOTERRA national focal point in each member state is mostly a national information centre dealing with environmental science and usually is located in the ministry or a government agency responsible for activities concerned with environmental protection. The primary function of each centre is to provide a national environmental information service.
- 4. UNESCO's Science and Technology Policy Programme: The Division of Science and Technology Policies of UNESCO had established SPINES Pilot Programme which was superseded by the Science and Technology Policies Information Exchange Programme (PIPS) in 1984. It was established to facilitate exchange, at the national and internationallevels, the documents and factual data that have a direct bearing on the formulation and monitoring of national science and technology policies. The PIPS programme contributed to development of compatible information services dealing with science and technology in UNESCO Member Countries. This picgramme is now



referred to as UNESCO Science and Technology Policy Programme and is part of UNESCO's Thematic Area- Natural Sciences and under this is Science Policy.

- **5. ASTINFO:** ASTINFO stands for Regional Network for Exchange of Information and Experience in Science and Technology in Asia and Pacific. It aims to promote the exchange of information and experience in science and technology among countries in the AsialPacific region. It was established in 1983 as an outcome of the Second Conference of the Science Ministers and Economic Planning Bodies in the AsialPacific region (CASTASIA II), held in March 1982 in Manilla (Philippines). ASTINFO has co-ordinating units in 18 Member States; and some 82 national/ regional institutions now hold the status of ASTINFO Associated Centres and Networks. A quarterly Newsletter is also being published.
- **6. MEDLARS:** The United States National Library of Medicine (NLM), a component of the National Institutes of Health (NIH) is located in the campus of NIH in Bethesda, Maryland. NLM is one of the largest medical libraries of the world. It collects materials in all major areas of the health sciences and related areas which include chemistry and physics. The goal of the library is to collect material and provide information and research services in all areas of biomedicine and health care.
- **7.** CAS: In the year 1907, the Chemical Abstracts Service (CAS) was started. It is a nonprofit organisation of the American Chemical Society (ACS), located in Columbus, Ohio. It disseminates chemistry related information derived from the scientific and . technical literature and patents world wide. CAS covers publications in 50 languages from about 150 countries of the world and uses advanced computer based systems for processing, storing, searching and disseminating relevant scientific, technical and industry information. The most important feature of CAS is the computerised Chemical Registry that identifies chemical substances by structure and assigns each one a unique number. This is used in CAS products to link the structure with related names, bibliographic references and other information on the substances.
- 8. INSPEC: INSPEC, started in the year 1967, by the Institution of Electrical Engineers (IEE), United Kingdom. Presently it is one of the leading bibliographic information services available in English-language. It provides access to the world's scientific and technical literature in physics, electrical engineering, electronics, communications, control engineering, computers and computing, and information technology. INSPEC based on the Science Abstracts service which has been available from the IEE since 1898. The major effort in this respect is preparation of the INSPEC database, since 1969, which provides all the services from INSPEC.
- **9. BIOSIS:** BIOSIS, provided by Thompson Scientific. It is serving the life science community by providing researchers, students, and librarians with references to research published and found in journal articles, conference proceedings, meetings, patents, book chapters and other sources of information. For this, BIOSIS selects more than 600,000 new entries each year. Based on the collected information,

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BIOSIS provides flexible information services which include databases and customised information products to the life sciences community globally.

#### **1.3.3 Characteristics of Information System:**

- 1. Capacity:Capacity involves the relationship between the size of the system and the user demands on it. The system needs to be able to collect, store and process all of the data necessary to develop the information required by its users, as well as have the capability to meet expansion requirements in the amount of database, in the information product, and in the number of users(Anupama Saini, 17:01:25 UTC).
- 2. Quality: Quality has several dimensions. It is related to each of the properties as well as to the subsystems as a whole. The accuracy and validity of each has a bearing on the utility of the system for the user.
- **3.** Compatibility: Compatibility is related to the appropriateness of the data and information of the systems for its users.
- **4. Timliness:** Timeliness is the temporal relationship between user needs and the system's response time. Another critical factor relates to the time for which the information is valid.
- **5.** Coherence: Coherence is a property related to efficiency. The organisation of the information system should be consistent and logical; the subsystems should be well-integrated to serve the user requirements.
- 6. Flexibility: Flexibility permits coherent adjustments as user needs or other aspects of the various subsystems change. Inherent in this property is the capacity to anticipate change.
- **7. Dependability:** It allows the information system to perform at given levels of accuracy and within given time constraints.
- **8.** Economy: It refers to the cost effectiveness property of an information system and is the most difficult property to measure.

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#### **IN-TEXT QUESTIONS**

- An information system is a method or a combination of methods for

   (a) acquiring (b)classifying (c)recording (d)All of these.
- 2. Quality is the important characteristic of information system. True/False
- 3. ICCR established in the year\_\_\_\_\_
- 4. AGRIS is the International Information System for the\_\_\_\_\_
- 5. International information system is also referred to as\_\_\_\_\_
- 6. INSPEC started in the year\_\_\_\_\_.
- 7. INIS stands for \_\_\_\_\_.
- 8. CAS stands for\_\_\_\_\_.
- 9. IGNCA is located in New Delhi. True/False
- 10. BIOSIS if provided by \_\_\_\_\_

# 1.4 SUMMARY

The lesson provides an concise overview of Information Systems in the fields of science and technology, social sciences and humanities, currently in operation in the country. In the field of science and technology, brief description of NISSAT programme and its achievements in 25 years of its operation and major activities and nationwide information services of National Informatics Centre, Biotechnology Information System, Environmental Information System, INFLIBNET and NISCAIR are covered. All the above mentioned systems and institutions (except INFLIBNET) are providing illformation services in science and technology. INFLIBNET is concerned with providing information services covering all the fields of knowledge, viz. S&T, social sciences and humanities. In the field of social sciences, major information systems programmes of Indian Council of Social Sciences Research and University Grant Commission are covered. In the field of humanities, information related activities and programmes of Indira Gandhi National Centre for Arts, National Mission for Manuscripts, Indian Council for Cultural Relation, Indian Council of Historical Research, Indian Council of Philosophical Research, Central Institute of English and Foreign Languages, Central Institute of Indian Languages, National Archives of India and National Museum, new Delhi are covered. Like NASSDOC in social sciences and NISCAIR in S&T, there is no National Information Centre in the field of humanities in the country.



There are many international organisations, systems and centres contributing towards promotion, coordination and development of library and information services for assisting the users. In this Unit, we have covered global information systems like INIS, AGRIS and INFOTERRA that provide cooperative systems and services and work on the principle of decentralised input, centralised processing and decentralised output.

# 1.5 GLOSSARY

Information: It is the processed data on which decisions and actions can be taken.

**Information System:**Information system refers to the methods, media, producers, and recipients involved in an organised way to effect information transfer within a specific field, activity or organisation.

National Information System: An information system which operate at national level.

International Information System: An international venture in terms of coverage of documents, variety of services and products to users for achieving economy in terms of money, time and efforts.

# 1.6 ANSWERS TO IN-TEXT QUESTIONS

1. (u)	1.	(d)
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- 2. True
- 3. 1950
- 4. Agricultural Sciences and Technology
- 5. Global Information System
- 6. 1967
  - 7. International Nuclear Information System
- 8. Chemical Abstracts Service

9. True

10. Thompson Scientific

# 1.7 SELF-ASSESSMENT QUESTIONS

- Explain the design elements of national information system. Describe the role of ENVIS in providing information to users in the field of Environmental Sciences.
- 2. 'INIS is an extensive pool of information in the nuclear field and its strength is based on international co-operation.' In view of this statement discuss the activities and structure of INIS.
- 3. List out some famous National Information Systems in India.
- 4. List out some famous International Information Systems in India.



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# **LESSON 1.2**

# Kinds of Information System: Libraries, Documentation **Centres and Information Centres**

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# **STRUCTURE**

- 1.1 Learning Objectives
- 1.2 Introduction
- niversit 1.3 Information System and its various kinds/types
- 1.4 Libraries
  - 1.4.1 Definition
  - 1.4.2 Need and Purpose
  - 1.4.3 Types of Libraries with examples
  - 1.4.4 Services of Libraries
- 1.5 **Documentation Centres** 
  - 1.5.1 Definition
  - 1.5.2 Need and Purpose
  - 1.5.3 Types of Documentation Centres with examples
  - 1.5.4 Services of Documentation Centres
- Information Centres 1.6
  - 1.6.1 Definition
  - 1.6.2 Need and Purpose
  - 1.6.3 Types of information Centres with examples
  - 1.6.4 Services of information Centres
- 1.7 Summary
- 1.8 Glossary
- 1.9 Answers to In-text Questions
- 1.10 Self-Assessment Questions
- 1.11 References
- 1.12 **Suggested Readings**

#### **LEARNING OBJECTIVES** 1.1

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After completing the lesson, you will be able to undertand:

- the need and purpose of libraries
- types of libraries and its examples
- describe the services of libraries
- the need and purpose of documentation centres
- types of documentation centres and its examples
- describe the services of documentation centres
- the need and purpose of information centres
- types of information centres and its examples
- describe the services of information centres

# **1.2 INTRODUCTION**

Libraries, Documentation and information centres are information systems that grew out of information needs of user communities engaged in research, industrial development, management of different 42 types of institutions organisations and planning for socioeconomic development. Several new types of libraries, documentation and information centres have sprung up, resulting in the development of a national framework of information institutions. This framework is generally referred to as the information infrastructure, comprising a set of institutions, organisations and resources which support the flow, handling and delivery of information from generator to user. Such institutions are involved in acquiring, processing, storing, retrieving and disseminating information. This information infrastructure encompasses libraries, documentation centres, information centres, referral centres, information analysis centres, data centres and clearing houses. They are the components of the total information system of a country. These component units function as intermediaries linking information and users. Each one of these units has a distinct role, and, at the same time, a common objective of serving the information needs of specialised users. After defining libraries, documentation centres, information centres, etc. we shall discuss their need and purpose, types and services

# 1.3 INFORMATION SYSTEM AND ITS KINDS

Different kinds of information systemslike: Libraries, Documentation Centres and Information Centres are discussed in the lesson. We have tried to provide a glance of all three important information systems with reference to its need and purpose, types and services.

# 1.4 LIBRARIES

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#### **1.4.1 Definition:**

The word "Library" means in English "a collection of books gathered for study, research, reference and recreation". It is being perceived that it has derived from a Latin word 'liber' which means 'a book'. The definition of library has changed as its functions have changed since it inception.

Let's see some of the definitions provided by different reference sources and the scholars of Library and Information Science("CBSE Class XI & XII Library & Information Science Textbooks," 2015).

The Oxford Dictionary defines library as "a building or room containing collections of books, periodicals, and sometimes films and recorded music for using or borrowing by the public or the members of an institution".

The Merriam-Webster's Dictionary says that "a place in which literary, musical, artistic, or reference materials (as books, manuscripts, recordings, or films) are kept for use but not for sale".

The Harrold's Librarians' Glossary and Reference Book explains library as:

- 1) A collection of books and other literary material kept for reading, study and consultation.
- 2) A place, building, room or rooms set apart for the keeping and use of a collection of books, etc.
- **3**) A number of books issued by one publisher under a comprehensive title as the 'Loeb Classical Library', and usually having some general characteristic, such as, subject, binding, or typography.
- 4) A collection of films, photographs and other non-book materials, plastic or metal tapes, disks and programs.

### 1.4.2 Need and Purpose:

The definition of a library, given by Ranganathan, helps us understand the status of a library in the society. He designates the library as a public institution. This status itself sets goals and objectives for a library. Being a public institution, it has the responsibility to serve the public without any reservation or biasness. Further, he says 'care of collection of books' which refers to the organization, maintenance and preservation aspects of the library materials so that it can serve the society or community for a longer period. The final and the most important factor in his definition is 'making them accessible'. This aspect of the definition sets an agenda to 1.3 Purpose of a Library 4 provide service to the society. The library should be made available to the public for use or consultation.



Hence, the purpose of a library is to serve the society through the records of human thoughts, ideas and expressions by making them available as and when required by the members of the society, and preserving them for the coming generations, as these records are the intellectual wealth of the society.

### 1.4.3 Types of Libraries:

#### **Broadly there are four types of libraries:**

1. Public Library: According to Ernestine Rose, a public library is an institution which is making honest efforts to build upon solid foundation on past tradition a modern structure adoptable of the changing need of today and susceptible to change in the future. A public library is a collection of books for public use, subject to public control and support. It is open to full public use. A modern public library collects the printed and audio-visual material. It interprets and guides in the use of material to enable as many persons as possible. A public library organises the collection and makes convenient and easy to use for users. In addition to books, a public library selects and provides pamphlets, documents and other non-book sources in printed form, and films, tapes, discs, and other non-print recording of knowledge and opinion.

#### Examples of Public Library are:

- Delhi Public Library
- State Library, Shimla
- Central State Library, Solan
- T.S. Central State Library, Chandigarh
- 2. Academic Library: Libraries are regarded as heart of institutions. University Education Commission Report of 1949 has put a great emphasis on the libraries in university system, and it is rightly called a heart of an institution. Kothari Commission Report of 1949 has put a great emphasis on roleof libraries in the life of university. Kothari Commission said that no new subject would be introduced in the university unless the libraries are given proper funds for purchase of books, periodicals, equipments and professional staff. A library have its own independent building. The recommendation of the Commission was that unless a library is given due importance the objectives of a university will not be fulfilled. Hence the library attached to the university, college and school should become the centre of attraction(Vyas, 1993).

Libraries that comes under academic library system are as follows:

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(a) School Library: Secondary Education Commission Report, 1952-53 recommended that the school libraries should cultivate in students the habit of general reading. The school library should be a repository of reference books, standard books, and books of general interest. Text books give brief information only. This is how text books are designed. Intelligent students would desire for more information. The commission found the general knowledge and interest among students about studies is deplorable. General reading habit among students is poor. This speaks for a good school library system. A school library is an essential instrument of education.

#### **Examples of School Library are:**

- Library Kendriya Vidyalaya Kanjikode
- Library, Kendriya Vidyalaya No.IV Ambala Cantt
- Library, DAV Public School, Sreshtha Vihar, Delhi
- (b) College Library: The college library's main objective is to help in collecting material which is uselful to teaching. The college library is the centre of all activities of the college. According to Lyle a college library's main functions are to extend reference service, to contribute in the development of the teaching and to provide library service in order to improve standard of teaching in fulfilment of the objectives, and to encourage students to read useful books. The college library becomes a centre of learning where learned and scholarly reading materials are kept for the use of the academic community.

#### **Examples of College Library are:**

- Library, St. Stephen's College, Delhi
- British Library Miranda house Library, Delhi
- Daulat Ram College Library, Delhi
- Library, Government Post Graduate College, Dharamshala, Himachal Pradesh
- (c) University Library: According to Wilson and Tauber the functions of university library is to acquire and collect books, manuscripts, journals and other reading materials, and organise them keeping in view the objectives. A library is a serice oriented institution. It renders service to the university community. According to M.A. Gelfand the greatest contribution of a library is ites educational services. A university library is not mere a collection of books, but important tool of education in today's world.



#### **Examples of University Library are:**

- Sayaji Rao Gaekwad Central Library, BHU
- Central Library, University of Delhi
- Maulana Azad Library, Aligarh Muslim University
- JNU Central Library
- **3. Special Library: L.M. Harrod,** "Special Library is a collection of books and other printed, graphic or recorded material dealing with a limited filed of knowledge and provided by a learned society, research organization, industrial or commercial undertaking, government department or even an educational institution. It may also be a special branch of a public library serving certain interests or occupational groups such as a technical library or a special subject library, meeting the needs of all enquiries on that given subject such as a music library" (Khanna, 1987).

#### **Examples of Special Library are:**

- National Accessible Library, NIPVED, Dehradun
- Nehru Memorial Museum and Library, New Delhi
- Tihar Jail Open Library
- National School of Drama Library, New Delhi
- 4. National Library: Since national library is a vital phenomenon of librarianship, S.R. Ranganathan ventured to define it as the library having the duty of collecting and preserving for posterity, the literary products of that county. It is the central station for assembling and dissemination thought energy. Inspired, probably by Ranganathan, Unesco's General Conference (1970) gave a more comprehensive definition which runs as under:

Libraries which irrespective of their title are responsible for acquiring and preserving copies of all significant publications published in a country and functioning as a deposit library, either by law or under other arrangements. They will also normally perform some of the following functions:

- a. Produce a national bibliography
- b. Hold and keep up-to-date a large and representative collection of foreign literature including books about the country;
- c. Act as a national bibliographic information centre;
- d. Compile union catalogue;
- e. Publish the retrospective national bibliography

#### **Examples of National Library are:**

• National Library of India (Kolkata; formerly Imperial Library)

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- British Library (London; formerly British Museum)
- Library of Congress (Washington)
- The Lenin Library (Moscow)
- The Bibliotheque Nationale (Paris)

#### **1.4.4 Services of Libraries:**

- 1) Circulation Services: The borrowing of books for hoine reading is the most widely used of all public library facilities. Presuming that the reader has been helped by a proper reference service to choose the book he wants to read at home, the routines involved in allowing him to take it out or borrow shou Id be clearly charted out and administered with precision.
  - a) Interlibrary Cooperation: Though there are many kinds of cooperative activities developed for providing better services to readers like cooperative acquisition, cataloguing, and storage of library materials, interlibrary .loan is an essential part of the cooperative effort.
- 2) Reading Room Services: The main activity of the reading rooms manifests itself in the actual handing out of the resources of the library to readers. Though open access helps the reader to locate his books of interest, the staff helps to locate books of peripheral and inter- disciplinary subjects. The range extends from merely handing over a book to the casual reader, to systematic servicing of material to the serious scholar.
  - a) Photocopying Services: Photocopying is a form of making copies of parts of books, journals, newspapers, and pamphlets . and the like. The practice is a very valuable aid to the library user. For example, people doing extensive the work on a project 'may need material from parts of many books, journals and newspapers. They can get copies of the information they need from each document. Thus, they have permanent possession of the material they need in form much reduced from the bulk of dozens of documents.
- **3) References Services:** Reference service is providing personal assistance to individual library users in search of a specific piece.of information. This service begins With a well-designed contact of readers, books and library staff.
- **4) Bibliographical Services:** Bibliography as a term has more than one definition. For the purpose ofthis unit the term may be defined as' a name given to' a list ef books, manuscripts. and other publications, systematically described and arranged which have some relationship to each other. The author bibliography lists all the works by and about one author while a subject bibliography is restricted to one subject or to one subject field.
- 5) **IT Based Services:** Each year, more and. more information becomes available about every subject that iriterests . the library interest users. The present era of information

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technology opens up a wide range of facilities for the libraries. the services of a library can be profitably improved from the use of technology and the following benefits can be derived:

- routine and repetitive jobs are handled with saving in staff time and removing drudgery,
- speed in work; and thus
- improving productivity, and
- the highly debated 'resource sharing' could become a reality
- 6) Community Intormation Services: Community information services are those services, which assist individuals and groups with daily problem-solving and with participation in the democratic process. The public library has a major role to play as a community information centre to the user community in socioeconomic development at all levels particularly in areas of decision making, problem-solving, economi'cproductivity, health care, continuing education etc. The services concentrate on the needs of those who do not have ready access to other sources of assistance and on the most important problems that people have to face -problems to do with their jobs, their homes and their rights.

#### **IN-TEXT QUESTIONS**

- 1. The system where only staff could fetch books from the shelves is called
- 2. An example of teaching aids used for simplifying teaching learning processes is .
- 3. The system where users can browse books from the shelves is called
- 4. DVDs, e-books and online journals one examples of \_\_\_\_\_ material.

### **1.5 DOCUMENTATION CENTRES**

#### 1.5.1 Definition:

Documentation activities of a country are very much interlinked with the research and developmental efforts of the country. Documentation centres are concerned with the dissemination of documentary information. Specialist libraries began to build up facilities for



meeting the changing needs of scholarly clientele for intensive services. Later in time, documentation centres began to emerge towards the same prupose.

In general, a documentation centre brings to the attention of the specialist users current and recent literature of value to them, sieves through information sources and indicates pinpointedly or with high precision the right kind of information, makes an exhaustive search of literature resources so as not to miss worthwhile information, and provides documentation and information services on demand and in anticipation.

A local documentation centre has the sole function of providing information services for supporting the programmes and activities of its own institution. The documentation centres at local levels and which are attached to individual R & D institutions business houses, industrial enterprises, etc. are established and administerd by their parent institution. At the national level, it might be the responsibility of the appropriate government agency to establish and administer the national documentation/information centres.

Definitions A 'document' is a single piece of written or printed matter which furnishes evidence or information on any subject. It can be graphic record of some idea in words, sound or image. The term 'documentation' is the process connected with identification, recording, organisation, storage and dissemination of intellectual content recorded in a document in print or non-print medium. 'Documentation centres' play an important role in collecting microliterature, indexing and abstracting them, bringing them to the notice of the users and disseminating them quickly to the needy users. They are established at local, regional, national and international levels.

#### 1.5.2 Need and Purpose:

The main purpose of the documentation centre is to identify, acquire, organise and store documents after indexing and abstracting them. It retrieves and disseminates the document when requested by the users.

Documentation service is same as reference service but the emphasis shifts from macrodocuments to micro-documents and general readers to special readers. Documentation service includes the following activities:

- Bring to the notice of readers availability of current information through Current Awareness Service (CAS) and Selective Dissemination of Information (SDI.
- Providing documents available in the centre.
- Getting documents on inter-library loan from other institutions
- Avoid unfamiliar words, double negatives, passive voice, and difficult language structures.
- Reproducing documents and providing photocopies.



• Arranging translation of documents in a language requested by the readers from other foreign languages.

#### **1.5.3** Types of Documentation Centres with examples:

During 1950s and 1960s, Documentation Centres were established at local, regional, national and international levels. a)

1) Local documentation centres are supposed to provide information services that support the requirements of the parent organisation to which they are attached. These are designed to meet the specific demands of the users. The documentation and information centres at local levels that are attached to individual R&D institutions, business houses, industrial enterprises, government departments. etc., are established and administered by their parent institutions.

Examples:

- National Centre for Science Information (NCSI) at the Indian Institute of Science, Bangalore
- SNDT University, Bombay
- MS University, Baroda.
- 2) National documentation centres are attached to R&D organisations, business and industrial organisations, government departments and soon. They undertake activities which are beyond the control of local documentation centres. Examples:
  - Indian National Scientific Documentation Centre, New Delhi.
  - Institute of Scientific and Technical Information, (China), Beijing.
  - Thailand National Documentation Centre, Bangkok.
- **3) International documentation centres** collect, organise, process and disseminate special literature available at international level to meet the information requirements of the researchers and scholars.

Examples:

- International Patent Documentation Centre (INPADOC), Vienna.
- Trade Information Service, International Trade Centre, Geneva.
- 4) Regional documentation centres are usually established nationally or internationally in a region. These are designed to meet the requirements of users in a particular region. In a geographically vast country, besides the National Documentation Centre, there may be a need to set up information centres in different regions in order to mobilise the information resources and facilities and to serve particular requirements of the users.

Examples:



#### **1.5.4** Services of Documentation Centres:

The below are some services which are offered by most of the information centres: The functions of documentation/information centres are performed with the basic objective of providing a variety of information services. These services are rendered either in response to or in anticipation of requests by the users. The responsive services are provided in response to users' specific special request. On the other hand, anticipatory services are provided in anticipation of the demands from the users. The various responsive and anticipatory services minersity provided by documentation/ information centres are:

#### **1)** Responsive Services

- **a**) Answering queries
- **b**) Referral services
- c) Compilation of bibliographies
- **d**) Retrospective search service
- e) Document back-up service
- **f**) Translation service
- 2) Anticipatory Services
  - a) Current Awareness Service (CAS)
  - b) Selective Dissemination of Information service (SDI)
  - c) Preparation of indexes and abstracts
  - d) Compilation of directories, handbooks, etc.
  - e) Compilation of ad-hoc bibliographies
  - f) State-of-the art reports

#### **IN-TEXT QUESTIONS**

- 5. Current Awareness service is an anticipatory service. True/False
- 6. Regional service is a Responsive service. True/False
- 7. State of the Art Report is a responsive service. True/False
- 8. Translation Service is an anticipatory service. True/False
- 9. Compilation of Bibliographies is a responsive service. True/False

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### **1.6 INFORMATION CENTRES**

#### **1.6.1 Definition:**

The Information service units in organisations have been usually referred to as 'Information Centres' or "Information Departments'. The emphasis in this case, as mentioned earlier, is towards provision of information contained in the documents, rather than documents themselves which is the main consideration of traditional libraries. An information centre can be defined as: "an organisation that (i) selects, acquires, stores and retrieves specific information in response to requests; (ii) announces, abstracts, extracts and indexes information; and (iii) disseminates information in response to request from documents or in anticipation."

Harrod's Librarians' Glossary defines an Information Centre as being "usually an office, or a section of a bibliographical centre, research bureau or documentation centre, which gives information about books or on a subject with which the organization providing the facilities or the centre is concerned. The functions of this centre include technical writing, indexing, abstracting, SDC, etc., each of intensive nature".

Another earlier definition of an Information Centre in relation to library functions is:

- An organisation with library as a unit with responsibility to its parent organisation,
- An organisation which charges a fee for its services that cover full cost of the cooperation, and
- An organisation that relies on the library collection to provide information services for an external user group upon request.

In the above definition we see that the emphasis is on activities and products and the amount of intellectual effort involved in the preparation of the products. It has to be noted here that each individual activity and product eventually forms the input for other activities and products. Here the activities like selection and collection have been taken from libraries which are document-oriented, whereas the activities like indexing, abstracting and extracting are peculiar to information centres. This feature distinguishes an information centre from other types of information institutions(Arora, 2006).

#### **1.6.2** Need and Purpose:

Some of the reasons for setting up of an information centre are:

- Avoid Increase in volume and variety of information sources;
- Rising cost of documents;

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- Emphasis of service from documents to information contained in documents;
- To meet the changing complexity of information needs of users;
- To keep pace with developments in various subject areas;
- Improved decision making by managers, scientists, R & D personnel, planners and policymakers;
- To be part of resource sharing and networking activity in a region, subject or otherwise;
- To have access to new publications, information services and databases;
- To avoid duplication of efforts; and
- Need for carefully evaluated, analysed, consolidated and repackaged information oriented towards the special needs of the users..

#### **1.6.3** Types of Information Centres with examples:

#### **1. By Specialised Interest**

Information Centres grouped under this category are those institutions that cater to specialists in various subject areas of research, mission-oriented projects, special kinds of information or information from particular regions.;

- Subject Field Information Centres devoted to subjects like-science, a) technology, social sciences, engineer!ng, agriculture, etc. Examples:
  - Science and Technology National Institute of Science Communication and Information Resources (NISCAIR), New Delhi.
- b) Mission-oriented - Information Centres devoted to missions, sectors, etc. of national economy. Examples:

•

Defence- Defence Scientific Information and Documentation Centre (DESIDOC), . , New Delhi.

Kinds of-Information - Information Centres dealing with a particular kind of information like industrial information, bibliographical information, management information, etc.

Examples:

- Industrial Information - Small Enterprises National Documentation Centre (SENDOC), Hyderabad.
- d) Geographical Region - Information Centres concerning a particular geographical region,

Examples:

• Japan Information Centre of Science and Technology, Tokyo.Japan.

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### 2. By Ownership

Information Centres by ownership include those institutions that are owned, funded and run by government agencies or learned societies or professional associations or private agencies.

#### (a) Government Information Centres

Examples:

- National Informatics Centre (NIC), New Delhi.
- National Social Science Documentation Centre (NASSDOC), New Delhi.

#### (b) Semi-Government Information Centres

Examples:

- National Centre for Science Information (University Grant Commission),
- Indian Institute of Science Campus, Bangalore.
- (c) Information Centres of Non-Government Organisations (NGOs) Examples:
  - International Development Research Centre (IDRC) Library, Canada.
  - UNESCO Social and Human Sciences Documentation Centre, Paris, France.

#### (d) Private Information Centres

Examples:

- Farmers' Information Centre (Maroochy Horticultural Research Station), Nambour, Australia.
- Documentation and Information Centre, TERI Library, TERI, New Delhi.

#### (e) International Information Centres

#### Examples:

- Trade Information Services, International Trade Centre (UNCTADIWTO), Geneva.
- International Patent Documentation Centre (INPADOC), European Patent Office, Munich.
- Infoterm International Information Centre for Terminology, Vienna.

#### 3. By Level of Service



Many information centres operate at various levels which can be international or global, regional, national or local.

- a) GlobalInternational Information Systems/Centres These centres usually have decentralised input, centralised processing and decentralised dissemination or output of information. Examples:
  - AGRIS/CARIS International Information System for the Agricultural Sciences and Technology, FAO, Rome.
  - Infoterm International Information Centre for Terminology, Vienna.
  - International Serials Data System (ISDS), Paris.
- **b) Regional Information Centres -** Countries belonging to a geographical region group together to form regional information activities.

Examples:

- SAARC Documentation Centre, New Delhi.
- Pan African Development Information System(pADIS),The Economic Commission For Africa (ECA), Addis Ababa, Ethiopia.
- c) National Information Centres These are information centres usually established by governments of nations and operate at national level. The national information centres perform national level fuctions, activities and services.

Examples:

- The National Documentation Centre, Bangkok, Thailand
- National Centre for Scientific arid Technological Information
  - & Documentation (NACESTID), Ministry of Science, Technology and Environment, Hanoi, Vietnam.
- Bangladesh National Scientific and Technical Documentation Centre (BANSDOC), Dhaka, Bangladesh.
- National Social Science Documentation Centre (NASSDOC), New Delhi.
- National Institute of Science Communication and Infomiation Resources (NISCAIR), New Delhi.
- **d) Regional Information Centres (inter-country) -** These centres are usually established in geographically large countries. Regional Centres are set-up in different regions in order to make available information facilities to user
- e) Sectoral Information Centres This category of information centres is devoted to a specific discipline or a subject area. These are available



on a nationalbasis to users and institution engaged in the concerned discipline or mission.

Examples:

- National Information Centre For Marine Sciences (NICMAS), National Instituteof Oceanography, Goa, India.
- Biotechnology Information Centre, Centre of Advanced Study in Marine Biology
- f) Local Information Centres These centres are attached to individualorganisations to meet their specific information requirements Examples:
  - Information Centre, United Riceland Ltd., Kurukshetra, India.
  - Business Information Centre, Transport Corporation ofIndia Ltd., Gurgaon,India.
  - Biotechnology Information Centre, Centre of Advanced Study in Marine Biology,

#### 4. By Variety of Services Provided

Information Centres can also be categorised by the variety of services provided totheir users. These centres usually offer some specialised services which are unique.

These services include: .

- a) Current Awareness Services
- b) Abstracting and Digest Services
- c) Product Information Services
- d) Data Bank

Examples.

National Social Science Documentation Centre (NASSDOC), New Delhi.

 National Institute of Science Communication and Information Resources (NISCAIR), New Delhi .

### 5. By Types of Material

Some information centres offer only a special kind of material like patents, standards, etc. and these are categorised according to types of material offered by them.

Examples:

• International Patent Documentation Centre (INPADOC), European Patent Office, Munich.

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• International Development Research Centre (IDRC) Library, Canada.

#### **1.6.4 Services of Information Centres:**

The below are some services which are offered by most of the information centres:

#### 1) Lending of Books

Lending of books to users for home reading has always been one of the basic functions of any library since time immemorial. Many information/documentation centres are still lending books. to users and it has been one of the chief services of most of the information centres especially for users belonging to the parent organisation of the centre. However, periodicals, reports and other categories of specialised materials are not lent to users.

#### 2) Inter-library Lending of Documents

Libraries have always been cooperating with each other by sharing resources in the form of inter-library lending. Inter-library lending of documents between libraries becomes a necessity when library materials are required by their users for a short period or on urgent basis especially in case of special libraries where material relevant to objectives/activities of the parent organisation only are acquired. Such material, thus, is borrowed from other libraries to satisfy user needs and returned back after use. This arrangement works on give and take principle and has been found to be very successful especially at local level. Most of information centres too offer this service by depending on local libraries for satisfying requirements of their users on demand.

#### 3) Photocopy Service

In this service, photocopy of materials available with the information centre is provided to users on request. Here, the user hirnself7herself locates the document, requests for a copy of the same, pays a token amount and copy of the document is provided on the spot. This service is very popular with student users and scholars. This service, however, is available only if copy of some portions of a document is required by users and not copy of the whole document. Many information centres also provide self operated photocopy service to users.

#### 4) Document Delivery Service

In document delivery service copies of materials are provided to users upon request. But in this case, copies of material not only from within the document base of the information centre, but also available from other organisations (within the city, region, country or world) are provided to the users. Contrary to photocopy service where on the spot copy of material located by the users is provided, here, user has to make a formal request on a form by giving bibliographic details of the documents required. The user is also expected to pay usually in advance for such a service. The information centre then traces the



documents, makes photocopy and sends the same to the user. This service thus may take one week to three months depending upon the availability of material requested for.

5) Reference, Literature Search and Preparation of Bibliographies

Reference services are either passive or active. A passive reference service is one in which the information centre acquires and makes available reference books, reports and data. The user can examine these' for the information that he/she needs. It functions more like a reference room in any library. An active reference service is provided when a member of the staff locates the material for the user rather than the user finds it for himself /herself.

Conducting literature searches on a specific problem or subject is a valuable service provided by most of the information centres. Such a search may present duplication of research, or may take the form of a state-of-the-art report or it may be an exhaustive survey. Literature search can be comprehensive search on a given topic or exhaustive retrospective search.

Bibliographies are usually compiled in an information centre as an end result of a literature search. A bibliography may contain a select listing by author, title and subject or it may take the form of an annotated listing in which significance, pertinence and relevance of the items are evaluated. Bibliographies may be selective or comprehensive or may be exhaustive in approach. Presently, information centres prepare bibliographies from printed sources (indexing! abstracting journals), CD-ROMs or from online access databases. As this is a paid service, users can request for the same according to their paying capacity wherein cost of bibliography prepared from online access databases is maximum and the one from printed sources is the least.

6) **Referral Service** This is also a .kind of reference service where a user requests for some material and the information centre does not have the same and cannot obtain it, then if its location is known, the user is referred to the source or organisation or individual who can provide the information about the material.

#### 7) Newspaper Clippings

In this service, newspaper clippings on topics relevant to the information centre are cut and pasted on sheets of paper and placed in folders for ready reference by users. The folders containing the newspaper clippings are properly indexed and in most of modern information centres, this service is being computerised too.

8) Translations In information centres, many users, especially those belonging to science and technology field often require translations from materials published in foreign languages. Translation service can be offered from within the information centre or the centre may contract the work to a translation agency. This service is becoming more and more useful. As science has no geographical boundaries and to



keep abreast with various scientific developments, it is essential that translation facilities to be made available in all information centres.

#### 9) Current Awareness Services

Majority of the users are of the view that current awareness services are synonymous with information centres and feel that these are offered only by information centres. The various current awareness services usually offered by information centres include circulation of accession list, selective dissemination of information, bulletin board, announcement of new arrivals, copies of contents pages of journals and many others. Abstracting is the process of writing a summary of an article, report, journal or similar publication so that users of an organisation may quickly read a digest of the original material. Bibliographical details accompany the summary giving the user enough information to identify the publisher. Besides preparing abstracts of internally generated material and externally originated publications, the information centre may also subscribe to any of the published abstracting indexing services. These publications are usually oriented towards a particular discipline. Many information centres also offer contents and abstracting service which is a combination of reproduction of contents pages of journals and also providing their abstracts alongwith to enable user to know what new/latest journal articles of their interest have been published.

#### **10) Information Centre Publications**

The information centre should keep its users informed of various holdings, new acquisitions and its own publications. This can be done in the form of various brochures about each activity/service/publication or an 'acquisition list' or 'list of new arrivals' or as a 'list of publication of the information centre.'

#### 11) CD-ROMSearch

Present day information centres, existing in an electronic environment, are gradually replacing printed resources by electronic resources. Majority of published literature is now also available in the form of CD-ROMs - both reference as well as full-textmaterial. Information centres thus make available to users either references or materials available on CD-ROMs or provide facilities for searching the CDs within library prerruses.

#### 12) Online Access to Databases

For the past so many years several major database vendors provide ready access to hundreds of databases containing a wide range of materials. The records of databases contain usually references to journal articles, books, technical reports, patents, conferences proceedings, standards, dissertations, etc. These databases cover recorded knowledge in most areas and carry useful data/information.' Users request for a search on a particular topic when they require current literature for research. Search can be for references or details on a topic of interest to the users. Online search is very expensive as the information organisation offering-this service has to subscribe-



to a database directly or through a vendor. Search process involves intervention of a senior information professional having subject knowledge as well as search skills.

#### 13) Internet Services

The modem information centres working in electronic and networked environment also make available several Internet setvices or services through Internet. Many users maintain contact with the information centres for various services through e-mail by sending and receiving requests for services. This is faster, cheaper, involving lesser human intervention and time saving. Besides this many information centres also extend limited Internet search facilities to their users by charging a token amount or even free

#### **IN-TEXT QUESTIONS**

- 10. Documentation and Information Centre, the energy Research Institute Library(TERI) is an example of \_\_\_\_\_\_ information centre.
- 11. National Informatics Centre (NIC), New Delhi is a \_\_\_\_\_ information centre.
- 12. Agriculture Information System of FAO(AGRIS) is the best example of a \_\_\_\_\_\_ information centre.

## 1.7 SUMMARY

- Libraries specialise in collecting, organising and disseminating different types of material to various users.
- Documentation/Information Centres emerged in course of time to meet the information requirements of special type of users.
- A library provides only the address of the document whereas a documentation/ information centres provides not only the address of the document but also the details of the centres of the document.

# 1.8 GLOSSARY

**Information System:**A system in terms of coverage of documents, variety of services and products to users for achieving economy in time, efforts and monetary terms.

**Library:**Library is a service institution with professionally trained staff to promote the use of the collection



**Documentation Centre:**Documentation centres are concerned with the dissemination of documentary information.

**Information Centre:**The emphasis in the case of Information centres is towards provision of information contained in the documents, rather than the documents themselves.

# **1.9 ANSWERS TO IN-TEXT QUESTIONS**

- 1. Closed Access system
- 2. Maps, Globes, Poster, Pictures etc.
- 3. Open Access System
- 4. Non-book Material
- 5. True
- 6. True
- 7. False
- 8. False

11.Government

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12.Global

10. Private

9. True

## 1.10 SELF-ASSESSMENT QUESTIONS

- 1. Distinguish between library, information centre and documentation centre.
- 2. Discuss the services of Library and Information/Documentation Centre.

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# 1.12 SUGGESTED READINGS

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## LESSON 1.3

# Data Centres, Information Analysis Centres, Referral Centres and Clearing Houses

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## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Information Institutions and Its types
- 1.4 Data Centres
  - 1.4.1 Definition
  - 1.4.2 Struture of Data Centres
  - 1.4.3 Functions of Data Centres
  - 1.4.4 Services of Data Centres
- 1.5 Information Analysis Centres
  - 1.5.1 Definition
  - 1.5.2 Need and Purpose
  - 1.5.3 Examples of Information Analysis Centres
  - 1.5.4 Services of Information Analysis Centres
- 1.6 Referral Centres
  - 1.6.1 Definition
  - 1.6.2 Need and Purpose
  - 1.6.3 Functions of Referral Centres
  - 1.6.4 Examples of Referral Centres
- 1.7 Clearing Houses: Meaning and Definition
- 1.8 Summary
- 1.9 Glossary
- 1.10 Answers to In-text Questions
- 1.11 Self-Assessment Questions
- 1.12 References
- 1.12 Suggested Readings

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## 1.1 LEARNING OBJECTIVES

After completing the lesson, you will be able to undertand:

- the meaning of Data Centres
- the structue of Data Centres
- describe the services of Data Centres
- the need and purpose of Information Analysis centres
- Examples of Information Analysis centres
- describe the services of Information Analysis centres
- the need and purpose of Referral centres
- functions of Referral centres and its examples
- describe the services of Referral centres
- the meaning of Clearing Houses

## **1.2 INTRODUCTION**

Information plays a significant role in the development of mankind. It is needed for different purposes, viz. education, entertainment, decision making, etc. Library is one of the agencies that exists to serve the information needs of the society. Data centres, information analysis centres and referral centres and clearing houses are other agencies involved in providing information. This less is devoted to a discussion of social perspectives of library and information(Satyanarayana, 2018). Such institutions are involved in acquiring, processing, storing, retrieving and disseminating information. This information infrastructure encompasses libraries, documentation centres, information centres, referral centres, information analysis centres, data centres and clearing houses. They are the components of the total information and users. Each one of these units has a distinct role, and, at the same time, a common objective of serving the information needs of specialised users. After defining Data centres, information analysis centres and referral centres and referral centres and role services and referral centres and referral centres and clearing houses.

## **1.3 INFORMATION INSTITUTIONS AND ITS TYPES**

The organising principle that paved the way for the establishment of information organisations in this era is solving societal problems by exploiting appropriate information. Systems that evolved in this period reflect a context in which information is used in problem solving such as economic development, industrial planning, agricultural productivity and

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environmental protection, etc. The institutions that came into existence during this period had the capability to handle specific type of information and could provide new products and services. However, they could not evolve appropriate structures. Though the systems which were developed during this era exhibit characteristics necessary to meet the informational requirements of the times, needed further development and legitimisation. The community of users whose needs the systems were expected to fulfil was somewhat amorphous and ill defined involving a variety of groups such as elected representatives of people, judiciary, technologists, media people and the general public. In addition to the amorphous nature of the users, the information systems had to tackle different types of information largely non – STI – some of the categories being local, ill-organised, proprietary, value-added and reflecting value judgements.

In the literature of Library and Information Science we come across different types of information institutions. The primary objective of all these organisations happens to be collection, processing, organisation and dissemination of information to individuals, groups and organisations as and when they require it. The most important type of these institutions are: libraries, documentation centres, information analysis centres, Data centres, clearning houses, Referral centres etc. Apart from these traditional institutions, which have been in existence for long, many de-institutionalised information services have sprung up lately. Some of these are discussed in the following sections of this less.

## **1.4 DATA CENTRES**

#### **1.4.1 Definition:**

Data is an important ingredient of research. Its societal importance can not be under estimated. The contemporary society needs data for various activities such as planning, development and decision-making, etc. in every sphere of human progress.

Data must be collected, processed and organised so as to facilitate its utilisation in an effective manner. Managing scientific data has been identified as one of the most important emerging needs of scientific community because of the sheer volume and increasing complexity of data collected. Effective generating, managing and analysing the data requires a comprehensive approach that encompasses all the stages from the initial data acquisition to the final analysis of the data. For this purpose, an institutional mechanism is essential. Such institutional mechanisms are known as data centres.

According to UNESCO a data centre "constitutes an organisation handling quantitative numerical material data". Such centres take the primary function of collecting, organising and disseminating data and also provide a measurement service and are in a position to advance relevant measurement techniques. The term data centre is used interchangeably to



define a range of information centres, not all of which are critically evaluating data. Data centres vary both in scope and size. There can be data centres at local, national, regional, and international levels.

## **1.4.2 Structure of Data Centres:**

A data centre generally includes three major components:

- An organised data collection (i.e. the database);
- A connection with data sources which feed the database; and
- A contact with users who are expected to interact with the data base with different types of questions.



Fig 1.1: Component of a Data Centre (Source: (Satyanarayana, 2017))

Modern data centres are usually maintained by organisations in order to handle core operations in information services including the Internet connectivity, intranets, LANs, WANs, and extranets. The most basic data centre will have a computer network and security applications which amounts to very large amounts of data stored in a number of computers. Generally larger companies will have IT infrastructure to handle the activities of a data centre.

It may be stated that the activities of data centre comprise:

- Data collection,
- Data control,
- Data codification,
- Data organisation and structuring into a database and
- Data retrieval.

For accomplishing all these functions a data centre should be equipped with suitably trained manpower. In India many data centres have been established under the erstwhile NISSAT programme. National Information Centre for Crystallography is an example of a data centre.

The World Data System (WDS) was established to achieve and distribute data collected from the observational programmes of the 1957-1958 International Geographical Year. It



was originally established in the United States, Europe, Russia and Japan, since then the WDS expanded to other countries and to new scientific disciplines. The WDS presently includes 52 centres in 12 countries. Its holdings include a wide range of solar, geographical, environmental, and human dimensions data. It is funded and maintained by host countries on behalf of the international scientific community.

# morsity Data Centre employs the following categories of personnel:

- Data Coordinators
- Data Specialists
- Data Analysts
- Programmers

#### **1.4.3 Functions of Data Centres:**

Functions performed by Data Centre are:

- a) Data collection;
- b) Data control;
- c) Data coding;
- d) Data storage;
- e) Data organisation and encoding; and
- f) Data dissemination and retrieval.

In short a Data Centre is expected to perform the following three functions:

- a) Data Evaluation;
- b) Data Dissemination; and
- c) Referral Service

## **1.4.4 Services of Data Centres:**

The Data Centre is expected to provide the following two types of basic services:

- Answer to users queries; and
- Supply the processed/synthesised data (processed from basic data). •

The Data Centre, which is involved in the acquisition and processing of data, is in a strategic position to disseminate the data and answer the user queries. Data services may be provided on demand and/or on anticipatory basis.

The categories of data services also involve appropriate mechanisms. They are:

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- 1) Reference Mechanism;
- 2) Referral Mechanism;
- 3) Announcement Mechanism;
- 4) Accretion Mechanism;
- 5) Compilation Mechanism;
- 6) EvaluationMechanism;,
- 7) Document Access Mechanism;
- 8) Publication Mechanism;
- 9) PromotionlLiaison Mechanism; and
- 10) System Monitoring/Improvement.

From the users' point-of-view, and to differentiate types of Data Centres, all these. mechanisms, can be reduced to three types of services:

Jersit

- 1) Data Evaluation and Compilation Services;
- 2) Data Dissemination Service; and
- 3) Data Referral Service.

## **IN-TEXT QUESTIONS**

- Activities of data centre comprises.
   (a) Data collection (b) Data control (c) Data retrieval (d) All of these
- 2. Data centre employs\_\_\_\_.
  (a) Data coordinator (b) Data specialist (c) Data analysts (d) All of these
- 3. Data source is not a component of data centre. True/False
- 4. Data must be collected, processed and organised so as to facilitate its utilisation in an effective manner. True/False

## 1.5 INFORMATION ANALYSIS CENTRES

## **1.5.1 Definition:**

The origin of activities pertaining to information analysis may be traced back to the 19th century. But the idea of a systematically organised centre for information analysis activity is relatively new. The Weinberg Report extensively discussed the role of information analysis centres (IACs) and their importance and emphasised that the activities of most successful



IACs are intrinsic part of science and technology. The centres not only disseminate and retrieve information; they create new information .... Theprocess of sifting through large masses of data often leads to new generalisations Information Institutions ... In short, knowledgeable scientific interpreters who can collect relevant data, review a field, and distil information in a manner that goes to the heart of a technical situation, are more helpful to the over burdened specialist than is a mere pile of relevant documents. Such knowledgeable scientific middlemen, who themselves contribute to science are backbone of the information (analysis) centre; they make information centre a technical institute rather than a technical library. The essence of good technical centre is that it is operated by highly competent working scientists and engineers – people who see the operation of centre as an opportunity to advance and deepen their own personal contact with their science and technology. The COSATI standing panel wrote the following comprehensive definition into its charter: "An Information Analysis Centre is a formally structured organisational unit, specifically (but not necessarily exclusively) established for the purpose of acquiring, selecting, storing, retrieving, evaluating, analysing and synthesising the body of information and / or in clearly defined and specialised field or pertaining to a specified mission with intent of compiling, digesting, repackaging or otherwise organising and presenting pertinent information and / or data in a form most authoritative, timely and useful to a society of peers and management".

The key activities of IACs are: analysis, interpretation, synthesis, evaluation, and repackaging of information carried out by subject specialists, resulting in the production of new, evaluated information – in the form of critical reviews, state-of-the-art-monographs, or data compilations, as wellsubstantive, evaluated responses to queries – for the purpose of assisting a community of users more broadly representative than the staff of the parent institutes or laboratories.

#### 1.5.2 Need and Purpose:

The users needed a valueadded reliable service, which involved analysis, synthesis and evaluation of information pertaining to clearly defined specialised field or pertaining to specific mission, packaged in appropriate form for different categories of users.

Thus, the need for information analysis was felt mainly due to three reasons viz:

- 1) overflow of information;
- 2) scattering of information; and
- **3**) uneven quality of information which required considerable amount of sifting and filtering to retrieve quality information.

## **1.5.3 Examples of Information Analysis Centres:**

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## 1) International

a) Carbon Dioxide Information Analysis Centre (CDIAC): It is the primary climate change data and information analysis centre of the U.S. Department of Energy. CDIAC data holdings include records of the atmospheric concentration of carbon dioxide and other radioactive gases; the role of the terrestrial biosphere and oceans in biochemical cycles of greenhouse gases; emission of carbon dioxide from fossil fuel consumption and land use changes; long term climate trends; and effect of elevated carbon dioxide on vegetation and vulnerability of coastal areas to the rising sea level. (http://www.cdiac.ornl.gov/)

CDIAC brings out the following information analysis products:

- CDIAC Newsletter
- Trends Online: A Compendium of Data on Global Change
- A Handbook of Methods for Analysis of the Various Parameters of the Carbon Dioxide System in Sea Water
- **b) DoD Information Analysis Centres:** United States Department of Defence (DoD) has the following ten information analysis centres, each dealing with specialised branch of S&T :
  - AMMTIAC- Advanced Materials Manufacturing and Testing Information Analysis Centre
  - CBRNIAC- Chemical, Biological, Radiological and Nuclear Defence Information Analysis Centre
  - CPIAC- Chemical Propulsion Information Analysis Center
  - DACS- Data and Analysis Centre for Software
  - IATAC- Information Assurance Technology Analysis Centre

## 2) National

- a) The Energy and Resources Institute (TERI): Commonly known as TERI (Formerly Tata Energy Research Institute), the institute provides information analysis service in the field of energy mostly to its research staff. TERI publishes IAC products for the use of different levels of its user groups also. You will study about its products in Unit 6 of this Course. (http://www.teriin.org/)
- **b)** Centre for Monitoring Indian Economy (CMIE): CMIE is a private organisation which provides information analysis services in different sectors of Economy. Its Industry Analysis Service and Economy Intelligence Service are cited as examples of information analysis services. (http://www.cmie.com)
- c) IDSA (Institute for Defence Studies and Analysis): It "is a non-partisan autonomous body dedicated to objective research and policy relevant studies



on all aspects of defence and security. Its mission is to promote national and international security through generation and dissemination of knowledge on defence and security related issues".

#### 1.5.4 Services of Information Analysis Centres:

The below are some services which are offered by most of the information analysis centres:

#### 1) Identifying Users and User's Needs

User constitutes the most important element in all information consolidation activities and perfect understanding of user's needs is a pre-requisite for any successful IAC product. As a matter of fact, it is now well recognised that information systems and services rail, ifuser's needs are not taken into account while designing these services. There are several methods available for user studies. Each method has some plus point and some limitations. It is observed that centres which make detailed plan for user studies carefully and carry out the study accordingly, bring out the successful IAC product(Anand, 2006).

#### 2) Selection of Relevant Information Sources

Based on the information needs of the user and the type of IAC product, relevant information sources are selected. Information sources can be categorised into: i) Documentary sources, ii) Institutional sources, and iii) Human sources. Documentary sources are primary, secondary and tertiary sources. While primary and secondary sources contain information on a subject, tertiary sources are used as an aid for selection of primary, secondary, institutional as well as human sources. Among documentary sources, advanced treatises from reputed institutions/publishers, primary peer reviewed periodicals, ad-hoc bibliographies, indexing and abstracting periodicals on the subject concerned, annual reviews or advances in particular subject series from reputed publishers should be selected for consolidation purposes.

## 3) Evaluation of Information

Evaluation involves judging the intrinsic merit, validity and reliability of information contained in the sources selected for consolidation. Procedures for judging intrinsic values are examination of: i) Reviews and state-of-the-arts publications on that topic: to see if the selected sources are covered by them. ii) Refereeing and peer review: to see if the selected sources have undergone refereeing and peer review process prior to publication, as is the normal practice in scholarly scientificpublications. iii) Citation indexes: analysis of amount of citations received by the selected sources which may be author, journal, or institution.

#### 4) Restructuring and Type of Product:



After analysis and synthesis of information from various sources, decision is taken on the type of product.Repackaging and type of product depends on the target audience. Results of user studies should be taken into account while determining the type of IAC product that will satisfy target user's needs. At the same time product should meet the comprehension level of target audience as well as reliably reflect the state of knowledge of data on the given subject. A largee number of products are possible. Some of them are:

- Reviews: Critical reviews; state-of-the-art reports; case studies; literature reviews, etc.
- Reports: Assessment, market and technical reports; alerting bulletins or newsletters.
- Databases: Expert databases; subject knowledge databases.

## 5) Dissemination and Communication

The work of IAC centre is not complete with the making of a product or provision of a service. Its active and effective dissemination through appropriate channels to the target audience and its effective utilisation by the user form th~ integral part of the whole information consolidation process.

## **IN-TEXT QUESTIONS**

- 5. IAC stands for\_\_\_\_.
- 6. The key activities of IACs are:(a)analysisof Information(b)interpretation of Information(c)synthesisof Information(d) All of these
- 7. The Energy and Resources Institute (TERI) is a national IAC. True/False
- 8. Selection of Relevant Information Sources is not a service of IAC. True/False
- 9. CDIAC stands for \_\_\_\_\_.

## 1.6 REFERRAL CENTRES

#### **1.6.1 Definition:**

The There are a variety of organisations involved in information dissemination activity. These different organisations need to be properly coordinated by an agency for their

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effective functioning. A new type of establishment with specific mandate to act as a switching mechanism among different information dissemination institutions is an essential requirement. Such an organisation is referred to as Referral Centre(Satyanarayana, 2017).

The Harrods's Librarian's Glossary provides the following explanatory annotation to the term Referral Centre:

- "An organisation for directing researchers for information and data to appropriate sources, such as libraries, information evaluation centres, documentation centres, documents and individuals;
- A Referral Centre is some sort of an Information Desk for the scientific and technical community which does not provide enquiries directly with the information they need, but suggests sources likely to satisfy the users / clients;
- Referral Centre is an organisation for the indication of sources (of persons, institutions and publications) from which scientific information may be obtained on a given subject".

In other words, a referral centre serves as an intermediary, directing those who have queries relating to information requirement on scientific and technical subjects, to the organisations as well as to individuals who have specialised knowledge in those fields and are willing to share that knowledge with others. To carry out its functions referral centre must:

- be equipped with an inventory of all significant information resources in different disciplines;
- compile and publish directories of scientific and technical information resources;
- analyse the operating relationship that exists in the scientific information complex.

As in the case of IACs the referral centres exist at different levels (i.e. local, regional and international).

## 1.6.2 Need and Purpose:

A single institution or organisation like a library, cannot cater to the users increasing and varied needs of information. It cannot also perform every function. Even the large computer systems and/or networks, are unable to cope-up with growing mass of information and simultaneously meet the user demands. This calls for division of labour in information handling. A switching and control mechanism is introduced to ease this complexity of information handling-activity. Anew type of information system known as Referral Centre came into existence to satisfy this need(Asundi & Singh, 2006).

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The basic purpose of a Referral Centre is to ease the stress on a single Information System which is being loaded Withall services. Libraries are integral and fundamental components of the information network system. They are unable to handle dynamic needs of users, which sometimes fall outside the contents of documents alone.

Some of the factors of change in this context are:

- 1. Bulk factor;
- 2. Time factor;
- 3. Current information factor;
- 4. Evaluation factor; and
- 5. Personal factor.

These factors have yet another dimension to create-and establish Referral Centres. The help, and guidance often sought from experts, specialists and individuals, is another influencing factor necessitating the establishment of Referral Centres.

#### **1.6.3 Functions of Referral Centres**

- **1.** To collect on a world-wide basis information about information/data sources within the subject or mission.
- **2.** To prepare a comprehensive inventory of the types of information data services available from these sources with a detailed subject index to facilitate its access.
- **3.** To guide users to the appropriate sources where from the required data orinformation may be obtained.
- **4.** To function as an intermediary between enquirer and the organisation and/or individuals who possess specialised knowledge on the subject of enquiry.

## **1.6.4 Examples of Referral Centres:**

The below are some notable Referral Centres:

## 1) National Referral Centre, Library of Congress

The National Referral Centre for Science and Technology of Library of Congress was  $\cdot$  started in 1963. The Referral Centre of Reference Department works closely with  $\cdot$  another division, viz. Science and Technology Division of the Library of Congress. This is deigned and developed as a clearing house.

## 2) International Referral Service of UNEP

The United Nations Environmental Programme (UNEP) has established International Referral Service covering all sources of environmental information. In every country, a National Group through various local centres provides details about the information. Library of Congress has established one such centre, which is actively cooperating with



the SpecialCommittee on Environmental Information of the SpecialLibrariesAssociation (SLA).

#### 3) Information Referral Service System (INRES)

The WIDE Initiative (Web ofInformation for Development) was launched by the United .Nations Development Programmes'(UNDP) Special Unit for Technical Cooperation among Developing Countries (SUrrCDC). In the year 1974, SUrrCDC was established within UNDP by the United Nations General Assembly. The WIDE Initiative was launched to support and to further, technical cooperation among developing countries (TCDC). It introduced Internet-based services and efforts to give more visibility to developing country expertise, foster communications and promote more effective technical cooperation among developing countries.

#### 4) DARE

DARE UNESCO Social and Human Sciences Documentation Centre encourages international cooperation in social sciences by exchange of information. It supports the social and human sciences information and documentation programmes of UNESCO. It serves as aclearing house forrelevant UNESCO documents. This also works as an information centre for specialists,governmental and non-governmental organisations, members states, and to train, research and documentation centres.

## 1.7 CLEARNING HOUSES: MEANING AND DEFINITION

A Clearing House is a central agency for collection, classification and distribution of information. It may include specialised Information Centres as well as conventional libraries. In scientific parlance, a Clearing House is a relatively new word. It represents a depository for documents with the additional objective of servicing as a central agency engaged in the distribution of information, It also includes such functions as collecting and maintaining records of research and development Sometimes, subjective questions about items in these records are referred to the source and thus a Clearing House may have to perform the function of a Referral Centre. The Smithsonianstitute of Science Information Exchange Services serves as a Clearing House for research in progress. Similarly, the National Referral Centre of the Library of Congress provides referral services to experts within the field of enquiry. It does not supply data or documents. The Defence Documentation Centre in the USA is a depository of reports and other documents generated by the Department of Defence. It also serves as a referral centre for identifying experts in various fields. The Educational Research Information Centre (ERIC) is another centre which acts as a resource centre and also provides referral service. For a number of years the BLLD, U'K, functioned as a Referral Centre.

Most of the Clearing Houses have specialised as well as developed collections. They have information gathering networks to acquire documents in their subject areas. They also

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provide specialised information services in some selected areas. They auswer specific and general type of questions and may act as central searching places for enquiry especially for R&D reports(Satyanarayana, 2006).

## **IN-TEXT QUESTIONS**

- 10. A Referral Centre is an organisation for the indication of \_\_\_\_\_.
- 11. UNEP stands for \_\_\_\_\_
- 12. The National Referral Centre for Science and Technology of Library of Congress was · started in 1966. True/False
- 13. INRES stands for\_\_\_\_\_.
- 14. A Clearing House is a central agency for collection, classification and distribution of information. True/False

## 1.7 SUMMARY

The lesson emphasis the significance of various information institutions like Data Centres, Information Analysis Centres, Referral Centres and Clearing Houses in the society. It also discuss about the role of these information institutions in the process of information dissemination. The leson concludes by emphasising the role of information institutions in the society.

## 1.8 GLOSSARY

**Data Centre:**A data centre is an organisation handling quantitative numerical or factual data, whose functions are to store collect, organise, analyse and disseminate data and provide various types of services on demand or in anticipation of demand.

**Information Analysis Centre:**An organisation directed towards the collection of technical information and data in a specific area and its evaluation and filtering into a form of condensed data, summaries and state-of-the-art reports.

**Referral Centre:**To guide users to the appropriate sources where from the required data orinformation may be obtained.

**Clearing House:**They provide a single point of access to information originating from different sources, countries and languages.



## **1.9 ANSWERS TO IN-TEXT QUESTIONS**

1. (d)	9. Carbon Dioxide Information Analysis
2. (d)	Centre (CDIAC)
3. False	10. Sources
4. True	11. United Nations Environmental
5. Information Analysis Centre	Programme (UNEP)
6. (d)	12. False
7. True	13. Information Referral Service System
8. False	(INRES)
	14. True

## 1.10 SELF-ASSESSMENT QUESTIONS

- 1. Distinguish between Data Centre, information analysis centre, Referral centre and Clearing House.
- 2. Discuss the services of Data Centre, information analysis centre, Referral centre and Clearing House.
- 3. Discuss the types of Data Centre, information analysis centre, Referral centre and Clearing House.
- 4. Distinguish between Data Centre and Referral Centre.
- 5. Explain the structure and functions of a Data Centre.

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## **LESSON 1.4**

# ARCHIVES AND TRANSLATION POOLS: FUNCTIONS AND SERVICES

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## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Archives

1.4

- 1.3.1 Meaning and Definition
- 1.3.2 Need and Purpose
- 1.3.3 Functions of Archives
- 1.3.4 Examples of Archives
- Translation Centres/Pools
  - 1.4.1 Meaning and Definition
  - 1.4.2 Translation Methods
  - 1.4.3 Translation Centres/Pools
  - 1.4.4 Translation Services in India
  - 1.4.5 Role of Libraries/Information Organisations in Translation Service

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- 1.5 Summary
- 1.6 Glossary
- 1.7 Answers to In-text Questions
- 1.8 Self-Assessment Questions
- 1.9 References
- 1.10 Suggested Readings

## **1.1 LEARNING OBJECTIVES**

After having read this Unit you will be able to:

• discuss archiving;

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- discuss translation centres/pools;
- explain the need and functions of archives; and
- list some of the famousarchives in India
- List the method of translation
- Discuss the translation services in India
- Explain the role of libraries in translation services

## **1.2 INTRODUCTION**

A research scientist, institution, organisation, or even an individual may keep noncurrent records and documents in their archives for preservation in all media, including paper, sound recordings, etc. As a result, the information kept in the archives is still valuable for use in the future. The archives' materials are one-of-a-kind in kind. The result of a process, an archive is a collection of information that has evolved from an activity and is associated both functionally and organizationally. Governments at all levels, universities, cultural institutions, nonprofit organisations, hospitals, museums, and other places where it is critical to store non-current records for an extended period of time all maintain archives.

The translators are in charge of translating the materials. To understand the terminology of the given subject, a translator for scientific translations needs to be well-versed in both languages and the subject. The majority of translation work was formerly carried out by human translators. Machine translation (MT) research got underway in the 1950s as computers became more common. Machine translation is the process of using computers to translate text between two different natural languages. A significant number of MT systems for mainframe computers, personal computers, and the Internet have been developed throughout the past 70 years of machine translation research.



## **1.3 ARCHIVES**

## **1.3.1 Meaning and Definition:**

Although there isn't a single, universal definition of archives, here are a few examples: Records become archival as soon as they are made or received, in accordance with the 1979 French definition of archives. Federal records in the United States become archival as soon as a federal agency formally offers them, and the National Archives signs a document assuming responsibility for them legally. Although records can be archives, not all records can be archives. Records are chosen for archiving because they are valuable in the long run, either as proof of past transactions or for the knowledge they hold about specific



people, places, and things. Archivists make the choice of which records to include in archives.

Archival records often pertain to local or at least geographically restricted concerns. Archival holdings are generally related to matters concerning the place where they are kept, and as archives seldom move, the best opportunity of finding your grandparents' marriage records is to turn to the archives of their home town. Many archivists are experts in historical issues related to the archives they administer, so they often deal with regional history("Manuscripts and Archives," 2018).

The term "archives" has derived from the Greek word " archeion". Etymologically, "archeion" has its origin in the word "arch" which refers to the magisterial residence, then the Public office where Government records are kept. Historical manuscripts, isolated letters of ancient rulers, copper plates, stone inscriptions, besides a host of other artifacts, are popularly known as archives. Archives are a greater or a lesser faction of records of an organization, institution or individual which are preserved for their enduring value whether they are current or noncurrent.

Engenio Casanova, an Italian archivist defines archives as, "the orderly accumulation of documents which were created in the course of its activity by an institution or an individual and which are preserved for the accomplishment of its political, legal or cultural purposes by such as institution or individual".

Dr. P Basu, an Indian archivist, said that "archives are records of enduring value nolonger required by the creating agency for frequent use". It is thus clear that archives are essentially all records but all records are not archives("Archival Librarianship: MLISc Elective Paper - Indian Books and Periodicals," n.d.)

Let's examine the role of an archivist. Archivist: A person who manages the archives' documents is referred to as an archivist. In order to be administratively helpful to its creators or successors, they keep the archives of the parent entity, whether it be a government, organisation, or institution.

## 1.3.2 Need and Purpose:

- to safeguard the National, regional, traditional culture of the society.
- to spread awareness among the people to respect and value their culture and also changes happening in the society. For example, an Ethnomusicology archives provides some of the rare and oldest recordings of folk/popular/ classical forms, which will be beneficial for any current research scholar or individual to observe the similarity/changes of the performance in present contest.
- making people to think about their past and its related history.
- preserves important recorded documents for future reference

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#### **1.3.3 Functions of Archives:**

#### 1. Acquisition

Archives collects non-current records of an organization/institution/research scholar or individual etc. types of material collected in the archives. These varies from Governments records, folklore materials, history of people, manuscripts etc., as per the archival requirement. Acquisition is thus pivotal. Following are the certain acquisition policy defines the types of records that archives seek to add to its holdings.

#### 2. Appraisal

The decision by an archives or organization is to take a collection to preserve and process its own archival records. It involves a significant commitment of time, money, and space, because, no one can afford to keep everything and anything. That is why, the incoming material being considered must be appraised to determine, firstly, whether the collection as a whole is worth keeping, and second, which item within it are permanently valuable. The preference of decision for preserving collection depends upon the current historical and cultural values, and the intellectual and conceptual frameworks of those conducting the appraisal.

#### 3. Documentation

An essential bridge between the collectors and the archives is documentation. It is the written document which accompanies with the acquired materials. For a systematic documentation every piece of note has great value as the context is not self evident. The documentation process includes the identification of item, storage location, retrieval, presentation and circulation for the information of users. For example, in a sound archives, the archivist have very little knowledge of being responsible for the preservation of recordings for the future user without knowing who they will be and what they may need to know. Therefore all details of the recording including the answers to the basic questions "why, what, where, when, by whom, for whom" etc., should be documented as an archival holding

#### 4. Preservation

It is one of the major process of archiving, the process of preservation takes place after a systematic, well-documented collection has been made with its contents. The goal of preservation is to assure that records in archival custody survive for an indefinite period of time, in some cases as long as legally necessary. This can be most easily achieved when the goals and basic principles of preservation are understood by all staff involved with the records. It is a join responsibility of a number of professional staff for preservation of archives, each of whom brings unique knowledge to bear on the complex problem of preserving archival records. Archival materials are diverse, they are composite object, generally composed of a variety of papers, inks (from carbon ink to laser printing), animal skins and its products, textiles,



photographs and photographic material, audio-visual materials (wax cylinders, shellac and vinyl disc and optical materials: CD and DVD), magnetic materials (tape, hard discs and floppy discs) etc.

## 5. Using archives

Archival collection exists to be used, but the understanding of appropriate use varies from institutions to institution in line with their missions. Usually all archives provide information of their collection in publish forms like newsletter, ephemera or brochures etc., and now-a-days in many countries information are provided through Internet. However, the archivist are much responsible to their user because of the uniqueness of their holdings. Therefore archivist require to guide the user to care for and handling of the archival records, specially for paper records are concern, they are very old being prone to perishing if handle recklessly. Every user to leave the records after consultations as far as possible in the same condition in which they were got used. Most often in sound archives, duplicate copies are made as required for the user, so the original recordings remain safe and intact. Most of the sound archives provide copies of recording to user for research activity in request.

## **1.3.4 Examples of Archives:**

## 1. The National Archives of India

It is the repository of the non-current records of the Government of India and is holding them in trust for the use of administrators and scholars. It is an attached office of the Department of culture under Ministry of Tourism and Culture. Its was set up in March 1891 in Calcutta (Kolkata) as the Imperial Record Department and subsequent to the transfer of the National Capital from Kolkata to New Delhi in 1911 it was shifted to its present building in 1926.

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## 2. National Film Archive of India (NFAI)

NFAI was established in February 1964, as a media unit of the Ministry of Information and Broadcasting. Its objective is to acquire, preserve and restore the rich heritage of National Cinema, and the cream of international cinema. The archive has made significant progress in the preservation of films, audio and video material, documentation, research and dissemination of film culture in India. The archive functions as the main repository of Indian and foreign research workers for viewing film classics, relating to their research projects. TheArchives Distribution Library caters to over 300 Film societies and Film Study groups in educational institutions in the country.

## 3. Archives of Research Centre for Ethnomusicology (ARCE)

The Archives and Research for Ethnomusicology (ARCE) was established in 1982 by the American Institute of Indian Studies (AIIS), at Gurgaon, Haryana, consortium of American Universities with a strong interest in SouthAsian Studies. The primary



objective of this archive was to provide a centre in India where collections of Indian music and oral traditions could be centralized and made available, and to stimulate the study of ethnomusicologyin India. The preservation of these recordings, cataloguing them and making them available to researchers form the basic of the dayto-day activities of the archives.

## **IN-TEXT QUESTIONS**

- 1. The term "archives" has derived from the Greek word \_\_\_\_\_
- 2. A person who is responsible for managing the records of archives is a\_\_\_\_.
- 3. NFAI was established in\_\_\_\_\_.
- 4. Preservation is the major process of archiving. True/False
- 5. The Archives and Research for Ethnomusicology (ARCE) was established in

## 1.4 TRANSLATION POOLS

#### **1.4.1 Meaning and Definition:**

Translation has been derived from the Latin word Translation which consists of two words Trans and Latum meaning "a carrying across" or "a bringing across". Translation is the process of transferring the information contents of the text in one language (L1) into another language (L2).

"Translation" means a written work expressed in a language other than the language in which it was originally composed. The purpose of translation is to make a document accessible to those who have insufficient knowledge of a language to be able to comprehend the text in its original form(LISBDNETWORK, 2018).

Translation pools—maintained both at national and international levels—which make available their holdings to each other through mutual cooperation. For easy and quick location of translations, the centers operating the translation pools maintain or bring out printed indexes. Union lists of translations are also brought out. Cover-to-cover translation is an important development in the field of translation of micro documents. It is translation of whole periodical issue from front cover to back cover. The librarian or information worker should work as a link between the user and the translator. He will receive demand for



translation or anticipate the demand, get the translation done by a suitable translator or procure it form some agency or pool and then serve the translation to the user("Translation Services - an Overview | ScienceDirect Topics," n.d.).

#### **1.4.2 Translation Methods:**

The appropriate method of translating any text depends on the material to be translated. Material in science, technology and social sciences is translated adhering to the contents of the original. This is known as literal translation. Literal translation is utilised for factual type of materials such as commercial correspondence, legal materials, technical materials as well as scholarly materials in the pure and applied sciences and social sciences whereas translation of materials in humanities such as novels, plays, poetry, films, television, radio, motion picture scripts and vocal music texts, etc. is literary translation. This type of translation differs from science and technology translation as here the style and techniques of expressing feelings are more important. Second difference is the delivery of material in target language. Translation of literary material is destined for mass consumption. On the other hand scientific, technical, legal and commercial materials are intended for the specialists in a given field. The other major difference is that science and technology translations are done once, while literary classics (such as novels, religious books like Bible, Bhagwat Gita, etc.) are repeatedly translated.

## **1.4.3 Translation Centres/Pools:**

In the United States, major translation efforts consisted of English language translation of S&T material captured during the World War II, sponsored by National Science Foundation (NSF) and Special Library Association (SLA). During this period a large number of foreign reports were being translated simultaneously by different organisations which resulted in duplication of translation efforts, amounting to waste of time and money. The need was felt to establish a clearing house for translations, where translations could be collected, processed, announced and copies supplied on request. In response to this need, two translation centres viz. Scientific Translation Center and SLA Translation Center (Later named as National Translation Center) were set up where translations could be deposited.NSF funded 'Scientific Translation Center' which covered Russian type scripts and technical reports that were deposited in Library of Congress. This Centre was located in Library of Congress.National Translation Center was founded in 1953 under the name of SLA Translation Pool. This Centre engaged in collecting and processing translations from western European and Oriental languages. The Center was located in John Crerar Library, Chicago.Industrial research facilities and government agencies increased their translation activities considerably. Consequently, the number of translations deposited in SLA Translation Pool grew. In 1957, the SLA Translation Pool changed its name to SLA



Translation Center and expanded its activities to cover not only translations deposited with the centre but also those available from commercial translation agencies and professional societies. SLA Translation Center to fully serve its users, established exchange agreements with national groups and professional societies around the world, by means of which translations were deposited with or reported to the Center. New additions to the Center's collections were announced in the monthly journal, Translation Register Index. This journal begun by the Special Library Association (SLA) in 1967 was transferred to National Translation Center in 1971. The SLA Translation Center became National Translation Center and was housed in John Crerar Library, Chicago. In 1989, The National Translation Center became part of the Library of Congress. In 1993, The Library of Congress closed the National Translation Center and holdings of the Center i.e. translations from 1989 to 1993, were transferred to Canada Institute for Scientific and Technical Information in Ottawa, Canada.

Translations held by 'Scientific Translation Center' were announced by the following indexes:

- Bibliography of Translations from Russian Scientific and Technical Literature (1953-1956).
- Translation Monthly (1955-58)
- Technical Translations (1959-1968)
- Translation Register Index (1967-86). This index merged with World Translation Index in 1987.

National Translation Center announced its translations by the following indexes:

- SLA List of Translations (1953-1955)
- Translation Monthly (1957-1858)
- Translation Register Index (1967-86). This index merged with World Translation Index in 1987.

International Translation Center (ITC) came into existence in 1961 (Formerly known as European Translation Center) in Delft, The Netherlands. The present name was adopted in 1975.

## **1.4.4 Translation Services in India:**

In India several Government and Public Sector Organizations, R&D institutions in science and technology have in-house translation facility to meet their own translation requirements for limited number of languages. Some such organizations are BARC, DESIDOC, BHEL, MECON and HAL.

## NISCAIR Foreign Language Service



NISCAIR (Erstwhile INSDOC) has been providing translation service to S&T community since its inception in 1952. It caters to the translation requirements of National laboratories, S&T institutes, R&D Organizations, Corporate and Public Sector Undertakings, Universities, Research scholars, etc. NISCAIR provides translations of S&T documents from 20 foreign languages into English. The languages include Chinese, Czech, Danish, Dutch, French, German, Hungarian, Italian, Japanese, Norwegian, Polish, Portuguese, Rumanian, Russian, SerboCroatian, Spanish, and Swedish, etc. NISCAIR also provides reverse translation (English into foreign language). It undertakes translation from English (maximum of one page) into French, German, Russian and Spanish. Translation of document in English into Japanese (Full document) is also undertaken. The translation work is carried out by experienced staff translators and panel of translators registered with NISCAIR.

#### Translation Activities in Humanities and Social Sciences in India

There are twenty-two official languages recognized by the Government in India. Hindi in Devanagari script is official language of the government and English is an associate language. Though there are orders from Government of India, that all official communication should be done in Hindi, but in reality it is not true. Quite a lot of communication is done in English and most State Governments function in their own regional languages. This situation demands urgent need for translation of official documents. Apart from official documents, there is urgent need for translation of text books, scholarly material, literary material, etc. In response to this need, a number of organizations in India are actively involved in translation activities in the field of humanities and social sciences.

Some of such organizations are as follows:

- **a.** National Council of Educational Research and Training (NCERT) and National Book Trust are both engaged in translation of text books in various Indian languages. (http://www.ncert.nic.in) (http://www.nbtindis.gov.in/)
- **b.** State Council of Educational Research and Training carries out translation work from English into state languages and from state languages into English and vice-versa. (http://www.edudel.nic.in/scert.html)
- c. Sahitya Academy is the central institution for publication and promotion of literary activities in 24 Indian languages including English. The Academy gives 24 annual awards to literary works in Indian languages. It gives equal number of awards to literary translations from and into languages of India. The academy has launched four Centres for Translations in Bangalore, Ahmadabad, Kolkata, and in Delhi. In addition, it has archive of Indian literature in Delhi. (http://www.sahitya-akademi.gov.in/)
- **d.** Central Institute of English and Foreign Languages conducts training courses in foreign languages including German, French, Russian, Arabic, Spanish and Japanese.



The institute also carries out translation work. (http://www.indiaedu.com/universities/deemed/centralinstitute.html/)

- e. Institute of Asian Studies, Chennai is involved in research, training, translation and publication activities in Asian languages. The institute carries out study and research in Tamil, Kannada, Japanese, Telugu, and Buddhism and related translation and publication activities. In addition, the Institute is carrying out research in Manuscript ology and Folklore studies and translation activities related to these areas. (http://www.istituteofasianstudies.com/)
- **f.** Indian Council for Cultural Relations (ICCR) carries out literary translations of books and other documents to project Indian cultural heritage to the world. The Council's translation and publication activities focus on books related to Indian culture, philosophy, mythology as well as traditional music, dance and theatre. The Council has translated Sanskrit classics into number of foreign language.

#### **1.4.5** Role of Libraries/Information Organisations in Translation Service:

Libraries/information organisations can play active role in meeting user demands for translation of documents, by maintaining details of translators and translating firms in the library, so as to contact the right agency when needed. If demands are more frequent, then a library staff member or a resource person should be there either to translate, or abstract or provide summary of the source language document into target language to meet users' urgent need for translation service.

#### **IN-TEXT QUESTIONS**

- 6. Translation has been derived from the Latin word. True / False
- 7. SLA Translation Pool changed its name to \_\_\_\_\_
- 8. International Translation Center (ITC) came into existence in \_\_\_\_\_
- 9. NISCAIR does not provide translation service in India. True/False
- 10. Hindi in Devanagari script is official language of the government. True/False

## 1.5 SUMMARY

Archives are important not just for historical research but also for the influence that knowledge of the past has on the present and the future. A few examples of how archives are effectively used include shifting social trends, various governmental laws, organisational and

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institutional regulations, etc. Archives are useful to everyone because they preserve an institution's memory. The use of archives enables accountability to the public as well as continuity and consistency. They greatly benefit residents in establishing and defending their individual and property rights and advantages, as well as giving them a sense of national identity. By giving enticing and physical examples of our society's legacy, they educate, amuse, and improve our lives. In other words, archives give us the foundation for understanding our past, they orient us to the present, and they direct our progress into the future.

## 1.6 GLOSSARY

Archive: Archives houses non-current records/documents (all formats such as paper, sound recordings etc.) of an institution/organization/research scholar or even individual for preservation.

**Translation Centre/Pool:**These centres either carried out translation work themselves or acted as referral centres for collecting, processing and announcing the translations done by various agencies in the country.

## 1.7 ANSWERS TO IN-TEXT QUESTIONS

1. Archeion		6. True
2. Archivist		7. SLA Translation Center
3. 1964	~	8. 1961
4. True	× 19	9. False
5. 1982		10. True

## 1.8 SELF-ASSESSMENT QUESTIONS

- 1. Describe the translation service of NISCAIR.
- 2. List the types of translation centres and their services.
- 3. Descibe the methods of translation
- 4. Discuss the role of libraries in translation services.
- 5. Discuss the meaning and functions of Archives.
- 6. List the name of various Archives in India.

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## UNIT II- NATIONAL INFORMATION SYSTEM AND POLICY

# LESSON 2.1 PLANNING AND DESIGN OF NATIONAL INFORMATION SYSTEM

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## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Understanding Concept of National Information System (NATIS)
- 1.4 Benefits of National Information System
- 1.5 Planning of National Information System
  - 1.5.1 Planning Objectives
  - 1.5.2 Functions of National Information System
  - 1.5.3 Design of National Information System
- 1.6 Developmental Initiatives for National Information Systems
  - 1.6.1 Early Initiatives
  - 1.6.2 Recent Government Initiatives
- 1.7 Summary
- 1.8 Answers to Self-Check Your Progress
  - 1.8.1 Five Short Questions
  - 1.8.2 Five Multiple Choice Questions
- 1.9 Key Words
- 1.10 Acronyms in the text
- 1.11 References and Further Reading

## 1.1 LEARNING OBJECTIVES

After reading this lesson, you will learn:

• An overview of national information systems, development history and programmes currently in progress in the country in areas of Science & Technology, Social Science & Humanities

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- Understand objectives, structure, functions, services, products, and achievements of major information systems and programmes that are operating in the country
- Role of these systems and programmes in promoting information delivery and bringing changes in information seeking of users.

## **1.2 INTRODUCTION**

We are living in information society, where relevant information hold the key decision making at every stages of life for individuals, communities, societies, economy and governance. Information is key to development of a nation in terms of government policy, education, training, research and knowledge. It helps to establish a link between resources and activities in intellectual development and educational materials in society, institutions and individuals. Access to precise and reliable information is key to policy development, academic development, scientific-technical research, commercial-economic transactions etc. Right information at appropriate time to the right person, help to minimize the wastage of resources, save time and money.

An Information System include all components that collect, manipulate and disseminate data or information. A wide spread national level network (offline or online) usually evolves as national information system. It usually includes hardware and software, connected people, collecting and disseminating institutions (libraries, data centres, government agencies, departments etc), all relevant communication systems such as telephone lines, WAN, websites and databases. Information system activities involved data collection, categorization, cleaning and validation, inputting of data, storage of data, processing of data into information and production of services and products based on the data for the users. Sometimes, government initiates information programmes for mass awareness and benefits where information systems that select, organise, store and disseminate public knowledge to the users as per the objectives laid down by the information programmes.

Recognising the importance of information, since independence Government of India as well as international organizations have been making consistent efforts to set up libraries and information centres with relevant resources and facilities in India. Over the past few decades, this has resulted into the growth of academic and research institutions, information centres, national level information infrastructure and networks in the country.

• Since over 90% of information in India are generated through government sources, Government of India has taken periodic stapes to develop national level information system through implementation of programmes, schemes, department, relevant policies and national level networks eg. establishment of National Informatics Centre (NIC). NIC today hosts largest government information base (both online and offline) following a robust decentralized information network. Most of the Government Ministries,

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government agencies, autonomous bodies and related organizations have opened up their own information centres (now available online through web sites), which primarily keep records, track achievements and promote activities performed.

- In academic sector, efforts have been made to set up libraries at school, college and university level. Government has been strengthening Public Library System and Community Information Centre to cater to information requirements of civil society.
- In R&D sector, libraries and information centres have come up in the field of science and technology, social sciences and humanities. These centres provide specialised information support and services to select subject areas. While many organizations are operating at national level, some important ones include National Institute of Science Communication and Information Resources (NISCAIR, formerly INSDOC)), Defence Scientific Documentation. Centre (DESIDOC), National Social Science Documentation Centre (SENDOC), Small Enterprises National Documentation Centre (SENDOC), etc.

Since existing information systems meet only certain limited goals within a particular agency related to the fields relevant to a specific activity of that institution, the process of storage, retrieval, and dissemination of information has been designed to the specific requirements of the organization. Thus the organization of information systems particularly planning infrastructure for national information systems should be one of the important and top-priority in the national development plans. (Joshi and Mehta, 2014)

# **1.3 UNDERSTANDING CONCEPT OF NATIONAL INFORMATION**

The computer age introduced a new element to businesses, universities, and a set of other organizations which deals with collecting and organizing data and information is part of information system. An information system is described as having five components *Computer hardware* - This is the physical technology that works with information collection process.

*Computer software* - The hardware needs to know what to do, and that is the role of software. *Telecommunications* - This component connects the hardware together to form a network.

*Databases and data warehouses* - This component is where the "material" that the other components work are put for use. A database is a place where data is collected and from which it can be retrieved by querying it using one or more specific criteria. A data warehouse contains all of the data in whatever form that an organization needs.

*Human resources and procedures* - The final component of information systems is the human element. It consists of the people who collect data following numerous processes, run the system and the procedures to build databases and data centres and put intellectual inputs to turn these huge data into learning that can interpret what has happened in the past and guide future actions.

When one or more of these components collectively work at the national level, serve national purpose and collaborate other countries networks it constitutes a National Information System.

The concept of National Information System (NATIS) was developed by UNESCO to encourage the creation in individual countries of a clear and coherent program and policy for recognizing the important elements in the nation's information systems and assigning priorities for their development. The program was initiated in 1974 and several countries made efforts to implement the programme. In India launching of NISSAT programme under the purview of Department of Scientific and Industrial Research (DSIR), Govt of India was an effort toward implementation of the concept of NATIS.

## 1.4 BENEFITS OF NATIONAL INFORMATION SYSTEM

The importance of the national information system as a powerful national pace is now being recognized by the government, industry, and education. 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. A number of recent developments have emphasized the need to focus more attention on the planning of information systems at the national level. Major benefits of NATIS will be

- Functioning of a national network with multiple sub-systems
- Access to computer facilities, bridging digital divide
- Access to information and services at all level
- Collaborative learning, work and execution of collective goal
- Saving time for researchers, academicians and business professionals
- Saving cost of information services
- Skill development of information/knowledge professionals

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#### **IN-TEXT QUESTIONS**

#### 1. What are planning objectives of NATIS?

- a. Access to information
- b. Protection of intellectual property
- c. Promotion of reading habits at all level
- d. Skilling of LIS professionals

#### 2. What benefits you won't get through NATIS?

- a. Access to information and services at all level
- b. Capturing primary knowledge of stakeholders
- c. Collaborative learning, work and execution of collective goal
- d. Saving time for researchers

#### 3. The functions of the NATIS could broadly be categorised under

- a. Coordination, collaboration & networking
- b. ICT tools, products and services development and promotion
- c. Training & development of professionals
- d. National policy development

## 1.5 PLANNING OF NATIONAL INFORMATION SYSTEM

National information system for libraries is a subsystem of a national super-system which cater requirement of overall information requirement of the country i.e.. Each and every field, whether education, research or social service.

The primary objective of any national information system for libraries is to collect, store, organize, retrieve and make available the information sources to the information users at the national level. The system should be able to respond quickly with relevant information gathering resources from all possible sources through existing network. This indicates the system planning need to create multiple actors which include awareness of users, national information centres, national level network and skilled workforce.

#### **1.5.1 Planning Objectives**

Components of national information system planning objectives have many facets. These include policy formulation for user education to skill development of associated professionals. A brief account is enumerated here.

Developing a national information policy: A national information policy reflecting the needs of all sectors of the library community and should address need of the national community as a whole, should be formulated to guide the establishment of a national information plan, whose elements should be incorporated in the national development plans.



- Assessment of user's need is primary requirement of the NATIS planning. A detailed analysis should be made of the information needs of Government for its tasks and of the various groups of users including research, academics, business etc in such areas. Thorough industry research and education planning is necessary to ensure that the national information system is planned to meet these needs.
- Stimulation of user awareness is possible through bridging digital divide by increasing user awareness; involving appropriate bodies, including universities and other educational institutions in the process. Systematic instructions in the use of the information resources should be made available in all the elements of NATIS.
- Analysis of existing information resources reflects gaps in the existing information resources, services or their delivery processes. Comprehensive surveys should be undertaken of the existing documentation practices, national documentation centres, libraries, and archives. A resource mapping is essential pre-requisite of sound national planning for the development of NATIS.
- Value of NATIS remain on it's usefulness as perceived by the potential users. Hence, in order to maintain the reading habit in the educational institutions including schools, colleges, universities and libraries within the NATIS, regular promotional strategy and programmes to be developed and executed.
- NATIS is expected to develop significant numbers of information products and services by the skilled professionals associated with the system. Comprehensive surveys should be conducted to analyse skill level of manpower in libraries, training requirement of

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associated professionals aligned to the contemporary technology development and user needs. Training calendar development and execution of trainings should be made part of the system planning process. The resources so developed would be able to assist as necessary and can be mobilized to enable minimum essential facilities for the users. Training need assessment and skill development is required to make efficient planning of manpower provision and forecasting of future needs for NATIS (Joshi & Mehta, 1997).

Many international efforts have been made in the past under the guidance of UNESCO in this direction through UNISIST, INIS, AGRIS, MEDLARS and other information systems initiatives, dealing with specific areas. These systems are based on the principle of coordination and voluntary cooperation at the international level of the relevant existing national institutional components in the corresponding area. However, a participatory approach of various national information systems initiatives with an equitable benefits for all would enhance the cooperation to a greater extent. The cooperation of the international non-governmental organizations, specialized in documentation and library and related fields which carry out many useful activities, are expected to be increased. UNESCO programmes envisage following efforts (may be through inter-governmental conferences) are necessary for a collaborative NATIS model. The components of this model include

- Assistance to the Member States for the planning and development of NATIS
- Methodologies will be elaborated as basic tools to guide Member states in the various phases of planning and developing NAT1S.
- Application of information technology to documentation, library services delivery and archival services will be encouraged and promoted as per NATIS concept
- The programme for professional education and training of information manpower will be revised and extended and
- Promotion of Universal Bibliographic Control.

Based on the above planning objectives of the national information system, it is felt that the functions of the national information system can be derived in accordance with the national development plans and policies.

## 1.5.2 Functions of National Information System

As per the international cases and Indian implementation initiatives, it becomes clear that successful achievement of NATIS objectives require robust functioning of the system. Since
multiple entities will be engaged in development and functioning of the system, a collaborative working network would be necessary. The functions of the NATIS could broadly be categorised under:

- (a) Coordination, collaboration & networking
- (b) ICT tools, products and services development and promotion
- (c) Training & development of professionals

#### (a) Coordination, Collaboration and Networking

- Identify, survey and assess information availability and requirements of stakeholders across the nation, forecast future information requirements and formulate national development plans and policies.
- Collaborate with national and international information agencies to build and use information resources and services to meet the present and future information requirements of the users eg. ELDIS, AGRIS, CTCN at the international level and NISSAT, BTIS, ENVIS etc at the national level.
- NATIS should participate actively in research, development, and innovation in library and information science to enhance both the efficiency of information services and the quality of the information provided by these services.
- NATIS should facilitate improved coordination between existing national, international, governmental and non-governmental organizations and information systems. This include exchange of publication, information, and human expertise in information handling

#### (b) ICT Tools, Products & Services Development and Promotion

- Developing network driven computer facilities at information centres (eg. NIC), create and maintain databases for fast information access and retrieval of users (eg. DELNET, INFLIBNET).
- Establishing standards in materials (eg. union catalogues, bibliographies, and current awareness services, indexing, and abstracting services), techniques and services as part of the national systems for their effective utilization at all levels.
- At the national level, NATIS should steer development of central databanks in standard interoperable format (eg. www.data.gov.in) and value based information services (VAS) for users to meet their information requirements. Also, VAS should provide encouragement users to stimulate new ideas and approaches to problems such as databases and services developed by INFLIBNET.
- NATIS should work collaboratively with the existing information systems and develop their information resources and services. It should also establish sector specific national information centres such as NISSAT centres wherever necessary according to the present and future requirement of users.
- NATIS need to work through multiple stakeholders for cooperative acquisition, processing, storage, retrieval, analysis and dissemination of information resources using

application of latest information technologies. This would facilitate efficient and economic inter-lending of information resources.

• Keeping pace with ICT development across the globe, NATIS should develop and use efficient tools and techniques for documentation, preservation and information handling.

#### (c) Training & Development of Professionals

Creation, maintenance and promotion of information resources and services for users at all levels utilizing ICT tools and technologies require specialized skills. NATIS need to assess present skills, service conditions and status for library and information science personnel, and build up expertise to cater to users. Providing appropriate education and training for adequate number of LIS professionals of different categories should be taken as top priority.

#### 1.5.3 Design of National Information System

Design of NATIS require adequate planning, legislative framework, skilled manpower, ICT and web technology intervention and fund allocation to implement these processes. While many sub-systems in different subject fields are available at national level, disseminated by various centres, however, dream of policy supported national information system remains unattended.

In order to design a NATIS plan, a design framework is necessary which should address all the issues mentioned in the following diagram.



#### NATIS Design Planning

#### **Planning the Organisational Structure**

The NATIS information resources collection, creation, product development and services delivery functions from centres which include information and documentation centres, resources and services of libraries and archives should be coordinated through a central body

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or bodies to form the national information system. This will ensure the optimum use of available resources, avoiding work duplication and the maximum contribution of these information sources to the cultural, social, and economic development of the nation.

#### **Establishing Legislative Framework for NATIS**

Legislative action should be taken from Government for implementation of the national information system. This legislation should cover a conceptual framework covering role and responsibilities of nodal ministry and implementation bodies of the national system and constituent specialized sub-systems. Government Departments such as Ministry of Human Resource Development (MHRD, the nodal ministry for higher education), Ministry of Culture (MoC, the nodal ministry for library activities in India) and agencies who own most of these sub-systems need to work in a coordinated manner under the framework to develop national information system. Guidelines of National Knowledge Commission and National Mission on Libraries indicated need of a coordinated approach of central, state and non-government organizations. Although, several information policies with specific requirements have been enacted in past years, however, an overall national information policy and a robust regulatory framework is yet to be established.

#### **Planning the Technological Needs**

The National Information plan should include adequate provision for the application of information technology tools and techniques, as appropriate in the various components of NATIS with the aim of achieving maximum utilization of existing resources. Most of the government contents are now available on the website in digital form, and many of these contents are in open domain for free use. But, with nearly 43% mobile penetration in rural India and low access to Internet has created digital divide over the years. Inclusive growth of society using ICT tools and technologies are therefore put on first priority by central and state governments in India. Providing access to information resources is now top government priority, already some work has started in different states in rural India. Bridging digital divide, access to network resources, availability of Internet connection and nation-wide facilities of computers are need of the hour to develop a national information system. Information collection in different formats, languages and resource sharing compatibility through standardization are essential requirement seen where technology intervention is necessary.

#### **Financial Allocation for NATIS**

Implementation of NATIS components across the country require improvement in existing network infrastructure, providing network access where necessary, establishing or acquiring existing library networks, development of data standardization and interoperable databases, creation of information products and services, and many more. Adequate financial provision in national budget should be made for effective implementation of the plan for the national information system. The expenditure required for the successful operation of the national

information system call for long-term finance allocation in national budget eg. NISSAT programme. It should be the main source of funds for NATIS financial support. Targets for NATIS financial provisions are

- Inclusion of the financial expenditure of NATIS in the national development plans and yearly budget allocated to nodal ministry
- Fund allocation and approval of purchase for all elements of NATIS from internal or international sources including foundations, multilateral bodies under education head of SDGs
- Allocation of fund for salary structure for the professionals involved in NATIS information work from nodal ministry budget eg. MHRD, MoC.

#### Skilling of Manpower for Information Infrastructure, Products and Services

NATIS should be recognized as a forward looking futuristic provision to create national level information system for learning and service delivery at all levels across India. NATIS calls for a large number of skilled manpower who should have digital competence to handle a national level network under the guidance of experts. In line of National Education Policy 2020, the national educational infrastructure should be formed for skill development of information professionals, which should be an integral part of existing education pedagogy and course contents at universities or equivalent institutions of higher education. Skill development in ICT, networking, information products, service innovation, interoperability and standardization, data handling, knowledge management, etc should be integrated with the existing courses of universities, national institutions and government/private programmes of professional education. The skill level should have a mapping with the requirement of the NATIS. This coordinated approach for developing skillful information manpower would regularly supply adequate numbers of professional staff to meet the demands for NATIS.

#### **Universal Bibliographic Control**

Universal Bibliographic Control (UBC) ensures data standardization and interoperability with any other countries national information system. This require metadata standard for any new publications, non-book materials or social media content. Major challenges will be materials or publications available in vernacular languages, which can be dealt with modern machine translation techniques and with other such software. The aim of UBC is to achieve universal availability of resources. This will enable universal resource sharing as in the case when we follow cataloguing and metadata using AACR2, MARK21, DublinCore and other data standard. The national information system should normally accept standardized record for any types of published documentation material.

## 1.6 DEVELOPMENTAL INITIATIVES FOR NATIONAL INFORMATION SYSTEMS

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Information sharing had always been in Government priority which we can understand as we see major steps including setting up post-independent UGC committees for education and library infrastructure development. Meanwhile, advances in computer and communication technologies and fast paced developments over the past few decades paved the way for computerisation of information resources and networking of different organisations for sharing and exchange of information. The need for strengthening the information base in the country was soon recognized by Government of India, and steps taken to integrate different information agencies into a national level information system.

#### 1.6.1 Early Initiatives

Consequently, Government of India took several early initiatives, particularly from 1975 onwards. National Information Systems and Programmes launched by Government of India in the country in the fields of S&T, Social Sciences and Humanities. These initiatives include launching new government schemes, programmes and setting up new institutions, departments to fulfil the national level information network need. Expenditure toward these initiatives primarily focus on science and technology areas rather than the subject fields of arts, social sciences, humanities, etc. Since beginning, substantial portion of expenses were spent in building up and maintaining good libraries and information centres. As a result, India has well developed library and information systems in most of the scientific disciplines such as medical sciences, agricultural sciences, engineering and technology, etc,

Some important government initiatives in S&T sector include setting up of NIC (National Informatics Centre) in 1975 and NISSAT (National Information System for Science and Technology) programme in 1977 and continued till 2002. NISSAT programme was launched by DSIR, Govt of India with the broad objective of interlinking and coordinating a large number of information sources, systems and services into an effective network under an overall coordinating agency. The NISSAT programme was formally operational to develop national information services using existing systems and services, create a framework for international cooperation in information sharing, skill development of information professionals, promotion of R&D in information science to develop information products and services.

Further to this national level specialised information systems were set up such as Biotechnology Information System (BTIS), Environmental Information System (ENVIS), etc. In late 1980's INFLIBNET Centre was set up to modernize university libraries through automation, provide access to information resources, creating library networks, databases, library consortia, ICT tools development and training manpower to facilitate information services. NISCAIR has been set up to host national science library and facilitate access to scientific knowledge for research and development.

To facilitate social science and humanities research in the national development, Government of India, initiated several programmes such as setting up of Indian Council of Social Science

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Research. The Council supports research in the areas of Economics (including commerce), Education, Management (including Business Administration), Political Science (including International Relations), Psychology, Public Administration, and Sociology (including Criminology and Social Work). Anthropology, Geography, History, Law, Library and Information Services and Linguistics, etc. The Council established National Social Science Documentation Centre (NASSDOC) to provide adequate support in documentation, bibliographical services and access to publications for social science research. Besides, UGC has set up Inter University Centre in Humanities and Social Sciences for strengthening research.

Similarly, in addition to the academic institutions like universities and colleges, government has initiated several programmes and created a number of national level institutions to promote and support research in the field of humanities. Some of these institutions at the national level are Indian Council of Philosophical Research (ICPR), Indian Council for Cultural Relations (ICCR), Indira Gandhi National Centre for Arts (IGNCA), Indian Council of Historical Research (ICHR), Sahitya Akademi, Central Institute of English and Foreign Languages, Central Institute of Indian Languages, National Archives of India, National Museum, and many more. Libraries and information centres attached to these institutions primarily support research and provide access to resources to the parent bodies. No national information system in humanities have been set up to coordinate and carry out information activities.

#### 1.6.2 Recent Government Initiatives

During the last three decades, NIC has developed "network centric" application software for programme implementation in various ministries and departments, using state-of-the-technology software tools. During 1980s and early 1990s, the policy thrust was on creating "Management Information System (MIS)" and "Decision Support System (DSS)" for development, planning and responsive administration in governments which led to the genesis of present day "e-Governance" / "e-Government". NIC has set up state-of-the-art ICT infrastructure consisting of national and state Data Centres to manage the information systems and websites of central ministries/ departments and local governments, disaster recovery centres, network operations facility to manage heterogeneous networks spread across bhawans, states and districts, certifying authority, video-conferencing and capacity building across the country. NIC has several national data servers, robust cyber protection and large quantity of government open and restricted data.

Recently, NIC has taken various initiatives like Government e-Procurement System (GePNIC), Office Management Software (e-Office), Hospital Management System (e-Hospital), Government Financial Accounting Information System (e-Lekha), National Land Records Modernization Programme (NLRMP), Transport and National Registry, Treasury Computerisation, VAT, MG-NREGA, India-Portal, e-Courts, Postal Life Insurance, etc.

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Besides NIC supported e-governance initiatives at national level, Ministry of Electronics and Telecommunications, Govt of India has initiated several schemes as part of Digital India Mission, where many sectoral national level information systems have been established to accomplish specific purpose. MyGov platform for providing government services and facilities, Aadhaar enabled payment system (AEPS), BPO Promotion Scheme, Digidhan Abhiyaan Bazar, National Mission on Education, NREGA-Soft, PAHAL (DBTL), Pradhan Mantri Gramin Digital Saksharta Abhiyaan, Pradhan Mantri Jan-Dhan Yojana, Pradhan Mantri Kaushal Vikas Yojana etc are national level information system in pieces.

Development of national information system in any field require creation of information infrastructure, funding and policy support. While, government has supported information sub-systems in respective fields through funding support of various schemes and initiative such as National Knowledge Commission, National Knowledge Network, National Library Mission, National Mission on Manuscripts etc, no specific information policies have been formed till date. However, in recent times, some important national policies and Acts have been enacted to facilitate information and data sharing. These include Right to Information Act 2005, Information Technology Act 2012, National Data Sharing Policy 2012 and National Education Policy 2020 etc. Collectively, these national level policies is expected to strengthen ICT driven information sharing in the country.

#### **INTEXT QUESTION**

#### 4. Which component is not part of NATIS framework design?

- a) Access to information
- b) Technology requirement
- c) Financial provision
- d) Legislative framework

#### **5.NATIS calls for a large number of manpower, who should have**

- a. Library science qualification
- b. Management proficiency
- c.Digital competence to handle network
- d.National policy development knowledge

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#### 1.7 SUMMARY

Objective of National Information System (NATIS) for libraries are to collect, organize and disseminate information to users at national level. The system should be quick to respond with solution from all possible sources through existing network. A successful NATIS require planning, designing of several sub-systems as per stakeholders need. Components of NATIS include designing and implementing information policies, create awareness, analysing information needs and mapping them with available sources and disseminate the relevant information using existing networks. The smooth functioning of NATIS is possible through improved network infrastructure, financial allocation and skilled manpower who would handle the systems.

About 90% of information in India are generated through public sources. Recognizing the value of information delivery using ICT tools and technologies, government has implemented several sectoral NATIS eg. NISSAT, NIC, INFLIBNET, NASSDOC, DESIDOC, DELNET etc and many national organizations eg. National library of India, RRRLF, NISCAIR, etc in early years of ICT development. In recent years, several useful Apps developed under Digital India programmes has helped to provide e-governance for public benefits.

#### 1.8 GLOSSARY

AGRIS International System for Agricultural Science and Technology

**BTIS** Biotechnology Information System

**DESIDOC** Defence Scientific Documentation Centre

**DSS** Decision Support System

**ENVIS** Environmental Information System

**INFLIBNET** Information and library Network

**INIS** International Nuclear Information System

MEDLARS Medical Literature Analysis and Retrieval System.

MHRD Ministry of Human Resource Development

MIS Management Information System

MoC Ministry of Culture

NASSDOC National Social Science Documentation Centre

NATIS National Information System

NIC National informatics Center

NISCAIR National Institute of Science Communication and Information Resources

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#### SENDOC Small Enterprises National Documentation Centre

UBC Universal Bibliographic Control

UNESCO United Nations Educational, Scientific and Cultural Organization

UNISIST United Nations International Scientific Information System

## 1.9 ANSWERS TO IN-TEXT QUESTIONS

1. Protection of intellectual property

- 4. Access to information
- 2. Capturing primary knowledge of
- 5. Digital competence to handle network

stakeholders

3. National policy development

## 1.10 SELF-ASSESSMENT QUESTIONS

- 1. How do you plan a National Information System?
- 2. What are functions of National Information System?
- 3. What are financial provisions of Indian National Information System?
- 4. Discuss on early work to develop National Information System in India.
- 5. National Information System functioning require proper planning and design Comment on the statement.

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## LESSON 2.2 NATIONAL INFORMATION POLICY

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#### **STRUCTURE**

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Understanding information policy perspectives
  - 1.3.1 Broad Concept of Information
  - 1.3.2 Understanding Policy
- 1.4 Concept of National Information Policy
  - 1.4.1 Definition of National Information policy
  - 1.4.2 Early Initiatives of National Policy Framework in India
    - 1.4.3 Relevance of Information Policies
- 1.5 National Information Policies in India
  - 1.5.1 Freedom of Information Act 2002
  - 1.5.2 Right to Information Act 2005
  - 1.5.3 Information Technology Action Plan
  - 1.5.4 National ICT Policy 2012
  - 1.5.5 National Data Sharing and Accessibility Policy (NDSAP) 2012
  - 1.5.6 New Education Policy (NEP 2020)
- 1.6 Summary

a.

- 1.7 Glossary
- 1.8 Answers to In-text Questions

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- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

## **1.1 LEARNING OBJECTIVES**

Multiple actors and major stakeholders owns various sub-systems of National Information System. Execution of such a system require knowledge access, technology skills, skilled manpower and collaborative work within a network environment. Organizing and handling such huge resources across national level need government intervention, so that such system can be functional properly and driven by legislative framework and policy support. Learning objectives and outcome of this Chapter include

- Understanding Information Policy Perspectives
- Concept of Information Policy
- Relevance and Need of Policies
- Role of Information Policies
- Examples of Existing National Information Policies

## **1.2 INTRODUCTION**

The National Information Policy is considered to be an overarching umbrella for different stakeholders, who perceives information policies differently to handle respective work. The stakeholders in this case include research professionals, library and information science professionals, ICT and networking experts, policy makers, mass media and common man. Each of these category of stakeholders perception about information policies varies widely since their viewpoint and use of information connotes different meanings. Perceptions these groups also vary widely regarding the concept information and policy. As perceptions of information policies vary for stakeholders, catering their need through one policy at the national level is very difficult.

- Information policy perspective of research and scholarly communities revolve around their respective research and development activities. Policy parameters should provide guidelines to the research data and information generated, disseminated and communicated by the peer community and their subsequent discussion format and processes in different contexts. Researchers also look for various forms of information eg. Reports, research papers, concept note, proposals, handbook, manuals etc and also the information support facilities to retrieve these contents.
- For library and information professionals, concept of information policy is to deal with contents of documents including products and services which they disseminate as per the needs of users. In this case information policies focus on
- Document forms, standard, format of explicit information
- Document types in textual, video, images, sound, microforms, etc

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- Type of documents available in electronic and digital form where standardization, metadata format, inter-operability, open or subscribed access to information
- Authority of documents from individual, institutional and organisational mechanisms
- Providing access to information contents and developing products and services
- The ICT and networking experts view information policy as a guideline which will support them to access hardware and software, improve their functionalities, develop solutions to user problems and meeting user demand, information processing packages, transmission of messages, communication networks. They also expect that the information policies should help them to develop and maintain WAN/LAN networks, tools, cloud storage, apps etc and other related matters.
- Government collect, process, analyse issues faced by various stakeholders within different civil groups, and want to perform both as repositories and solution providers. For them, information policies supposed to highlights issues, problems, large scale implementation processes etc. Policy makers expect information policies should work as a decision making and implementation tool for government ministries and their agencies to draw recommendations, measure effectiveness of present systems and future governance methodologies which should be carried out to support nation-wide government functions.
- Professionals who works for mass media such as radio, TV, news and social media, would understand information policy to cover' the gathering, analysis and dissemination of news, views, and general information to the public in different forms and formats. They expect that information policies should emphasized on freedom of information and related areas for public at large. For them, access and dissemination of information generated by governments and other agencies without any constraints should get primary focus in information policy.
- On the other hand, for a common man information policy is anything that provide access to information and helps them to decide, act or be informed on any issues revolving around. Common man wants access to current and correct information without delay and view information policies are tool to support this aspiration.

The government, while formulating a National Information Policy (Policies) should have to take into consideration all these perceptions and evolve a mechanism to consult and develop appropriate policy conducive to all. This process is further complicated due to acute digital divide, which makes inclusive single policy development virtually impossible. However, over the past few decades government has relentlessly working to streamline various issues raised by different categories of user groups, and are to some extent successful to visualise and develop policy parameters suitable to all.

## **1.3 UNDERSTANDING INFORMATION POLICY**

#### **1.3.1 Broad Concept of Information:**

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Derived from the definition given in the UNISIST Main Working document, information is the symbolic element used for communicating knowledge, irrespective of their nature (numeric, textual, etc.) material content, form of presentation, etc. Information is used to communicate scientific, technical, philosophical and social knowledge to it's users on their demand. Information refers to substance of documents which is available as physical existence. While information is developed after refining and consolidating 'data'; organised set of information when presented to form a conclusive understanding, judgement or an experimental result is 'knowledge'.

In the context of National Information Policy, 'information' is considered as whole range of related activities that include data collection, consolidation, processing, packaging and dissemination. This covers work and activities of scientists, academicians, business houses, artists, authors, raw data collectors and many others. Government agencies generate nearly 90% of available information, engaging various actors (publishing and database providers industry, films and television industries, data processing organisations, libraries and archives, indexing and abstracting services, NGOs and corporates etc) and performing several overlapping activities (storage, retrieval, processing, disseminating and duplicating information)

#### **1.3.2 Understanding Policy:**

To many of us, meaning of the term 'Policy' is sometimes vague and remain undefined while many of us follow it during course of own work. Fundamentally, a policy means a statement of guidelines for a course of action. However, it require formulation of levels of generality and specificity to execute an action based on a policy. To understand appropriate meaning of policies, we should know meaning of associated terms and their hierarchy while taking any action, these include goal, policy, strategy and programme.

As per management experts, a goal is the ultimate destination to be reached, over an indefinite period of time, following some specific actions. A policy is a firm statement of commitment to define the actions to be performed to achieve the goal. On the other hand, a strategy is a predetermined course of actions to be carried out from a number of alternatives, defined by the policy. Programme defines a set of tasks taken to implement a strategy to reach to the final goal.



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As evident from the above diagram, all these steps are inter-related to achieve the goal, ie. National Information policy (NIP). While policies and it's framework development is important first stone to achieve the predefined goal, however, policies can change at regular intervals with fixed goal. To make these changes realistic, policies are kept flexible enough to adopt changing environments of political, economic, social and cultural perspective of the user categories. Policy implementation require defined actionable strategy, which then executed through a series of programmes where actions are taken. In the present context policy means an instrument which support to plan, design a strategic framework seeking to concretise some programmatic actions to achieve information policy as national level goal. In light of the present discussion, it is now possible to understand National Information Policy.

#### 1.4 CONCEPT OF NATIONAL INFORMATION POLICY

#### 1.4.1 Definition of National Information policy

According to UNISIST 11- main working document (1971) "A National Information Policy is a set of decisions taken by a government, through appropriate laws and regulations, to orient the harmonious development of information transfer activities in order to satisfy the information needs of the country. A National Information Policy needs provision of necessary means or instruments such as financial, personnel, institutional, for concrete implementation." This was presented in the form of a model, which was cited later in multiple literature and development process. This model offered not only descriptive parameters, but also supported a theoretical perspective from which information systems may be understood and evaluated.

However, there is a need to bring this model to the focus of information science (IS) research as well as to update and revise it in today's perspective. The original model only considered scientific and technical communication as a whole. Revision of this model is necessary with respect to the humanities and social sciences aspects and also to regard internal differences in the sciences (Søndergaard, 2003). Further to this, the model was based on information communication process in physical form, however, empirically most of the communications are happening today following digital or electronic communication processes. Hence, National Information policy definition should be revisited giving adequate importance to digital technology, online media and existing tools.

Moreover, National Information policy (NIP) definition had some restrictions as the way library and information professionals would like to view information policy, to meet the challenges of the changing context of information collection, processing, distribution under the purview of digital platforms and delivery mechanism. This changing context has far reaching impact on envisioning national information systems and services with reference to education, research, business activities, and network planning and operational issues. This has resulted in continuous progress of government initiatives towards developing multiple issues specific information policies since early days of digitization to present days.

#### 1.4.2 Early Initiatives of National Policy Framework in India

Initial process of development of National Information Policy was initiated in October 1985 by Ministry of Culture and Ministry of human Resources Development through establishing a Committee of senior library and education professionals with Prof. D P Chattopadhyay as Chairman to draft a national information policy with special focus on library and information science. The Committee submitted it's report in May 1986 highlighting various aspects and pertinent issues in LIS professionals which include public library systems and bibliographic services, manpower issues, professional status of librarians and salary structures, modernization of library and information systems, initiation of new programmes relevant to national needs of information, financial requirements etc. The committee also recommended suggestions to each of these issues for promotion of national information system in library and information domain. During this period a few important government measures were taken to develop legal provisions and procedures to access to information. Many significant outcomes happened after submission of this report, which may or may not have direct relation to this report.

- Around the same time NISSAT was established in 1986 and continued till 2002 catering the need of national information system on science and technology space. Detail account of NISSAT activities and performance will be discussed in Chapter -3 of Unit-2 module. Another important development to put adequate stress on sharing of resources through network among libraries. NIC was established in 1976 to provide access to government and other paid information through nation-wide network to wider mass as per their requirement. NIC started aggressive promotion of government information services through NICNET. One more important step taken by MHRD was to establish INFLIBNET under UGC. INFLIBNET was envisioned to establish a nation-wide framework and implementable network to promote information resource sharing within university libraries, developing knowledge products and services and ICT enabled databases and tools for libraries.
- A series of library and information networks like the Delhi Library Network (DELNET), Bombay Library Network (BONET), Madras Library Network (MALIBNET), and Calcutta Library Network (CALIBNET), etc. were also set up to integrate resources and services of select libraries in major cities of India. Also, professional LIS associations like the Indian Library Association (ILA), the Indian Association of Special Libraries and Information Centers (IASLIC), Society for Information Science (SIS) and many others were advocating LIS issues to the government to initiate efforts towards formulating a National Information Policy, through a number of seminars and conferences.
- Another significant development during this phase was establishing a high level Task force in 1998 to draft an Information Technology Action Plan. National Task Force on Information Technology and Software Development had submitted the Information Technology Action Plan on July 1998, which comprises 108 action points aimed at three basic objectives of Info-infrastructure Drive, Target ITEX-50 and IT for All by 2008. The

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plan will accelerate the drive for setting up a robust info- infrastructure with an extensive spread of fibre optic networks, satcom networks and wireless networks to interconnect existing informatics infrastructure. Target ITEX – 50 will leverage a potential 2 trillion dollar Global IT industry by the year 2008. The plan also emphasized on IT for All by 2008 mandate and accelerated the rate of PC/set-top-box penetration in the country from the 1998 level of one per 500 to one per 50 people along with a universal access to Internet / Extranets/ Intranets by the year 2008. Towards the goal of IT for all by 2008, policies are provided for setting the base for a rapid spread of IT awareness among the citizens, business and several infrastructures were planned to be set up (DSIR, 1998).

• Freedom of Information Act, 2002 was notified to provide for freedom to every citizen to secure access to information under the control of public authorities and promoted openness, transparency and accountability in administrative processes. Freedom of information is the right to obtain information from any public authority by means of (i) inspection, taking of extracts and notes ; (ii) certified copies of any records of such public authority; (iii) disketts, floppies or in any other electronic mode or through printouts where such information is stored in a computer or in any other device. Virtually all agencies of the executive branch of the government are required by the Act to issue regulations to implement the provisions of the Act. The freedom of information Act held government agencies accountable to citizens.

#### **1.5 RELEVANCE OF INFORMATION POLICIES**

Information is used by all stakeholders for different purposes and formulate varieties of outputs on daily basis using relevant information. A NIP helps in establishing e-govenance structure, content creation and delivery, heritage/legacy, quality of information, social inclusion, universal access, e-commerce, legal deposit, intellectual property rights, freedom confidentiality, information, privacy and authenticity/authorisation, metadata. of interoperability and information literacy. The ultimate purpose of information and knowledge is to put them to use, and in turn, to provide for a higher quality of life to people in general and specific to people who are engaged in research, education, policy making, and business processes. The vital role of information in national development has to be seen in this perspective.

Stakeholder groups which use different types of information regularly and felt necessity of national information policy include a) scientific, technical and societal information for education, research and development, business, and socio-economic development; b) mass media dealing with newspapers, TV, Radio broadcasts, etc; c) publication and information database deals with selling information as products; d) ICT and networking experts who handle technology, hardware and software problems and e) general users for daily information requirement and exercising right to access to government information. A

National Information Policy has potential to change silo's mind-set of individual public, government agencies and organizations. It can instigate information sharing and use, and eventually helps a country to achieve a sustainable socio-economic development. Following are major issues identified why a country should develop a NIP or several sectoral policies for societal benefits.

- Access to government information using RTI Act 2005
- Promotion of government information for benefits of civil society
- Development of national information infrastructure
- Managing data standardisation and interoperability
- Promotion of technological innovation
- Wider information access through resource sharing, consortia development
- Facilitate delivery of high quality lower-cost government services to the public
- Cost saving for purchase of priced information
- Engage in collaborative work in a network environment
- Development of the electronic information industry
- Protection of Intellectual Property Rights (IPR)
- Support to lifelong learning
- Improving regional and international cooperation

Barring government generated information, information in most cases are intellectual output and are under intellectual protection, restricting misuse. While most of the government information are now available online for free use, however, such process are restricted due to digital divide across multiple users categories., Moreover, awareness of fair information use eg. copyright issues, creative common licencing, etc are still in infant stages in India, resulting into skewed information availability and use. While we are living in information society, access to information many-a-times remain restricted due to scattered information sources, licencing issues, high purchase cost, languages, digital divide, standards and format, interoperability, internet access and many more. A robust information and data sharing framework is necessary to wider information access to civil society.

In the context of India, a National Information Policy or a set of policies must necessarily be governed and owned by Government agencies, based on regulatory framework of data sharing mechanism. At various stages of our national development - social, economic, educational, research - government have framed information policies in consultation with domain experts. All the policies needs to be compatible with the Five-Year National Plan and should be integrated with national programmes of the country.

#### 1.6 NATIONAL INFORMATION POLICIES IN INDIA

Indian government has recognized information generation, processing and dissemination as most important pillar to improve citizen's lifestyle and promote government beneficial activities to civil society. As a result, over the years has enacted several information policies for different perspectives in India. Some of the important policies which have direct relevance to LIS professionals are highlighted.

#### 1.6.1 Freedom of Information Act 2002

Freedom of Information emphasize on the fundamental principle of human rights. This right to information is guaranteed in international law and many countries including India are now giving legal effect to it. The Freedom of Information Bill, 2002 was passed into a law in December 2002 after many years of public debate in a number of States. The Act provides freedom of government information access right to every citizen of India from from public authorities, subject to certain exceptions stated in the Act. The Act extends to the whole of India, except the State of Jammu and Kashmir for constitutional reasons.



#### The Act defines

- Information as "material in any form relating to the administration, operation or decisions of a public authority".
- 'Public authority' as anybody established under the Indian Constitution or by any law, as well as anybody "owned, controlled or substantially financed by funds provided directly or indirectly" by government.

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• Record as any document, microfilm, microfiche or any material or any material reproduced by any device from the public authorities.

#### **Promotional measures**

Public authorities are required to appoint Public Information Officers who are responsible for dealing with requests and providing reply to requesters. Individuals who have acted in good faith pursuant to Law are protected against sanction. In other words, individuals who release information of wrongdoing-whistle blowers must be protected.

#### **Process to follow**

The Act laid down process of requesting information from any public authorities, which are to be followed by all actors while the law is in force.

- Requests for information by any Indian citizen must be made in writing, wherever individuals have difficulties with this, the Public Information Officer is required to provide "all reasonable assistance" to them.
- Requests must be dealt with as expeditiously as possible and in any event, within 30 days. Requests may be accepted subject to the payment of a fee for information falls within the ambit of the Act.
- Where a request for information is rejected, the requester is entitled to be informed of the reasons for the rejection, the period within which an appeal may be lodged with the relevant information about to the appellate authority.

#### Mandatory disclosure of Publishing Authorities functions and facilities

The Act requires public bodies to publish at intervals prescribed by the government, the following information:

- Particulars of organisation details, functions, facilities and duties
- Powers and duties of its officers and employees and the procedure followed by them
- The norms set by the public authority for the discharge of its functions
- Rules, regulations, instructions, manuals and other categories or records used by their employees
- Details of the Public Information Officer

#### **Exceptions allowed under the Act**

This section highlights exceptions in the Act most of which are not impacting general public interests. However, a requester can appeal against any decision of a Public Information Officer within 30 days of the reply. Exceptions where the information:

- Information that would adversely the sovereignty and integrity of the Country, security, strategic papers and decisions and scientific or economic international relations
- Information that affect public safety and order including detection, trial and investigation of an offence

- If disclosed such information would affect centre-state relations
- Contains trade or commercial secrets protected by law of a public authority

#### E-governance and freedom of information access

Information on changes of E-governance at the right time is one of the effective information tool for the people. ICT driven E-governance application enables people to understand the processes of government functioning, accountability, speedy response and transparency of the government. E-governance integrates people, processes, technology for meeting governance goals. (Raghavan and Nair, 2003). The government has already initiated appropriate steps of E-governance by executive orders across the nation eg. creating online voting provisions, almost all transport processes in RTOs, net-banking for financial transactions, payment and calculation of utility tariffs, online education tools for study, examination and results etc. The freedom of information access has helped the citizens to understand government functions, policies, activities and responsiveness.

#### **Citizen's expectations**

As the governments are committed to do welfare of the people and States, the assigned bodies provide support in almost all areas of public interest. The information generated and disseminated and published in any form, get stocked for future records in a number of libraries and other information institutions in our country.

#### 1.6.2 Right to Information Act 2005

India is recognized as world's largest democracy. Citizens have right to know government processes, policies and consultations, government decisions pertaining to public. Right to Information Act 2005 mandates timely response to citizen requests for government information. It is an initiative taken by Department of Personnel and Training, Ministry of Personnel, Public Grievances and Pensions. RTI Act 2005 incorporated required provisions and replaced earlier Freedom of Information Act 2002 with additional power to Indian citizens towards government information access.

#### Objectives

The basic object of the Right to Information Act is to empower the citizens, promote transparency and accountability in the working of the Government, contain corruption, and make our democracy work for the people in real sense. It creates informed citizens who are better equipped to keep necessary vigil on the instruments of governance and make the government more accountable to the governed.

#### Salient features

Under the Right to Information Act, people have a right to seek information from public authorities, including government organisations. The law lists down the rules and procedures on how somebody can request information. A citizen can request any government document and get certified copies of the same. Salient features of RTI Act, 2005 includes

- The RTI Act allows people to file legal requests to government agencies to look at government documents, understand processes and ask for any public information from the government.
- All government bodies, whether state, central or local, are liable to respond to an RTI query filed by any citizen within a stipulated time frame. All government-owned organisations are also liable to provide information under RTI Act.
- In any government set-up, a Public Information Officer (PIO) will be designated to handle RTI queries, who accepts the request forms and provide information to public, with rare exception of classified information of national security related issues.
- Any information that are disclosed in the Central or State legislative assembly must be given to any applicant under the RTI Act.
- Moreover, Assistant PIOs work in every district or divisional level to accept and process public requests and help people get desired information.

A website gateway has been established to file RTI requests to gather government information to provide a– RTI Portal Gateway to the citizens for quick search of information on the details of first Appellate Authorities, PIOs etc. Besides, access to RTI related information / disclosures published on the web by various Public Authorities under the government of India as well as the State Governments can be accessed. The process of recovering information from government sources using RTI route are as follows:

- Every person who wants to get information under the RTI Act must fill out an application in Hindi or English and send it in by email. If you can't write it, PIOs will assist in putting your oral request in writing.
- If the applicant is deaf, blind, or has disabilities, the public authority must offer assistance and access to the documents sought.
- The applicant doesn't need to explain why they want the information or give any other personal information, rather they can simply send requests for government information.
- The applicant can file a complaint against the PIO if the person failed to provide requisite information on time.
- PIOs are liable to pay a fine of Rs. 250 per day for delay in not furnishing the required information to an applicant.

RTI Act 2005 has a direct consequence in library and information service delivery option. While LIS professionals supposed to provide information services on user demand, some relevant government data which otherwise are not available on public domain, can be

obtained from various government organizations and ministries. This will ensure data authenticity and quality in providing services.

However, we have seen significant criticism of the Right to Information Act, as many felt hat the Act hasn't been able to reach it's full goals because of systemic flaws including nonavailability of nation-wide coordination between government departments and agencies, absence of data standardization, variation in data collection parameters and unnecessary delay by government agencies in providing information etc. However, the fact is that the RTI Act gives us a rare chance to see how the government works, especially at the grassroots level, where citizens have the most say in how things are done.

On the other hand, RTI Act has been grossly misused for gaining individual benefits rather than a social cause. The Delhi High Court has said that the misuse of the RTI Act needs to be dealt with proper regulations or the public will lose faith and trust in this act.

#### **1.6.3 Information Technology Action Plan**

Recognising the potential of ICT for rapid and all-round national development, a National Task Force on Information Technology and Software development was constituted in May 1988. The report of the task force, formulated into the Information Technology Action Plan, 1988 contains 108 recommendations covering developmental possibilities and bottlenecks areas which are crucial for boosting ICT in India.

The recommendations, cover a wide spectrum of issues relating to telecommunications, finance, banking, revenue, commerce, electronics, human resource development, defence, and rural development. The report addressed critical national needs in the areas of information infrastructure, Internet access, software development and exports, hardware manufacture, electronic commerce, R&D in ICT, manpower training and education. Salient points of the National Task Force on Information Technology and Software Development are as follows:

- A strategy roadmap for extensive use of IT in all areas of national economy i.e. agriculture, industry, trade and services as a critical input in making India a global economic power.
- Recommended a design for building world class physical, institutional and regulatory IT infrastructure keeping in mind convergence of telecommunications, computers, consumer electronics and the media infrastructure.
- Highlighted need and means for creating a national informatics infrastructure (NII) backbone, bridging local and the global informatics infrastructure at optimal cost by using existing government resources.
- Suggested measures for massive expansion of personal computer density and Internet use by all sections of society.
- Recommend a strategy for boosting the learning and use of IT in Indian languages through promotion of software development

- Suggested measures to catalyze the growth of exports through the extensive use of commerce and electronic data interchange.
- Suggest ways in which the use of IT can be maximised in the Government at all levels, so as to make its functioning people-friendly, transparent and accountable.
- Devise a strategy for establishing a strong and internationally competitive domestic manufacturing base for computers, computer components and peripherals.
- Design an all-inclusive training and manpower development plan involving Government agencies, private business, voluntary organizations, educational institutions and others
- Develop an innovative and strategic plan to raise the necessary financial resources to minimise government outlay.
- Recommended how India can leverage its global competitiveness in InfoTech to play a prominent role in the development of IT in India and other countries.

The Task' Force recommended to give information technology a pro-people and prodevelopment thrust. The government has acted in line of these findings and taken a series of policy measures to develop India's ICT policy directives with support from another IT Task Force, which submitted its "IT Action Plan" in 1998. The report focussed on universalization of IT and IT based education at all levels. Some of the highlights of the IT Action Plan are:

- Conversion of STD/ISD booths in the Country into "Information-Kiosks" providing Internet and related services like email.
- Ministries and Departments to earmark 1-3 % of the budget for IT infrastructure development with 3 time increase of capital investment.
- IT literacy for Government / Public Sector employees.
- Software and IT to be treated as priority sector by banks and other financial organizations.
- Approval for Indian IT companies for overseas acquisitions.
- Broadening definition of software to include entire range of IT software as per WTO-ITA norms.
- Zero duty on all IT products and exemption for software developers and exporters from physical and custom bonding at STPs, EDUs and EPZs
- Early introduction of cyber laws
- Networking of all Engineering / Medical colleges, Universities

#### 1.6.4 National ICT Policy 2012

National Policy on Information Technology 2012 aims at leveraging benefits of information & communication technology (ICT) to address the country's economic and developmental challenges to transform the lives of people. IT has been recognized as key driver of the knowledge based global economy, hence it was envisioned that right policies and investment in ICT infrastructure can strengthen Indian economy as global power-house.

#### Objectives

The policy attempts to optimally leverage India's global edge in ICT and an inclusive growth for an equitable society. The policy is oriented towards e-governance, empowerment of citizens and bridging digital divide. The Government has initiated the process of mass adoption of National ICT Policy to guide ICT development, accessibility to information and its utilization to meet the local, national and global challenges.

The broad objectives of the National ICT policy include creation, adoption and promotion of ICT through development of policy instruments, regulatory framework, human resource development, industry promotion and e-governance.

#### Thrust areas

The ICT Policy 2012 envisaged the growth of the IT market to USD 300 billion and creation of additional 10 million employments in India in different ITeS sector by 2020. The thrust areas of the policy include:

- Establish India as global market-player in emerging technologies and services.
- Promote IT driven innovation and R&D infrastructure in cutting edge technologies and developing solutions in areas like GPS based services, mobile services, cloud computing, social media and utility models.
- Encourage adoption of ICTs in key economic and strategic sectors to improve productivity.
- Provide fiscal benefits to SMEs and Start-Ups for adoption of IT in value creation and supply chain management
- Establish IT education strategy and skilled manpower to management information systems at all levels including government, private and academics.
- Bridge digital divide among urban and rural population through IT infrastructure development, Internet penetration and e-literacy programmes.
- Encouraging mandatory e-delivery and affordable access to all public services in electronic mode.
- Enhance transparency, accountability, efficiency, reliability and decentralization in Government through e-governance and delivery of public services.
- Promote top quality ICT initiatives in social sectors like education, health, rural development and financial services to promote equity.
- Make India the global hub for development of language technologies, encourage
- development of Indian languages content accessible to all.
- Enable access of content and ICT applications by differently-abled people for inclusive development.
- Strengthen regulatory control on ITeS sectors and security framework for a legally compliant cyber ecosystem.

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• Adopt open standards and promote open source, open data and open technologies in all sectors including education

#### Implementable guidelines

#### **Policy instruments**

- A countrywide reliable and efficient ICT infrastructure was envisioned which shall have sufficient capacity, network speeds, able to provide improved connectivity in a cost-effective manner to cater to the needs of the country. Effective utilization of all installed ICT infrastructures were strategically planned to contribute to flexibility and redundancy on a national basis. The government has created provisions for sharing and co-locating of infrastructure and facilities for this purpose. Also, private sector was recognized as integral part of the development of ICT infrastructures and solutions. Competitive markets for ICT services were ensured for development of the ICT sector in India.
- Promote widespread accessibility to ICT services, deployment and maintenance of networks, deployment of ICT infrastructure to allow e-commerce and e-governance that are interoperable on a national basis.

#### Legal and Regulatory Framework

- Review the existing legislations in view of international best practices and support development of a legal framework for ICT sector for e-governance, e-business and innovation.
- Promote confidence for engagement with the information society through enactment of legislations addressing issues of computer use, equitable competition amongst service providers, cyber-crimes, consumer protection, intellectual property rights, dispute resolution and security.
- Promote online training and skill development regulations for encouraging multi-sector digital transformation, development of legal processes and communities on regulatory issues, including law enforcement agencies.

#### Human Resource Development

- Establish favourable environment and government schemes for different cadres of ICT personnel in the ministries, government agencies as well as private sectors through public-private participation and promote ICT awareness programmes.
- Promote and support training of ICT qualified personnel in internationally acceptable standards at all levels of the education system (formal, vocational, short-term etc) to meet the growing market needs.
- Promote the use of ICT in the informal education, libraries and online information database sector, with emphasis on open access and open data initiatives.

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- Encourage activities relating to lifelong learning through the use of ICT for all educational, scientific and research institutions, libraries, archives, museums, and community centers.in physical and distance education.
- Promote the development of national online certification and accreditation systems in the ICT sector.

#### Industry

- Encourage research, innovations and experimentation in software, hardware and ICT systems development by increasing awareness among the public and private sector for carrying out all economic activities.
- Promote the professional recognition of technical professionals in the ICT sector.
- Promote participation of local ICT organizations and foreign entrepreneurs in the ICT sector through engagement in international ICT events, market participation, acquisitions and joint ventures following the current trends and establishment of business contacts.
- Create a culture of innovation, entrepreneurship and technological sophistication using ICT as a catalyst in order to remain globally competitive in business modernization in all sectors.
- Encourage development of multimedia based local e-contents, online learning for safeguarding the nation's environmental, historical, traditional and cultural heritage.

#### **E-Government**

- Adopting high-level ICT leadership at the national level for enhanced efficiency and effectiveness of Government operations and service delivery.
- Encourage easy, secure and efficient access to appropriate Government information systems and services.
- Facilitate public Internet literacy, information access, bridging digital divides and the use of computers and other ICT equipments within Government.
- Develop and promote e-governance tools, standardized contents, e-learning tools, online delivery methods and other web services which enhance the use of ICT in every business and education sectors to project country's positive image internationally.
- Encourage and support the use of ICT tools to predict, monitor and respond to disasters (natural and human made) and in environmental management.
- Enhance collaboration and co-ordination in ICT development at the local, regional and international level.

#### **1.6.5** National Data Sharing and Accessibility Policy (NDSAP) 2012

A large quantum of data generated using public funds by various organizations and institutions in the country remains inaccessible to the public, although most of such data may be non-sensitive in nature and could be used by public for scientific, economic and developmental purposes. There has been an increasing demand by the community, that such

data collected with the deployment of public funds should be made more readily available to all, for enabling rational debate, better decision making and use in meeting civil society needs. The NDSAP policy is designed to promote data sharing and enable access to Government of India owned data for national planning, development and awareness.

#### Objectives

NDSAP-2012 was designed to promote technology-based culture of data management as well as data sharing and access (Open Government Data) across India.

- It provide an enabling provision and platform for proactive and open access to the data generated by various Government of India entities.
- It opens up, proactively, information on available data, which could be shared with civil society for developmental purposes, their price details if any, and methods for gaining access to registered and restricted use.
- NDSAP is to facilitate access to Government of India owned shareable data (along with its usage information) in machine readable form through a wide area network all over the country in a periodically updatable manner, within the framework of various related policies, acts and rules of Government of India, thereby permitting a wider accessibility and usage by public. (www.data.gov.in)

#### **Policy scope**

The policy has limited its scope to data owned by the agencies, departments/ Ministries and entities under the Government of India and forms a statement of the Government of India of its commitment to transparency and efficiency in governance. Department of Science & Technology will continue the process of evolving the policy further, keeping in tune with technological advancements and the National requirements and enrolling the State Governments (www.data.gov.in). The open government data initiative started in India with the notification of the National Data Sharing and Accessibility Policy (NDSAP), by the Department of Science and Technology on March 2012.

#### **Application of the policy**

The National Data Sharing and Accessibility Policy will apply to all data and information created, generated, collected and achieved using public funds provided by Government of India directly or through authorised agencies by various Ministries / Departments/ Organisations/ Agencies and Autonomous bodies.

#### Nodal agency

Department of Science & Technology (DST) is the Nodal Department for all matters connected with overall co-ordination, formulation, implementation and monitoring of the policy. The NDSAP identified the Department of Electronics & Information Technology as the nodal department for the implementation of the policy through National Informatics Centre. In pursuance of the Policy, the Open Government Data Platform India was launched

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in 2012 (<u>www.data.gov.in</u>). For Geospatial Data, existing National Spatial Data Infrastructure (NSDI) mechanism involving both Department of Space and Department of Science & Technology would be used for any conflict resolution.

#### Implementation guidelines for NDSAP

- The implementation guidelines for NDSAP include "openness, flexibility, transparency, quality" of data, and aim to facilitate "access to Government of India shareable data in machine-readable form".
- The guidelines prescribe open digital formats suitable for analysis and dissemination.
- Opaque formats such as the portable document format and the image format are discouraged.
- Shareable data/ Positive list: As per the policy, the data sets identified by the ministries / departments which are not disclosing privacy information (such as GDP, production, demographic data, services delivered by government agencies etc) shall be verified and validated by the individual departments and then ported on the website www.data.gov.in or on the respective ministry/department websites.
- Non-Shareable data/Negative list under the policy: The negative list includes the data that is not sharable and the same would not be available on the public domain. Sections 8 and 9 of the Right to Information Act, 2005, The Information Technology Act, 2000 and the right to privacy as upheld by the Supreme Court of India in its various judgements, need to be consulted/taken into consideration while preparing the negative list.

#### **1.6.6** New Education Policy (NEP 2020)

The New Education Policy (NEP 2020) was released by the Ministry of Human Resource Development (MHRD) in July 2020 replacing the 34-year-old National Education Policy (NEP) that was formulated in 1986. It outlines the government's vision for the education sector in India over the next ten years.

This is a significant step forward for India's education system which is expected to bring about massive reforms in all business and learning sectors and change in the country and its people. Hence, this policy specially calls for the requirements of ICT driven advance quality information infrastructure, LIS professional development, relevant training and services for promotion of comprehensive skill and educational development.

#### Objectives

The NEP 2022 is a comprehensive policy that covers all aspects of education, from early childhood education to higher education and vocational training. The policy aims to

- Transform the education system in India as per the present market needs and make it at par with international standards
- It also emphasizes on providing quality education to all regardless of their socioeconomic background.
- It aims to increase the Gross Enrolment Ratio in higher education to 50% by 2035.

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#### **Education Policy Highlights**

- The policy emphasizes on providing quality and affordable education to all children in the age group of 3-18 years.
- It emphasizes on holistic and multidisciplinary education instead of rote learning. Students will trained to apply concepts to solve real problems rather than remembering things from books. The school curriculum has been updated to incorporate more core concepts and vocational education.
- It emphasizes that the three-language formula will be followed in schools, focusing on the regional language, Hindi and English. Students to learn instruction in regional languages in the first five grades instead of English.



## NEP 2020 Features

- The policy focuses on using technology in education to make it more accessible and effective. It envisages a system where there is no distinction between rural and urban areas, and all children have access to quality education.
- The policy proposes several measures to improve the quality of teaching, such as mandatory teacher eligibility tests, teacher professional development programmes, and teacher education programmes at the elementary, secondary and tertiary levels.
- The policy also focuses on providing vocational and technical education to students so that they are better equipped to enter the workforce.
- The policy proposes to set up a National Higher Education Regulatory Council to oversee the regulation of higher education institutions.

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- The policy also seeks to provide greater autonomy to higher education institutions and promote academic mobility. As a result, the public and private universities will both be governed by the same regulations.
- This policy introduces a new 5+3+3+4 education structure, which moves away from the current 10+2 system.
- The Government has announced that all higher education institutes (HEIs) will be governed by a single regulator, except the Medical and Law Colleges. HEIs now have to answer to a new body, the Office for Students.
- The master's degree (MPhil) course will no longer be required for PhD programme, students can enrol in PhD programme directly, can take breaks and complete research afterwards.

#### **Major Reforms in New Education Policy**

- School board examinations will continue in 10th and 12th classes and be redesigned to be more holistic and developmental. PARAKH is a new national assessment platform. It will assess students' learning and help them to analyze their strengths, weaknesses, gaps, and potentials.
- The new system will focus on strengthening the local language/regional language and mother tongue as a medium of education. It will be available for grades 1 to 5.
- Vocational education will start in school, starting with grade 6, also known as middle school. Internships will be a part of that vocational education curriculum as well.
- There are plans for literature in India and other classical languages as an option. Students who pursue those degrees will have the freedom to choose which language they wish to study. The same principle is applicable to other disciplines like science, technology, engineering and mathematics.
- Higher education will receive flexibility in subjects. There will be multiple entry points and exit points for all students. UG programmed courses can range in duration from three to four years. The minimum duration required to get a certificate is one year. However, students can opt for a different route if they want to, such as obtaining a two-year Advanced Diploma or getting a B. Tech degree.
- The new system will be student-centric, where all subjects' education is reduced to its core essentials.
- According to NEP, learning should be holistic, joyful, stress-free, and a lifelong process. It focuses on critical thinking, discovery, inquiry, discussion, and teaching based on analysis and holistic learning methods.
- Academic bank of credit (ABC) will be created as a digital recognition awarded for a student's academic performance by universities. ABC will be used to verify an institution's credits or schools can use it to reward students.
- Regulators for higher education will keep a strict vigil on implementation of the policy activities and outcomes in a standardized manner.

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- Focus on online learning to ensure that students are educated to the highest standard. In the new system, e-learning will be expanded to include online courses, which will provide flexibility in terms of location and time for students.
- By the end of 2040, universities will become multidisciplinary institutions each of which will have 3000 or more students. At least one oversized multidisciplinary HEI (higher education institution) should be built-in or near every district by 2030.
- This is one of the ways we can make our schools more connected to their communities and provide them with growth opportunities. The goal is to help create 100% youth and adult literacy.

#### Impact of NEP on Libraries and Information Systems

• As per NEP 2020, books are needed to be developed consisting of attractive learning materials content for the students at all levels in all local and Indian languages. Both public and private sector institutions will work strategically to improve the quality and attractiveness of books with support of various libraries as they will act as information clearinghouse for the purpose.



## **Perceived NEP 2020 Impact on Libraries**

• The NEP emphasized on education for all categories of students and enhanced higher education rate, which makes accessibility of books, periodicals, other attractive learning materials content for the students at all levels in all local and Indian languages learning and teaching materials in both schools and higher education institutional libraries. Moreover, public libraries will also ensure availability of books to all including physically handicap. This will enhance libraries role as an academic centre of excellence within the institutions.

- Both public and school libraries will be extensively used to increase the readership across the country. Public libraries will be strengthened and modernized with latest technology who will.
- The Government will provide infrastructure to ensure adult education and lifelong learning processes to all interested in Education. The public library spaces shall be used for adult education and other activities for support local communities, particularly in villages for their information need during non-school hours community engagement and skill development.
- Government will promote skill development and acceptable career paths for library staff and ensure appropriate staffing to meet its goal to digital transformation of library facilities and services.



#### 1.7 SUMMARY

The National Information Policy (NIP) provides policy directives on how to access and use information. NIP is viewed by different stakeholders which include research professionals, library and information science professionals, ICT and networking experts, policy makers, mass media and common man, from different perspectives to handle respective work. While a single policy can hardy meet needs of different stakeholders, government has from time to time has constituted working groups who framed a number of policies relevant to LIS professionals.

While early NIP initiatives in this regard was resulted into working of NISSAT, NIC, however, realizing the power of ICT to drive future information society, Information Technology Action Plan was framed in 1998. Many information systems and policies have come up in last few decades, however, major NIPs relevant to LIS professionals include Freedom of Information Act which later replaced by Right to Information Act 2005, National Information Technology Policy 2021, National Data Sharing and Access policy 2012 and National Education Policy 2020. All these policies have far reaching impact on performance of library and information centres in India.

#### 1.8 GLOSSARY

ABC Academic bank of credit

DST Department of Science & Technology

HEI Higher Education Institution

**ICT** Information and communication technology

**ITeS** Information Technology enabled Services

MHRD Ministry of Human Resource Development

NDSAP National Data Sharing and Accessibility Policy

**NEP** National Education Policy

NIP National Information Policy

NSDI National Spatial Data Infrastructure

PIO Public Information Officer

**RTI** Right to Information Act

UNISIST United Nations International Scientific Information System

# **1.9** ANSWERS TO IN-TEXT QUESTIONS1. Marketing of decisions4. Department of Electronics & Information2. TechnologytransferbetweenTechnology

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organizations 3. 1998

5. All private organisations are liable to provide information

#### 1.10 SELF-ASSESSMENT QUESTIONS

1.Explain the concept of learning. Discuss personal factors that influence learning, with suitable examples.

2.Discuss some effective methods of learning that you would like your students to practice in class and at home. Illustrate your answer with relevant examples.

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## LESSON 2.3

## National Information Systems: NISCAIR, DESIDOC, NASSDOC, SENDOC, ENVIS, etc.

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# **1.1 LEARNING OBJECTIVES**

Widespread use of computer and communication technologies in information dissemination would require compatibility of systems for information exchange. Many sectoral sub-systems working collectively in India to fill the gap of an over-arching National Information System. Multiple actors in government owns various sub-systems and provide seamless physical and digital access of information in present days, these include national systems and organizations, information centres and networks, online knowledge portals etc created mostly by government. In this chapter, you will understand past and present information systems, their functioning and facilities. Learning objectives and outcome of this Chapter include

- Role of past and present National Information Systems in different sectors
- National information centres and related information infrastructure
- Existing national information systems
- National organizations supporting information systems

# 1.2 INTRODUCTION

A number of national systems, information organisations and centres have been established by Government of India over the years to contribute towards promotion, coordination and development of library and information services. These include governmental bodies, network of multiple organization working towards a common cause and voluntary professional organisations. Some of the private bodies have also contributed in this journey of development of Nation Information Systems in India. National organisations like UGC and RRRLF, the National Information System for Science and Technology of India; and National Documentation Centres of India, such as the Indian National Scientific Documentation Centre (INSDOC, now NISCAIR), the National Social Science Documentation Centre (DESIDOC) and the Defence Scientific Information and Documentation Centre (DESIDOC). These organizations collectively function in providing advisory, catalytic, funding support towards working of multiple national information systems in India.

While developing a single overarching National Information System is complex task, sector specific national systems, centres and digital tools have been developed to foster networking, resource sharing and cooperation in collaborative knowledge creation, dissemination, e-governance and handling of information services.

# **1.3** NATIONAL INFORMATION SYSTEMS (NIS)

Over the years as outcome of government initiatives several national level information centres and agencies have come up for providing information access to society. Some premiere national information systems have been created in past few decades to

promote information sharing and knowledge based services. This chapter will highlight some of these systems along with their objective, functions and achievements.

National Information Systems can broadly be divided based on their subject coverage and nature of services.

- NIS on Science and Technology
- NIS on Social Sciences and Humanities

These include national information systems and networks such as NISSAT, NIC, INSDOC, NASSDOC, DESIDOC, DELNET, INFLIBNET, ENVIS, BTIS etc.

Further to this, some other national organizations like UGC, RRRLF, NASSCOM, National Library etc and government programmes including Knowledge Commission, National Mission on Libraries and many systems developed have helped promoting information to citizens through systematic approach. These government systems, supported by suitable ICT technology and education policies have paved the way for modern sector specific information systems. In recent times major focus was given on developing e-governance infrastructure through Digital India programmes.

#### **1.3.1** National Information Systems on Science & Technology:

The contents should be divided into smaller chunks and structured under heading and sub-headings. The purpose is to present a logical and graded arrangement of subject matter. The language should be simple and easy to understand. It should not be bookish and full of jargon. The language used should be appropriate to the level of the learner.

Indian government has created and promoted national information systems and networks in science & technology areas to create countries human resource capability in techno-savy India with an innovative mind-set. Government of India have been emphasizing need for innovation, research and development in scientific fields since independence, however, these initiatives were having bottlenecks of providing relevant information access to research and academic communities, huge information infrastructure development cost across India. However, these initiatives got a real boost with development in ICT based networking technologies, which has resulted in setting up of number of national level information systems and national information organizations. Some important systems are highlighted here.

#### 1.3.1.1 National Information System for Science and Technology (NISSAT)

NISSAT programme was launched by DSIR, Govt of India with the broad objective of interlinking and coordinating a large number of information sources, systems and services into an effective network under an overall coordinating agency (Lahiri, 1986). The NISSAT programme was formally started operational in September 1977 with National Focal Point located in DSIR, New Delhi with the following objectives:

- Development of national information services
- Promotion of existing information systems and services
- Introduction of modern information handling tools and techniques

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- Promotion of international cooperation in information
- Development of indigenous products and services
- Organisation of skill development programmes and
- Promotion of R&D in information science and technology

NISSAT strategies were primarily to put emphasis on contents creation and providing access, knowledge sharing using existing infrastructural facilities, creating process to intellectual property protection, and commercialisation of Information Services. As a result a number of information products, skills and services were developed. However, thrust areas of NISSAT were continuously modified, keeping in tune with the global information scenario during its operations from 1977-2002 (DSIR Annual Report, 2002-2003). During it's 25 years of operation, NISSAT programme achieved the following desired objectives:

• Establishing & functioning national information centres:NISSAT established sectoral national information centres (Table-1) were usually built around the existing information resources and facilities across India, who already have established library and information centres. Majority of these centres were established in Council of Scientific and Industrial Research (CSIR) institutes across India. The objective was to provide access to relevant sectoral R&D and industrial information to users across India from centralized sources.

**Table**: NISSAT sectoral national information centres

Name of National Information Centre	Host Institution
National Information Centre for Leather and	Central Leather Institute, Chennai
Allied Industries (NICLAI)	
National Information Centre for Food	Central Food Technological Research
Sciences (NICFOS)	Institute, Mysore
National Information Centre for Machine	Central Machine Tools Institute, Bangalore
Tools and Production Engineering	
(NICMAP)	
National Information Centre for Drugs and	Central Drug Research Institute, Lucknow
Pharmaceuticals (NICDAP)	
National Information Centre for Textiles	Ahmedabad Textile Industry's Research
and Allied Subjects (NICTAS)	Association (ATIRA)
National Information Centre for Chemistry	National Chemical Laboratory, Pune
and Chemical Technology (NICHEM)	
National Information Centre for	Indian Institute of Management,
Management (NICMAN)	Ahmedabad
National Information Centre for Marine and	National Institute of Oceanography, Goa
Aquatic Sciences (NICMAS)	
National Information Centre for Advanced	Central Glass and Ceramic Research

Ceramics (NICAC) National Information Centre for Bibliometrics (NCB)

National Information Centre for Crystallography (NICRYS) National Information Centre for CD-Rom (NICDROM) CD-Rom National Collection Centre (NCCC) Institute, Calcutta National Institute of Science Communication and Information Resources (NISCAIR), New Delhi University of Madras, Chennai

National Aerospace Laboratory, Bangalore

Indian Institute of Technology, New Delhi

- Knowledge network: NISSAT initiated a project for a Knowledge Network using local language electronic database. The objective of the project was to collect, document, translate in local languages and digitize innovations and examples of outstanding traditional knowledge mainly from rural areas, organize these in a multimedia database.
- National Access Centres to International Database Services (NACID): NISSAT established 11 NACID facilities in select cities for providing online facility to access international database services such as Dialog and STN databases.
- National server on factual science and technology information: The aim of this project was to collect and collate factual information from diverse sources, and host these on a server christened VIGYAN (http://www.vigyan.org.in) for national and international access. Indian Institute of Science, Bangalore, set up the server and managed the operations.
- National websites on S&T subjects: NISSAT initiated creation of several national websites for national and international access, such as websites on Intellectual Property Rights (http://www.iprlawindia.org), Knowledge Management (http://www.kmindia.org), Indian Traditional Textile Design (http://www.indiantextiledesign.com), Food Science and Technology (http://www.mylibnet.org), etc.
- Database development activities: NISSAT completed 11 database development projects such as Biographical database of Indian Scientists, Directory of Libraries and Information Centres in Gujarat, databases on Virus and Virology, Directory of S&T institutions in India, S.R. Ranganathan's works and letters, Database on Folk Wisdom, etc.
- Library networks: NISSAT has initiated library/information network development activities. ADINET in Ahmedabad, BONET in Mumbai, CALIBNET in Calcutta, DELNET in New Delhi, MYLIBNET in Mysore and PUNENET in Pune
- Union catalogue: To serve as a valuable tool to provide information on the availability of serials in the selected cities. Promoted development of Union List of Current & Scientific Serials (ULCSS) in major cities Ahmedabad, Bangalore, Mumbai, Calcutta, New Delhi, Goa, Nagpur, Pune and Ranchi. Also completed union list of scientific serials in Oil

Sector. Besides, Online access centers to international data services, CDROM based SDI services have been developed

- Information Technology application: NISSAT acquired rights of software packages like CDS/ISIS for bibliographic information processing and retrieval and IDAMS for statistical data processing from UNESCO. SANJAY tool was developed to improve libraries housekeeping and service function through automation. Also, TRISHNA tool developed in collaboration with National Institute of Science Technology and Development Studies (NISTADS), New Delhi supports the use of CDS/ISIS using a GIST CARD for materials in Devnagari scripts. This package was distributed to ASTINFO member countries like Nepal and Bangaladesh.
- Vidyanidhi database: Vidyanidhi was an information infrastructure, a digital library, a portal of resources, tools and facilities for doctoral research in India. Vidyanidhi was envisioned to evolve as a national repository and a consortium for e-theses through participation and partnership with universities, academic institutions and other stake holders. Vidyanidhi was created at Mysore University with the support of NISSAT.
- Skill development: NISSAT encouraged and supported manpower development programmes such as application of computers in library and information centers, use of personal computers & CDS/ISIS, TQM in library services, science and technical communication, scientomertics & bibliometrics, etc. Also, NISSAT has developed post-graduate course on information and knowledge management in collaboration with National Centre for Science Information (NCSI) and Indian Institute of Science, Bangalore, to evolve a model that could fill in the gap in professional manpower demand and supply and could be replicated elsewhere.
- Regional cooperation: NISSAT advisory committee also functioned as the National Advisory Committee of UNISIST and the National Advisory Group for ASTINFO/UNESCO (Regional Network for the Exchange of Information and Experiences in Asia and the pacific/UNESCO).
- Virtual information center: A virtual Information Center at ICICI Knowledge Park, Hyderabad, was set up under a three-year project for providing a gateway to existing information centers and fast and reliable access to information and interaction among industry, academia and public research institutions in the area of Science and Technology.
- E-publishing of scholarly journals: With the help of NISSAT, Indian National Science Academy started converting the back volumes of its journal in e-format and established a mechanism to publish the current journals also in e-format. INSA was expected to help other organizations in this matter in future.
- Model for web-driven distance education: NISSAT, in collaboration with Indira Gandhi National Open University, New Delhi, initiated a project to evolve a model that would include online lectures, chat, discussions with experts, online submission, and evaluation of exercises, etc.

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- National mapping of science: In consultation with and active participation of subject specialists, NISSAT formulated a plan of action for scientometric and informetric studies in India. As a first step in the implementation of a program of coordinated research, ten projects on National Mapping of Science using CAB, Compendex, Inspec, Science Citation Index, MEDLINE Plus, BIOSIS, EMBASE, GeoRef, CAB, Agricola, and Indian Science Abstracts were taken up.
- Other studies: NISSAT also promoted and supported research and development and survey studies. NISSAT completed a study on "Assessment of Information Needs of Small and Medium Enterprises in MP and setting up of information centres for fulfilling those needs." Two other studies on "Food Informatics and Training Opportunities in Food Technology Networking (FITOFTN) and Digital library of Natural History of Collections were also taken up."
- Publications: NISSAT had been bringing out its NISSAT Newsletter—a quarterly newsletter, since the beginning of the program. It was later renamed as Information Today & Tomorrow (ITI) and its contents were augmented in changing information scenario. The newsletter was being distributed free to 5000 individuals and institutions. The last issue of the newsletter was published in 2002.

#### 1.3.1.2 National Informatics Centre (NIC)

National Informatics Centre (NIC) was established in 1976, and has since emerged as pioneer of e-Government / e-Governance applications up to the grassroots level as well as a promoter of digital opportunities for sustainable development. NIC, through its ICT Network, "NICNET", has created institutional linkages with all the Ministries, Departments of the Central Government, 35 State Governments/ UTs and about 625 District administrations of India.

ICT driven government programmes are spearheaded by NIC to derive competitive advantage by implementing ICT applications in social & public administration. NIC has been instrumental in steering e-Government/e-Governance applications in government ministries/establishments across India facilitating government services. It also supports transparency in government services, promote decentralized planning and management for efficient functioning of government and ensures accountability. The following major activities are being undertaken by NIC:

- Setting up of ICT infrastructure across India
- Facilitating ICT based products and services from government
- Implementation of national and state level e-governance projects
- Consultancy to the government departments
- Capacity building of government and civil society
- Research and development towards new tools, process development

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During the last three decades, NIC has developed "network centric" application software for programme implementation in various ministries and departments, using state-of-the-technology software tools. During 1980s and early 1990s, the policy thrust was on creating "Management Information System (MIS)" and "Decision Support System (DSS)" for development, planning and responsive administration in governments which led to the genesis of present day "e-Governance" / "e-Government". Bridging the "Digital Divide", "social and financial inclusion through ICT and "reaching- the-unreached" concepts were tried and made operational in the late nineties.



Source: https://www.nic.in/

NIC works in broad area of ICT planning, strategizing, implementation, monitoring and data sorage of government in coordination with other government ministries/agencies. Some of the major functions of NIC include the following:

- NIC has set up state-of-the-art ICT infrastructure consisting of national and state Data Centres to manage the information systems and websites of central ministries/ departments, disaster recovery centres, network operations facility to manage heterogeneous networks spread across bhawans, states and districts, certifying authority, video-conferencing and capacity building across the country.
- NIC has several national data servers, robust cyber protection and large quantity of government open and restricted data. Besides, it also develop several knowledge management systems for ministries (websites), government schemes and programmes such as MyGov, Make India, Skill India, Swatchch Bharat, Namami Ganga, etc.
- It provides Nationwide Common ICT Infrastructure to support e-Governance services to the citizen, Products and Solutions designed to address e-Governance Initiatives, Major e-Governance Projects, State/UT Informatics Support and district level services rendered.

- NIC secured vast expertise in the design, development and operationalization of various e-Government projects in all the areas where government has taken ICT-led initiatives and implementation. NIC also provides many types of information services viz. Biomedical Information Service, Patent Information Service and Rural Information Service. In Biomedical Information Service, NIC and ICMR (Indian Council of Medical Research) have jointly set up Indian Medlars Centre (IMC) to cater to the Information needs of medical community of India. NIC has designed and developed 3 databases viz., IndMED, medIND and Union Catalogue of Biomedical Periodicals to provide quick and easy access to Indian biomedical literature. NIC provides online and oflline patents information services for users. Services' offered are bibliographic search, abstracts and full-text patent document services. Databases used for online searching include EPIDOS, INPADOC, USPTO, WPO etc which covers bibliography of patents applied and granted in 65 countries since 1968, consisting of over 33 million references. Besides, in 1986 NIC in Rural Information Service. This is outcome of NIC's IT services in villages to facilitate planning, monitoring and exchange of information between various agencies in rural development administration.
- National Knowledge Network (NKN) has been set up to connect institutions/ organizations carrying out research and development, Higher Education and Governance with speed of the order of multi Gigabits per second. Further, State Government secretariats are connected to the Central Government by very high speed links on Optical Fiber Cable (OFC). Districts are connected to respective State capitals through leased lines.
- Various initiatives like Government e-Procurement System (GePNIC), Office Management Software (e-Office), Hospital Management System (e-Hospital), Government Financial Accounting Information System (e-Lekha), National Land Records Modernization Programme (NLRMP), Transport and National Registry, Treasury Computerisation, VAT, MG-NREGA, India-Portal, e-Courts, Postal Life Insurance, etc.

#### **1.3.1.3** Environmental Information System (ENVIS)

The Economic Division, Ministry of Environment, Forests and Climate Change, Government of India implements the Environmental Information System (ENVIS) Scheme since 1984. The ENVIS serves as a single-stop web-enabled repository of comprehensive environmental information with collection, collation, storage, retrieval and dissemination of the same through a nationwide network of 62 ENVIS Hubs (hosted by the Environment/ Forest Department of State Governments/ UT Administrations) and ENVIS Resource Partners (RPs) (hosted by environment related governmental and non-governmental organizations/institutes of professional excellence).

## Objectives

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Since beginning ENVIS has been working on to collect environmental information and bridge the information gaps in different environmental areas such as forestry & biodiversity, pollution, waste management, wetlands development, disaster management, marine ecosystems, clean energy, state-of-environment etc. Recently, ENVIS has revamped to include awareness building among rural population, GIS data collection and green skill development.



Source: http://www.envis.nic.in/index.aspx

#### Activities

- Promoted, implemented and coordinated Green Skill Development Programme (GSDP), an initiative to skill youth in environment, forest and wildlife sectors and developing livelihood generation
- Implemented National Environment Survey (NES) a Grid-based Resource Information and Decision Support System (GRIDSS) for sustainable management of natural resources.
- Implemented and coordinated Community-driven Environmentally Sustainable Village Programme (CESVP) with the objective of mobilizing rural communities on environmental issues, creating decentralized models of development to empower local communities and build an awareness for sustainable practices at community level.
- Developed, maintained and disseminated environmental information for research, academics and policy support
- Enable application of modem technologies of acquisition, processing, storage, retrieval and dissemination of information of environmental nature.
- Updation and maintenance of Indian State-Level Basic Environmental Information Database (ISBEID) covering 337 environmental parameters at the state/district level on a centralized server.

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Future development potential of ENVIS network include

- Building a strong statistical base such that ENVIS is recognised as a South Asian Hub for environment information
- To promote national cooperation and liaise with agencies concerned for exchange of environment related information.
- To promote, support and assist education and personnel training programmes designed to enhance ESIM capabilities.

#### **1.** Biotechnology Information System Network (BTIS)

Recognizing the importance of information technology for pursuing advanced research in modern biology and biotechnology, a bioinformatics programme was envisaged by Department of Biotechnology (DBT) as a distributed database and network organisation, was launched during 1986-87. The computer communication network, linking all the bioinformatics centres, is playing a vital role in the success of the bioinformatics programme. Database development, R&D activities in bioinformatics, human resource development and a variety of services in support of biotechnology R&D programmes and projects, has made this programme very useful to the scientific community. Over the years, this programme has evolved as a vehicle to transfer and exchange of information, scientific knowledge, technology packages and references in the country.

The Biotechnology Information Centre (BTIC), established at the Department of Biotechnology is coordinating the entire network activities of 46 Sub-Distributed Information Centres, located in universities and research institutes of national importance. The BTIS maintains DBT website, Patent Facilitating Cell as well as maintaining several directories and databases on the research projects funded by this department. Other important activities of BTIS include:

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Source: http://www.btisnet.gov.in/

- The Network has emerged as a sophisticated scientific infrastructure for bioinformatics involving state-of-the-art computational and communication facilities
- Six national facilities have been set up for interactive graphics based molecular modelling and other bio-computational needs
- Four long term courses at the level of post MSc Diploma in Bioinformatics, at Poona University, Jawaharlal Nehru University, Calcutta University and Madurai Kamaraj University are full-filling the long outstanding need for trained human resources
- More than 100 databases dealing with different aspects and of relevance to R&D efforts in biotechnology are now available on the network
- A national node of EMBnet has been established at the Centre of DNA Fingerprinting and Diagnostics (CDFD), Hyderabad

With these resources now available on the BTISnet, it has now become a single largest information resource for all references to biotechnology related literature, scientific data, patent information, policy matters and related issues.

# 1.4 NATIONAL INFORMATION SYSTEMS ON SOCIAL SCIENCES & HUMANITIES

**1.4.1** National Social Science Documentation Centre (NASSDOC)

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National Social Science Documentation Centre (NASSDOC), was established in 1969 as a Division of the Indian Council of Social Science Research (ICSSR) with the objective to provide library and information support services to researchers in social sciences; those working in academic institutions, autonomous research organisations, policy making, planning and research units of government departments, business and industry etc.

NASSDOC also provides guidance to libraries of ICSSR supported Research Institutes and Regional Centres.

NASSDOC intends to meet challenges of digital environment for social scientists by creating, applying and utilizing information with ICT driven services, automated library collection, WEBOPAC, online databases/e-resources etc. NASSDOC has a rich collection of reference sources, bibliographies, 5,500 doctoral theses, over 11,000 bound volumes of periodicals, 3400 research project reports and 15,500 books. Besides, users can also access working papers, seminar papers, ICSSR publications, other subscribed resources etc.



Source: https://icssr.org/nassdoc

NASSDOC provides varieties of documentation, library and information services in social science areas, which include following services and database development/maintenance. NASSDOC services and Databases

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- Library and reference service
- Bibliography on demand
- Online Databases/CDs search facility
- Literature search from e-resources
- Acquisition of Ph.D theses, Grey literature
- Document delivery/inter-library loan
- Provides Current Awareness Service to social scientists and LIS professionals by bringing out different publications on regular basis eg. New Arrivals, Bibliographic Reprints, Conference Alert, Doctoral Dissertation Abstracts
- Provides access to JSTORE to ICSSR research institutes
- Consortium of E-resources: ICSSR has established ICSSR Consortium of e-resources.

- Annotated Index to Indian Social Science Journals
- Directory of Social Science Research and Training Institutes in India, 2005
- Directory of Social Scientists in India, 2006
- Holding List of Periodicals, 2007
- ICSSR Research Project Reports, 2000-2005 (Abstracts)
- INSPEL (Indian Social Science Periodical Literature) up to 1970 (Retrospective Index)
- Union List of Current Social Science & Humanities Periodicals: Delhi Libraries, 2004-05.
- Digitized access to PhD theses

#### Other services and information products

Web-hosting of ICSSR Journals (ICSSR Journal of Abstracts and Reviews on Economics, Geography, Political Science, Sociology and Social Anthropology; Indian Psychological Abstracts and Reviews)

#### Supporting LIS projects & other funding support

- NASSDOC supports bibliographical and documentation projects which may include research proposals in the field of library and information sciences and compilation of research / reference tools for the social scientists. The project proposals should fall under one of the following categories:
- Financial assistance to PhD Scholars for consulting libraries and archives anywhere in India.
- Grants-in-Aid to Bibliographical and Documentation Projects: Financial assistance for research in Library and Information Science and compilation of research/reference tools for social scientists.
- Continuing Education Programme: Short-term training workshops / seminars / interactive sessions / lectures for the social science community & Library and Information Science Professionals to upgrade their knowledge.
- Apprenticeship and Internship: Practical training for library and information Science students.

## **1.4.2** National Institute of Science Communication and Information Resources

#### (NISCAIR)

NISCAIR, a body under Council of Scientific and Industrial Research (CSIR), erstwhile known as Indian National Scientific Documentation Centre (INSDOC), came into existence in 2002 with the merger of National Institute of Science Communication (NISCOM) and Indian National Scientific Documentation Centre (INSDOC). Both NISCOM and INSDOC were devoted to dissemination and documentation of S&T information across India.

#### Objectives

- Develop formal linkages of communication and disseminate information among the scientific community in different areas of S&T, public, students to inculcate interest in science.
- Collect, collate and disseminate information on plant, animal and mineral wealth of the country.
- Promote information technology applications in information management through science communication and modernizing libraries.
- Act as a facilitator in providing timely access to relevant information in economic, social, industrial and scientific areas.
- Develop human resources in science communication, library and documentation services.
- Collaborate with international institutions and organizations

#### Achievements

- Implementation of Online Access of NISCAIR's Primary Journals through open source digital repository system software. The repository has about 6400 articles.
- NISCAIR is the nodal organization for developing a National Knowledge Resource Consortium (formerly CSIR e-Journals Consortium) for CSIR laboratories for accessing e-journals. The activity includes subscription, monitoring access facility of scientific periodicals published by leading publishers and international institutions.
- NISCAIR developed and maintain the TKDL (Traditional Knowledge Digital Library) database to protect Indian traditional medicinal plant information from international misuse. This is done through international Patent Classification (IPC)-Traditional Knowledge Resource Classification (TKRC) concordance list.



#### Activities and Services

- NISCAIR maintains Online periodicals Repository, National Science Library, National Knowledge Resource Consortium, National Union Catalogue, multiple databases, etc and provide services to S&T community.
- NISCAIR facilitates science communication, dissemination and S&T information management systems and services using modern IT infrastructure. NISCAIR collect, store, publish and disseminate S&T information through a mix of traditional and modern means
- The institute offers wide range of information services ranging from literature search to production and printing of S&T publications.
- The institute has strong human resource development programme for training personnel in library & information science, documentation, science communication etc.
- NISCAIR also undertakes projects on turnkey basis for other organizations in design and development of databases, automation and modernization of libraries, editing and production of various publications like journals, books, conference proceedings, annual reports, etc.

## **1.4.3** Defence Scientific Information and Documentation Centre (DESIDOC)

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DESIDOC was established in 1958 under the Defence Research and Development Organisation (DRDO) to serve primarily the information requirements of DRDO scientists. In 1967, it became an independent institution under DRDO.

**Objective:** DESIDOC functions as a central agency in DRDO to collect scientific and technical information from various published and unpublished sources and to process and disseminate it to various user groups in the defence establishments. It has also a coordination role in the information set-up of DRDO. DESIDOC library, Defence Science Library (DSL), is a fully automated ISO 9001:2008 certified library to provide information related to defence science and technology to the project leaders, top management, and research community of DRDO within least possible time.

**DSL strength:** The DSL is equipped with RFID technology and has a rich collection in the fields of physics, chemistry, materials, electronics, aerospace, life sciences, computer science, mathematics, remote sensing and defence science technology. It has rich collection of 75,000 books, one lakh technical reports, 30,000 SPIE conference proceedings and latest defence related reference materials. It has special collection of standards, specifications, Jane's publications etc. to meet the information requirement of scientific community. It subscribes to 600 online journals and 200 print periodicals. DSL has one lakh bound volumes of journals from various publishers.

**DESIDOC Services:** DSL provides both traditional and digital library services to users. The following library services are extended to the scientific community of DRDO as per their information requirements

- Digital Library & E-Services (DILES)
- Koha OPAC
- Current awareness service including newspaper clipping service
- Selective Dissemination of Information Service
- Infowatch Service (Cluster based)
- Reference Service
- DESIDOC provides DRDO E-Journals service to DRDO fraternity. Nearly 50 lakh full text articles were viewed by users.

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Source: https://www.drdo.gov.in/labs-and-establishments/defence-scientific-information-

documentation-centre-desidoc

- Digital Library & E-Services (DILES)
- It is providing Library Automation Service to all DRDO TIRCs and subsequently, will integrate the OPACs of all these libraries, so that DRDO users will be able to search the library holdings of any DRDO TIRC through a single interface
- It is a digital library platform for DRDO, so that all the library resources (OPACs and Eresource like e-Journals, e-Books etc) can be accessed (searched or browsed) through this single platform. This platform provides access to a pool of openly available e-resources also. Presently 3000 DRDO scientists/ staff are benefitting from this e-Library by enrolling themselves as members.
- This digital library platform of DRDO is also accessible through mobiles and other handheld devices to ensure 'Anywhere-Anytime Access' of e-resources. To ensure this, the division has developed dedicated mobile-app for library services.
- DILES also looking after the National Digital Library related activities of DESIDOC which is the nodal agency on behalf of DRDO.

**Network service:** DESIDOC is responsible for designing; hosting and maintenance of DRDO website on Internet, DRDO Intranet administration and co-ordination, designing, hosting, maintenance of DESIDOC website, Internet services through OFC based leased lines. The division is also engaged in software development, hardware maintenance, network management

**DRDO Publications:** DESIDOC brings out publication of three peer-reviewed journals; Defence Science Journal (DSJ), Defence Life Science Journal (DLSJ) and DESIDOC Journal of Library & Information Technology (DJLIT). DESIDOC also publishes Monographs and special publications authored by retired eminent scientists. Further, it brings out a monthly DRDO Newsletter which is bilingual and a bi-monthly magazine Technology Focus

#### **1.4.4 Small Enterprises National Documentation Centre (SENDOC)**

SENDOC was set up in 1970 by SIET to support MSMEs in India and the developing countries around the world with information and knowledge. Since then, it has been functioning as a clearing house of information both for entrepreneurs and extension agents. The Centre has emerged as a one-stop global and IT powered information centre for a wide spectrum of MSMEs, academia, students, research institutions, industry associations and entrepreneurs.

**Objectives:** The objectives of the Centre are to collect, store and disseminate technomanagerial information pertaining to MSMEs and to conduct need and demand based training programmes.

**Strengths:** The library of the SENDOC possesses 70,000 books, 18,000 back volumes of journals, 30,000 reports, 65,000 journal abstracts, 7,500 product profiles, and subscribes to 140 national and international periodicals. It has also a collection that provides information on statistics, economics, production, finance, marketing, technology, machinery and equipment, raw materials, consultants, Government policies and programmes, exports and imports, investment, trade and area literature, licensing, etc. Experts working in the Centre scan and arrange information systematically for quick retrieval using LIMS (Library Information Management System) package. The information is accessible through our website www.nimsme.org.

Services: Some of the important services provided by the Centre for MSMEs are:

- Inter-library lending of documents
- Lending of books
- Reference Services (preparation of bibliographies) and literature search
- Newspaper clippings (on select items)
- Technical enquiry
- Reprographic Services
- It also provides consultancy service, product profiles, and organises training programmes for clientele on cost.

**Publications:** SENDOC plays a crucial role in the publication of the primary quarterly research journal 'Small Enterprises Development, Management and Extension (SEDME)' since 1974 which is dedicated to small entrepreneurs and academia who wish to express and exchange their thoughts on any facet of MSMEs. It also publishes monthly News Bulletin (monthly) highlighting MSME development news.

#### 1.4.5 Developing Library Network (DELNET)

DELNET, was set up as a society in 1992. It was initially supported by the NISSAT, DSIR, Government of India, but was subsequently supported by the National Informatics Centre, Department of Information Technology, Ministry of Communications and Information Technology, Government of India and the Ministry of Culture, Government of India.



Source: https://delnet.in/index.html

#### Objectives

DELNET was established to promote resource sharing among the libraries through the development of a network of libraries. It was aimed to collect, store and disseminate information to users and also to build computerised databases, union catalogues and offer services on user demand. The resource sharing was aimed to reduce duplication of information resources and cost reduction in organizations wherever possible.

#### Activities

DELNET has been actively engaged with the compilation of various UnionCatalogues of the resources available in 5000 member-libraries. It has created and maintain Union Catalogues and databases of books, periodicals, CD-ROMs, Indian specialists, articles, video recordings, urdu manuscripts, theses and dissertations, Indian language publications etc. All the DELNET databases have been developed on in-house software developed on BASISPlus, an RDBMS which has been provided by NIC. DELNET'S relentless efforts in resource sharing has contributed a lot towards the modernization of libraries in India. It has provided document delivery and inter library loan support, library automation and software development support and reference services to member libraries.

## 1.4.6 Information and Library Network (INFLIBNET)

INFLIBNET (Information and Library Network) was set up under UGC in 1991, is a computer communication network for linking libraries and information centres in

universities, deemed to be universities, colleges, UGC information centres, institutions of national importance and R&D institutions, etc.

### Objectives

INFLIBNET to promote and establish communication facilities and provide knowledge access to improve capability in information transfer that provide support to resource sharing, learning, research and academic pursuit and skill development through cooperation and involvement of agencies concerned. Major objectives include

- Establish a national library network interconnecting various libraries and information centres in the country and to improve capability in information handling and services
- Promote and implement computerization of operations and services in the libraries and information centres of the country
- Promote uniform standard and guidelines in LIS functions, techniques, procedures, computer hardware and software and services
- Encourage and facilitates sharing of resources towards optimal use through shared cataloguing, inter-library loan, catalogue production, collection building, database development
- Provide reliable access to document collection of libraries by creating on-line union catalogue of serials, theses/ dissertations, books, monographs and non-book materials
- Provide access to bibliographic information sources with citations, abstracts, etc. through indigenously created databases
- Create databases of projects, institutions, specialists, etc. and facilitates on-line information service delivery
- Train and develop human resources in the field of computerized library operations and networking.

## **Major Activities**

INFLIBNET centre has taken-up a number of new initiatives for benefit of the academic and research community in universities and colleges. These initiatives include

- Shodhganga: a reservoir of Indian Theses and Dissertations
- Shodhgangotri: a repository of approved synopsis submitted to the universities for registration under Ph.D programme
- OJAS@INFLIBNET: An open access journal publishing platform
- Shibboleth-based access management system
- Development of open source software R& D promotion
- InfoPort: A comprehensive gateway to all Indian electronic scholarly content
- e-PG Pathshala: a platform of e-Contents for PG courses in different disciplines
- Measuring research output of Indian Universities.
- The centre developed and promoted SoUL software to standardize library OPAC and collection development

Also, INFLIBNNET initiated "UGC-Infonet Digital Library Consortium" and provided access to major scholarly electronic journals and databases in different disciplines. The Centre is responsible for execution and monitoring access to e-resources to all Govt. / Govt-aided colleges under a project entitled "National Library and Information Infrastructure for Scholarly Content (N-LIST)" funded by the MHRD.

# 1.5 RECENT GOVERNMENT INITIATIVES SUPPORTING NATIONAL INFORMATION SYSTEM

## **1.5.1** National Knowledge Commission (NKC)

The ability of a nation to use and create knowledge capital determines its capacity to empower and enable its citizens by increasing human capabilities. In the next few decades, India will have the largest set of young people in the world. Following a knowledge oriented paradigm of development would enable India to leverage this demographic advantage.

With this broad task in mind, the National Knowledge Commission (NKC) was constituted and functioned during October 2005 to 2nd October 2008. As a high-level advisory body to the Prime Minister of India, the National Knowledge Commission has been given a mandate to guide policy and direct reforms, focusing on certain key areas such as education, science and technology, agriculture, industry, e-governance etc. Easy access to knowledge, creation and preservation of knowledge systems, dissemination of knowledge and better knowledge services are core concerns of the commission.

#### Objectives

The overarching aim of the National Knowledge Commission was to enable the development of a vibrant knowledge based society. This include both a radical improvement in existing systems of knowledge and also creating avenues for generating new forms of knowledge. Greater participation and more equitable access to knowledge across all sections of society were recognized as vital components in achieving these goals.

In view of the above, the NKC wanted to develop appropriate institutional frameworks to:

• Strengthen the education system, promote domestic research and innovation and facilitate knowledge application in sectors like health, agriculture, and industry.

• Leverage information and communication technologies to enhance governance and improve connectivity.

• Devise mechanisms for exchange and interaction between knowledge systems in the global arena.

In its endeavour to transform the knowledge landscape of the country, the National

Knowledge Commission had submitted around 300 recommendations on 27 focus areas during its three and a half year term where constitution of National Library Mission was recommended for implementation under Ministry of Culture, Government of India.

While the term of the NKC has come to an end, the implementation of NKC's recommendations is currently underway at the Central and State levels in various forms.

Some of the recommendations of NKC have already been undertaken for implementation as part of other government schemes.

#### **1.5.2** National Mission on Libraries

National Mission on Libraries has been set up by Ministry of Culture, Government of India, on May, 2012 in pursuance of National Knowledge Commission recommendations for sustained attention for development of Libraries and Information Science Sector. National Mission on Libraries set up four working groups and after deliberating on the recommendations of the working groups formulated the scheme "National Mission on Libraries (NML) - upgradation of libraries providing service to the public". The scheme consists of four components.

Creation of National Virtual Library of India (NVLI) - The purpose of National Virtual Library of India is to facilitate a comprehensive database on digital resources on information about India and on information generated in India, in an open access environment.

Setting up of NML Model Libraries - The setting up on NML Model Libraries would develop 6 Libraries under Ministry of Culture, 35 State Central Libraries and 35 District Libraries with particular emphasis on economically backward districts, as model Libraries. In addition, 629 district libraries across the states would be provided network connectivity.

Quantitative & Qualitative Survey of Libraries - The Quantitative and Qualitative Survey of Libraries would be undertaken to prepare a baseline data of libraries in India through a survey of 5000 Libraries.

Capacity Building - The Capacity Building would be undertaken to enhance the professional competence of library personnel.

#### **1.5.3** National Mission for Manuscript

The National Mission for Manuscripts was established in February 2003, by the Ministry of Tourism and Culture, Government of India. A unique project in its programme and mandate, the Mission seeks to unearth and preserve the vast manuscript wealth of India. India possesses an estimate of five million manuscripts, probably the largest collection in the world. These cover a variety of themes, textures and aesthetics, scripts, languages, calligraphies, illuminations and illustrations. Together, they constitute the 'memory' of India's history, heritage and thought. These manuscripts lie scattered across the country and beyond, in numerous institutions as well as private collections, often unattended and undocumented.

The National Mission for Manuscripts aims to locate, document, preserve and render these accessible—to connect India's past with its future, its memory with its aspirations.

• Locate manuscripts through national level Survey and Post-Survey.

• Document each and every manuscript and manuscript repository, for a National Electronic Database that currently contains information on one million manuscripts making this the largest database on Indian manuscripts in the world

• Conserve manuscripts incorporating both modern and indigenous methods of conservation and training a new generation of manuscript conservators

• Train the next generation of scholars in various aspects of Manuscript Studies like languages, scripts and critical editing and cataloguing of texts and conservation of manuscripts

• Promote access to manuscripts by digitizing the rarest and most endangered manuscripts

• Promote access to manuscripts through publication of critical editions of unpublished manuscripts and catalogues

• Facilitate public's engagement with manuscripts through lectures, seminars, publications and other outreach programmes

Challenges before the Mission

• The manuscript wealth of India is estimated at around five million manuscripts and is perhaps the largest collection of in the world.

• Manuscripts are found in a vast number of languages and scripts many of which can no longer be read.

• Manuscripts are found in different kinds of repositories—ranging from museums, institutions of learning to private homes and houses of worship, big and small.

• Manuscripts are often found to have been neglected for decades and in very poor physical state—insect ridden, fungus infected or brittle, fading and fragile.

• Major lack of connection between so-called 'modern knowledge' and the knowledge contained in manuscripts. Scholars who can study and use manuscripts are fast disappearing and a new generation of scholars is not able to rise to the challenge. Often, the knowledge in manuscripts is not seen as relevant to our times.

## **1.5.4** National Digital Library of India (NDLI)

NDLI is a virtual repository of learning resources sponsored and mentored by Ministry of Education, Government of India, through its National Mission on Education through Information and Communication Technology (NMEICT). It is developed, operated and maintained from Indian Institute of Technology Kharagpur. NDLI offers availability of diverse resources such as books/audio books, lectures/video lectures, presentations, simulations, lecture notes, question papers and solutions etc. It offers a free NDLI Club facilities to access all resources. Presently, NDLI covers over 8.6 crore resources from across Indian organizations in multiple languages.

## Objectives

• Developing a single-window learning platform to meet India's complex mix of learning needs spanning from multiple languages, geographies, socio-economic groups to multiple streams and levels of proficiency.

• Paving the way to democratize education in the country through digitisation so that access can be provided to all leading to collaborative learning, knowledge sharing and grow. This also supports entrepreneurship in digital learning.

• A virtual teaching-learning-evaluation-knowledge discovery and innovation platform to encourage collaborative, personalized, self-paced, new-age multi-media education at all levels.

• A movement for integrated digital learning across India by engaging learners and promote effective utilization of NDLI's vast resources through competitions, training sessions and workshops.

• NDLI also collaborate with international reputed organizations and bring best practices to digital learning in India.

Source: https://ndl.iitkgp.ac.in/

### Services offered

• NDLI offers online search/browse facilities, which also provides a host of services for the learner community, which include

• Filtered and federated searching to facilitate focused searching to access resources with least effort and in minimum time.

• NDLI provides user group-specific services such as Examination Preparatory for School and College students and job aspirants.

• NDLI is designed to hold content of any language and provides interface support for 10 most widely used Indian languages.

• It is built to provide support for all academic levels and learners from all disciplines.

• NDLI offers people to learn and prepare from best practices from all over the world and to facilitate researchers to perform inter-linked exploration from multiple sources.

National Digital Library of India Club (NDLI Club) is an enabler of career progression for students, job seekers, researchers and learners. NDLI Clubs are set up in institutes and nodal bodies, and these Clubs conduct events to facilitate students to develop knowledge, skill and traits beyond regular curriculum which are essential for their progression in respective professional domain.

## 1.5.5 Digital India programme

Digital India is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy. E-governance initiatives in India took a broader dimension in the middle of 1990s for wider sectoral applications with emphasis on citizen-centric services. The major ICT initiatives of the Government included some major projects, such as railway computerization, land record computerisation etc. which focused mainly on the development of information systems across India and facilitate citizens journey towards a information society. Later on, many states started ambitious individual e-governance projects aimed at providing electronic services to citizens.

Digital India has initiated many e-governance services, Apps and platforms for citizens use. Some of the important projects conceptualised and implemented under Digital India programme are included here.

**Agrimarket App:** This mobile application aims to keep farmers abreast with the crop prices and discourage them to carry-out distress sale. Farmers can get information related to prices of crops in markets within 50km of their own device location using the AgriMarket Mobile App. This app automatically captures the location of the farmers using mobile GPS and fetches the market prices of crops. Currently, the apps is available in English and Hindi languages.

Website. http://mkisan.gov.in/downloadmobileapps.aspx

**E-Granthalaya:** It is an Integrated Library Management Software developed by National Informatics Centre,(NIC), Department of Electronics & Information Technology. The application is useful for automation of in-house activities of libraries and to provide various online member services. The software provides built-in Web OPAC interface to publish the library catalogue over Internet. The software is UNICODE Compliant, thus, supports data entry in local languages.

Website. http://egranthalaya.nic.in/

**Knowledge Management System (KMS):** Knowledge Management Portal has been created to establish a culture where knowledge is captured, shared, created and reused by government departments and officials. It provides a platform to leverage the transformation of data to knowledge by systematically aligning with the organizational goals and strategy. Website. https://kms.negd.in

**Learning Management System (LMS):** Learning Management System (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of electronic courses (e-learning) and training programs. As a capacity building tool, LMS facilitates efficient administration of e-learning and training for various government officials both at centre and states/union territories. It has the objective of enhancing knowledge and skills of users as per their roles envisaged in the e-Governance Competency Framework (eGCF).

Website. https://lms.negd.in/

Accessible India Campaign and Mobile App: Sugamya Bharat Abhiyaan or Accessible India Campaign is a nation-wide flagship campaign for achieving universal accessibility that enables people with disabilities to gain access for equal opportunity, live independently and participate fully in all aspects of life in an inclusive society. The campaign targets at enhancing the accessibility of built environment, transport system and Information and communication ecosystem. The mobile application is a crowd sourcing platform to comprehensively obtain information on inaccessible places across the country.

Website. http://accessibleindia.gov.in/content/

**Bhim (Bharat Interface for Money):** This app makes payment transactions simple, easy and quick using Unified Payments Interface (UPI). It enables direct bank to bank payments instantly and collect money using a Mobile number or Payment address.

Website. http://www.bhimupi.org.in/

**e-Courts:** A total of 11,810 courts have been computerized. Site preparation activity has been completed at 874 courts, Local Area Network has been established at 3,508 courts, ; Computer hardware and software has been deployed at 2,482 courts. Around 8,300 district and subordinate courts across India have started providing key services like Case Filing, Registration, Case Allocations, Cause Lists, Daily Case Proceedings, Case Registrations, etc. Website: https://ecourts.gov.in/

**e-Hospital:** e-Hospital has been developed by NIC and has been implemented at 17 different hospitals across the country. The modules being implemented include OPD registration

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including appointments, cash & billing, inventory management system, casualty patient registration and in-patient registration, ward management, lab and radiology services and blood bank management.

#### Website: https://ehospital.gov.in/

**National e-Governance Services Ltd (NeSL):** It is India's first information utility and is registered with the Insolvency and Bankruptcy Board of India (IBBI) under the aegis of the Insolvency and Bankruptcy Code, 2016 (IBC). The company has been set up by leading banks and public institutions. The primary role of NeSL is to serve as a repository of legal evidence holding the information pertaining to any debt/claim, as submitted by the financial or operational creditor and verified and authenticated by the parties to the debt.

Website: https://nesl.co.in/

**National e-Services Dashboard (NeSD):** Govt. of India and State Govt. have been implementing large number of e-Governance projects. Various G2C, G2B and G2G services are being delivered by the Ministry/ Departments or Government Organization. The requirements of consolidation of all the e-service transaction counts being felt at various levels. NeSD is being conceptualized keeping in view the above mentioned requirements. It is a graphics rich dashboard and disseminates e-Transaction statistics of Central and State level e-Governance Projects including Mission Mode Projects (MMPs). It receives transaction statistics from web based applications periodically on near real time basis.

Website: https://www.india.gov.in/e-governance-portal

**e-Districts:** A number of G2C services are rendered electronically to the citizens at the district/block/sub block level. The list includes different types of certificates such as Income Certificate, Caste Certificate, and Residence Certificate, etc. along with other services such as Scholarship portals, permits, passes, licenses, to name a few. The eDistrict portals of each State provides analysis of these citizen centric services in various states including the services offered under eDistrict MMP. The services have been categorized into 34 core services for conducting the analysis. The analysis is based on the data compiled and sent by respective DIOs of NIC. It contains data collected from most of the states and union territories across different districts.

**Farmer Portal:** The portal is envisaged to make available relevant information and services to the farming community and private sector through the use of information and communication technologies, to supplement the existing delivery channels provided for by the department. Farmers' Portal is an endeavour in this direction to create one-stop-shop for meeting all informational needs relating to agriculture, animal husbandry and fisheries sectors production, sale/storage of an Indian farmer. With this Indian Farmer will not be required to sift through maze of websites created for specific purposes.

Website. http://farmer.gov.in/

**ePanchayat:** Panchayat Enterprise Suite (PES) under ePanchayat mission mode project was implemented. Data porting activities for some of the existing applications have already been completed. As part of integration activity, PRIASoft and PlanPlus have been integrated with other PES applications, in particular Local Government Directory. Training is being

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undertaken across the country on all PES applications. So far, more than 3000 people have been trained on one or more PES applications.

Website. http://epanchayat.in/

**Data Portal India:** Data Portal India has been set up in compliance with the National Data Sharing and Accessibility Policy (NDSAP) to provide single point access to all the datasets published by different government departments in open format. It also provides a strong search & discovery mechanism for instant access to desired datasets. Data Portal has a rich component of citizen engagement. Data Portal has a backend system which can be used by government departments to publish their datasets through a predefined workflow. Data Portal also has a 'Communities' component which facilitates forming of communities around datasets, domain of interest such as agriculture, education, health, or it could be application developer's community or even of data journalists.

Website: http://data.gov.in

**Geological Survey of India (GSI):** The portal has been developed through the Online Core Business Integrated System Project (OCBIS). The objective behind the portal is to provide a single window access to the information and services being provided by the GSI for the broad geoscientific community, citizens and other stakeholders. An attempt has been made through this portal to provide comprehensive, accurate, reliable and single point source of information about GSI, its activities, achievements, geoscientific information and its various facets.

Website. https://www.gsi.gov.in/

Though these e-governance projects were citizen-centric, they could make less than the desired impact due to their limited features. The isolated and less interactive systems revealed major gaps that were thwarting the successful adoption of e-governance along the entire spectrum of governance. It clearly pointed towards the need for a more comprehensive planning and implementation for the infrastructure required to be put in place, interoperability issues to be addressed etc., to establish a more connected government.

# 1.6 NATIONAL ORGANIZATIONS SUPPORTING INFORMATION SYSTEMS

## **1.6.1** University Grants Commission (UGC)

The University Grants Commission (UGC) is a statutory organization established by an Act of Parliament in 1956. This is a national body for the co-ordination, determination and maintenance of standards of college-university higher education. In addition to its role of giving grants to universities and colleges; the UGC also advises union and state governments on the educational measures necessary for the improvement of university education including new university requirement; frames regulations; formulation, evaluation and monitoring of curriculum and programmes.

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The Commission has also played a major role in promoting library and information services in universities and colleges. The Commission provides substantial grants for the acquisition of educational resources, other infrastructural facilities also like library buildings, furniture and equipment grants are given in every five-year plan period. Besides, it has also established and constituted a number of libraries/information centers, study centers and committees to improve quality education and library services. Following activities of UGC are highlighted in the field of library and information activities.

- Financial assistance to university and college libraries for purchasing resources, library buildings, infrastructures, staff recruitments and training
- Setting up several high power committees to promote library infrastructure, services, LIS schools, innovative service development, staff salary and designation standardization, and curriculum development in library & information science.
- Establishment of National Information Centres
- Establishment of INFLIBNET to facilitate library network, software development, resource sharing, database development, and training of LIS staffs
- Modernization of university libraries through automation and computerize their services. It helped university libraries financially and intellectually to connect various network programmes like INFLIBNET to provide computerized information service to its users
- National review committee on university and college libraries to assess financial requirements, prepare a status report of university and college libraries, and devise a strategy for the future for smooth

#### 1.6.2 Raja Rammohun Roy Library Foundation (RRRLF), Calcutta

#### http://rrrlf.nic.in/Default.aspx

Raja Rammohun Roy Library Foundation was established in May 1972, is an autonomous organization, established and sponsored by the Department of Culture, Govt. of India. Its headquarters is located at Calcutta. The foundation is to promote and support the public library in the country by providing finance, adequate library services and by developing reading and learning habits. This objective is achieved with the active cooperation of state governments and union territories and of voluntary organizations operating in the field of library services, cultural activities, adult education etc

**Objectives:** Major objectives of RRRLF include

- Formulating a national library policy and working towards its adoption by the union and state governments and persuading them to enact library legislation
- Developing a national library system by integrating the services of national libraries, state central libraries, district libraries and other types of libraries
- Acting as a clearing house for ideas and information on library development
- Providing financial assistance to libraries, to regional and national library associations and to other organisations engaged or interested in the promotion of library development

• Taking measures and support research to develop solutions to problems of library development in India

Besides being a fund disbursing body, the foundation is a nodal agency of the union government in the field of public libraries and functions as a national agency for coordinating, monitoring and developing the public library movement.

## **Programmes and Schemes of Assistance**

The foundation has functioned as a promotional agency and provided advisory and consultancy support to public libraries in India. Also, worked as a funding body for public library development in India. The foundation has covered almost 35,000 libraries at different levels throughout the country. The foundation has taken a number of steps to promote and develop all types of public libraries under certain schemes

- Building up of an adequate stock of books and other reading and visual materials
- Development of rural book deposit centres and mobile library services.

There are seven other schemes under which financial assistance is also rendered to different libraries and information organizations.

- Organisation of seminars, workshops, training courses (orientation/refresher) and book exhibitions
- Assistance towards storage and display of books
- Assistance to provide public library services
- Assistance to public libraries below district level for increasing accommodation;
- Assistance to state central libraries and distinct libraries to acquire educational infrastructures
- Assistance to children's libraries or children's sections of general public libraries
- Assistance to public libraries towards centenary celebrations.

## **Other Promotional Activities**

- The foundation also played a major role in the preparing a national policy on library and information system and issued guidelines on public library system and services.
- RRRLF initiated digitizing rare books, including pre-Independence newspapers, journals and other documents housed in public libraries. A Digital Repository will be created for providing access to all stakeholders to digitized documents. Selected copyright-free materials, including paintings, photographs, manuscripts etc., available in public libraries will also be digitized and will be made available to the public.
- Raja Rammohun Roy Memorial Lecture by a scholar of eminence is an annual feature of anniversary celebrations for the Foundation.
- RRRLF also interacts with many national and international professional associations like IFLA, ILA, IASLIC and different state level library associations.
- The Foundation introduced Annual Raja Rammohun Roy Award to the best contributor of an article covering the area of development of Public Library Systems and Services or suggesting measures for promotion of reading habit.

- The Foundation has also undertaken a programme of giving seven awards annually one for the best State central Library and six for the best District Libraries of six regions in the country.
- The Foundation institutes "RRRLF Fellowship" to offer fellowship to five eminent men and women in the field of Library Services who have contributed to the library movement in the country.

## 1.6.3 National Library of India

## Source: http://www.nationallibrary.gov.in/

The Calcutta Public Library (established in 1836) and the Imperial Library (founded in 1891) was amalgamated to Imperial Library in 1903 at Metcalf Hall, Kolkata. After Independence the Government of India changed the name of the Imperial Library to the National Library, with the enactment of the Imperial Library (Change of Name) Act, 1948. On 1 February 1953 the National Library was opened to the public at it's present location in Belvedere Estate. The National Library receives books and periodicals in almost all Indian languages under the Delivery of Books and Newspapers (Public Libraries) Act 1954 (D.B. Act) and also develop collection of CD-ROMs. The library has multiple divisions for acquiring, maintenance and preservation of Indian languages collections. Besides, computerized data collection and maintenance division etc are also functioning to conduct digitization activities. **Objectives** 

- Acquisition and conservation of all significant national production of printed material, concerning the country and also acquisition of photographic records of material which are otherwise not available with in the country.
- Acquisition and conservation of foreign material required by the country.
- Rendering of bibliographical and documents services of current and retrospective material, both general and specialised.
- Acting as a referral centre purveying full and accurate knowledge.
- Develop Indian languages collection
- Language divisions acquire, process and provide reading materials in all major Indian languages. Hindi, Kashmiri, Punjabi, Sindhi, Telugu and Urdu language divisions maintain their own stacks. Other language books are stacked in the Stack division. Language divisions are also responsible for answering reference queries.

## Strength of Library collection

The National Library perform has a national repository of published books in India and CD-ROMs. The web-OPAC has over 9,50,000 records, including books in foreign languages, bound journals, and maps. Besides National Library has access to huge online open educational resources consist of multiple databases, online books, periodicals, reports etc. The National Library has now acquired several online databases such as Oxford English Dictionary, Oxford Bibliographies On-line, House of Lords Parliamentary Papers, ebrary Online Books, Oxford Journals, SAGE Online Journals, Cambridge Companion Online,

Cambridge Law Report, Orlando Women's Writing, Shakespeare Survey Online and ProQuest Dissertations (Full Texts).

The Computer division was established in 1988 to assist in the modernisation programmes of the library. The library has so far digitized and archived over 25000 rare and brittle books, 6837 reports and the digitization process is under way. English books and documents published before 1900 and Indian publications of pre-1920 are considered for digitisation. So far 11448 selected books in Indian and English languages have already been digitized. Some of the notable titles already archived on CDs are Documents of East India Company, e.g. Report of the Proceedings of the East India Company in regard to the Production of Cotton Wool (1788), Bengal Selection of Records (1826), Prabasi journal in Bengali, Land Settlement Reports. Earliest book archived on CD is entitled The Fam'd Romance Rendered into English by Charles Cotterell (1667), Les voyages de Jean Struys en Moscovie (1720), Calcutta Monthly Magazine (1797) etc.

#### Services

- Provide reading, local and outstation membership
- Facilitates lending services and Inter-library loan facility
- Reprographic services, bibliographic services
- Book exhibitions for users and general public eg. the National Library has put on public view rare manuscripts and books of Rabindranath Tagore on the occasion of the 150th birth anniversary of the poet.
- Services for children to inculcate reading habits
- Training and guidance to youths including organizing seminars, workshops etc for promotion of education and research
- One of the basic functions of the National Library is to preserve the printed documents for future generations. For this purpose, the library has separate divisions for physical, chemical, reprographic and digital preservation of documents.

## **1.6.4** National Medical Library (NML)

This library was initially conceived as departmental library having a small collection of books for the use of officers of the erstwhile Directorate General of Indian Medical Services (DGIMS) in 1947. Realizing the need for a Central Library to support academic, research and clinical work of Biomedical Professionals in the country, the Directorate General of Health Services (Dte.GHS) library was developed gradually and declared as Central Medical Library in 1961 and as the National Medical Library on 1st April 1966.

## Objectives

The National Medical Library aims to provide wide and efficient library and information services to the health science (HS) professionals in India. It functions under the administrative control of the Directorate General of Health Services.

## Library strength

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The Library is mainly a reference library in the field of Medical and Allied Sciences with all library services. It has 7.5 lakh volumes of books, reports, bound volume of journals and other literature and adds latest books and serials every year. It also subscribes to 1500 current periodicals. The library has good collection of 19th century literature. NML's electronic resources in medicine has been conceptualised into NML-ERMED Consortium, an initiative taken by Dte.GHS & MOHFW to develop nationwide electronic information resources in the field of medicine for delivering effective health care. 70 state and centrally funded Government Institutions including all AIIMS are selected as its members. The members are divided into Level-I and Level-II on the basis of number of end-users in different institutes. The consortium will continue to be expanded and updated on an ongoing basis and presently subscribing to 242 high quality online e-journals from 5 leading publishers including British Medical Journal Publishing, Cambridge University Press, Lippincott Williams & Wilkins, Oxford University Press, John Wiley & Sons.

#### 1.6.5 National Association of Software and Service Companies (NASSCOM)

The NASSCOM is the industry association for the IT-BPM sector in India. It's objective is to build a growth-led, sustainable, technology and business services segment in the country. NASSCOM's membership has grown over the years to over 1,800 in recent time. NASSCOM spearheaded IT industries initiatives and programmes to strengthen the sector in the country and globally.

#### Objectives

- NASSCOM helps the IT and IT-enabled products and services industries in India to be trustworthy, respected, innovative, and society-friendly.
- It works towards expanding IT-BPM industries core markets through quality services and solutions to client problems.
- It also builds strategic partnerships with its customers other national and international market players. It seeks to establish India as a hub for innovation and professional services.

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Source: https://nasscom.in/

## Activities

With support from the National Skill Development Council (NSDC), NASSCOM is committed to develop skilled IT workforce for the IT and IT-enabled products and services. NASSCOM has also contributed to the development of two organisationsthe Data Security Council of India to focus on security and the NASSCOM Foundation, which helps sectoral Corporate Social Responsibility (CSR) initiatives. Besides, NASSCOM collaborates with the Government of India at the Centre and States to build a conducive policy framework to improve growth of the IT-BPM industries in the country. Other activities of the NASSCOM include the following

- NASSCOM works closely with its member organisations, encouraging them to share best practices and experiences through workshops, industry meets etc, and mentor smaller organisations to improve their learning curve.
- NASSCOM conducts industry research, surveys and studies on emerging IT-BPM trends and sector performance to assess future growth perspectives
- NASSCOM is engaging with a broad spectrum of academia, industry and governments to devise policies, curriculum and assessments that achieve this objective. In order to enhance the employability of the talent pool in the country the NASSCOM IT-ITeS Sector Skills Council has launched the following frameworks and programmes such as
- NASSCOM Assessment of Competence (NAC) to assess, certify and ensures a steady supply of quality professionals for the IT-BPM industry
- Global Business Foundation Skills (GBFS) and Foundation Skills in Information Technology (FSIT) programmes to help increase the industry readiness of students

- Performance standards that individuals must follow while functioning in the workplace, together with specifications of the NOS (National Occupational Standards) across verticals in the IT-BPM industries
- NASSCOM initiated mass scale Start-ups Programme where 10,000 industries are aimed at incubating, funding and supporting 10,000 technology start-ups in India.

#### **1.6.6** National Institute of Smart Government (NISG)

NISG is a not-for-profit company setup in a Public-Private-Partnership (PPP) in 2002under the recommendations of The National Taskforce on Information Technologyand SoftwareDevelopment, with 51% equity contributed by the private sector and49% by the public sector.

#### Objectives

The main idea behind setting up of NISG was the revolution in Information and Communication Technologies which necessitates the government to keep up with the changing environment and revolutionized the way the Government interacts with citizens and business entities. In order to transform Government departments and agencies from department-centric mode of working to a citizen-centric way, the National e-Governance Programme (NeGP) was conceived with the vision of making all Government services accessible to the common man through common service delivery outlets and ensure efficiency, transparency & reliability of such services at affordable costs to realize the basic needs of the common man.

#### Activities

NISG act as an advisory and consulting body which offers the orientation and efficiency of the private sector combined with the accountability of the public sector which would aid and guide the public sector in planning and implementing e-solutions to improve service delivery mechanisms and efficiency of the public departments.

Over the years, NISG has grown in stature and acquired the status of a reliable advisory and consulting body to the Central Government, State Governments and PSUs in their endeavor to adopt and implement ICT solutions to improve service delivery and efficiency of the government departments.

**IN-TEXT QUESTIONS** 1. Which of the following is not a Digital India initiative? a) e-Granthalaya b) e-Districts c) e-Sodhsindhu d) BHIM 2. Which of the following can be considered as National Information System? a) NIC b) NASSCOM c) National Library d) NISG 3. Which of the following is an Information Network? a) SENDOC b) NASSCOM c) National Library d) RRRLF 4. Which of the following national information centre was not established by NISSAT? a) NICLAI b) NCB c) NIC d) NICDAP 5. Which of the following services are not part of INFLIBNET? a) UGC-Infonet b) Sodhganga c) SoUL d) Worldcat

## 1.6 SUMMARY

Over the past few decades Indian government has made conscious efforts to promote national information systems in Science & Technology, Social Science & Humanities areas. A overarching national system development covering all aspects of life is complex and perhaps unviable. Several Government Committees have favoured the need of sectoral information systems to deliver wider knowledge access and benefits of government services to citizens. As a result several systems had come up in early years of implementation such as NISSAT, NIC, INSDOC, DESIDOC, NASSDOC. These systems were ably support by other government networks set-up to promote resource sharing for wide spread research and development, such as ENVIS, BTIS, INFLIBNET, DELNET etc. While primary objectives of these systems and networks are to promote information access to all, bridge

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digital divide and bring improvement in education and learning. Over the years, these systems and networks performed to develop information infrastructure in India and contributed towards promotion, coordination and development of library and information services. Indian Government from time to time has also established national centres such as UGC, RRRLF, NASSCOM etc which provided direction, guidance and framed policies for development of national information systems in India.

With adequate proficiency in ICT tools and technologies, focus of developing national information systems have shifted toward digital domain. In recent years, government has recognized the need of leveraging benefits of e-governance to reach out to citizens. As a result, we have seen several important projects have come up under digital India Programme. Collectively these initiatives have made government processes seamless, accessible and foster faster service delivery to common users. More such initiatives are expected in future years.

## 1.7 GLOSSARY

**ASTINFO** Regional Network for the Exchange of Information and Experiences in Science and Technology in Asia and the Pacific **ADINET** Ahmedabad Library Network **BHIM** Bharat Interface for Money **BONET** Bombay Library Network **BTIS** Biotechnology Information System Network **CALIBNET** Calcutta Library Network **CSIR** Council of Scientific and Industrial Research **DBT** Department of Biotechnology **DELNET** Developing Library Network **DESIDOC** Defence Scientific Information and Documentation Centre **DRDO** Defence Research and Development Organisation eGCF e-Governance Competency Framework **ENVIS** Environmental Information System **GRIDSS** Grid-based Resource Information and Decision Support System **ICMR** Indian Council of Medical Research **ICSSR** Indian Council of Social Science Research **ICT** Information Communication Technology **IMC** Indian Medlars Centre **INFLIBNET** Information and Library Network

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**INPADOC** International Patent Documentation **ISBEID** Indian State-Level Basic Environmental Information Database **KMS** Knowledge Management System LIS Library and Information Services LMS Learning Management System **MIS** Management Information System **MoEFCC** Ministry of Environment, Forests and Climate Change **MSMEs** Micro, Small and Medium Enterprises **MYLIBNET** Mysore Library Network **NASSCOM** National Association of Software and Service Companies **NASSDOC** National Social Science Documentation Centre **NCSI** National Centre for Science Information **NDLI** National Digital Library of India NDSAP National Data Sharing and Accessibility Policy **NES** National Environment Survey NeSL National e-Governance Services Ltd **NeSD** National e-Services Dashboard **NIC** National Informatics Centre **NIS** National Information Systems NISCAIR National Institute of Science Communication and Information Resources **NISG** National Institute of Smart Government NISTADS National Institute of Science Technology and Development Studies **NISSAT** National Information System for Science and Technology NKC National Knowledge Commission **NKN** National Knowledge Network **NML** National Medical Library **PES** Panchayat Enterprise Suite **PUNENET** Pune Library Network **RRRLF** Raja Rammohun Roy Library Foundation **SENDOC** Small Enterprises National Documentation Centre TQM Total Quality Management **UGC** University Grants Commission

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ULCSS Union List of Current & Scientific Serials

UNESCO United Nations Educational, Scientific and Cultural Organization

**USPTO** United States Patent Office

WPO World Patent office

# **1.8 ANSWERS TO IN-TEXT QUESTIONS**

1. e-Sodhsindhu

5. Worldcat

2. NIC

3. SENDOC

4. NIC

# 1.9 SELF-ASSESSMENT QUESTIONS

1. What role NISSAT played in promoting National Information System in India?

2. Briefly describe role of National Knowledge Commission?

3. 'Digital India programme is a game changer in promoting e-Governance in India' – Comment on the statement.

4. What are salient features of ENVIS and BTIS? How far they are successful as National Information System?

5.What are the major initiatives in recent years towards meeting objectives of National Information System?

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# **UNIT 3 - GLOBAL INFORMATION SYSTEMS**

# LESSON 3.1 UNESCO, UNISIST AND IFLA

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
  - 1.2.1 Objectives of Global Information Systems
  - 1.2.2 Important Global Information Systems
- 1.3 United Nations Educational Scientific and Cultural Organisations (UNESCO)
  - 1.3.1 Aims and Objectives of the UNESCO
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- 1.5 United Nations International Scientific Information System (UNISIST)
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  - 1.5.5 UNISIST Guidelines and ISO Standards
  - 1.5.6 Staffing and Education, Training and Development of Personnel
  - International Federation of Library Associations and Institutions (IFLA)
    - 1.6.1 Aims and Objectives of IFLA
    - 1.6.2 Structure of the IFLA
    - 1.6.3 Publications of IFLA
    - 1.6.4 Activities of IFLA
- 1.7 Summary

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- **1.8** Answers to In-Text Questions
- **1.9** Self Assessment Questions
- 1.10 References

# **1.1 LEARNING OBJECTIVES**

After reading this lesson, the student will be able to:

- 1. Learn the basics of the International Organizations like UNESCO, UNISIST and IFLA.
- 2. Outline the importance of these International Organizations.
- 3. Study the activities of these International Organizations at the global level.
- 4. Support these International Organizations for the conduct of training programmes.
- 5. Identify the different products of these Global Information Systems.

# **1.2 INTRODUCTION**

A huge number of worldwide information systems in different subject fields are involved in the development of library and information services. These also include organizations and systems for collecting, processing, and disseminating information across in various countries' national boundaries. The use of computers for internet access and machine-readable databases rose with the use of computers for information locating, gathering, storing, and processing, which speed up the development of global/international information systems. This growth has been information input from the participating system's member nations has helped this growth even further because it allows for centralized information processing possible through computers, while also allowing for decentralized information distribution at the end-user level.

# **1.2.1** Objectives of Global Information Systems

- 1. The creation, coordination, and promotion of library and information services for the convenience of users is assisted through global information systems and centres.
- 2. Global information systems provide services that work on decentralized input, centralized processing, and decentralized output.

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- 3. Information systems and centers are important components of our information infrastructure, as evidenced by that the expanding demand for information and the growing utilization of present facilities and services.
- 4. A machine-readable database has become more likely to be developed due to the emergence of computers as a significant tool in processing of information, which has increased the application and capabilities of modern global information systems.
- 5. Global information system statistical data can be collected, maintained, evaluated, and presented using a global information system, which includes hardware, software, and data. GIS enables us to see, comprehend, query, interpret, and visualize data in a variety of ways that reveal correlations, patterns, and trends through the use of maps, globes, reports, and graphs.
- 6. Global information system assists you in finding the answers to your questions and resolving issues. Each activity can utilize Global information system technology Framework for information systems of formats in different locations. In order to examine your data holistically and use it to inform important business and planning choices, you need a mechanism to integrate it.
- 7. Global Information Systems can concern any information with a dimensional component, regardless of the source of the data determined by address and generated from your customer database.
- 8. Global Information Systems visualizes this data, enabling dispatchers to design the most efficient routes for mobile personnel or send the worker who is closest to a users

# **1.2.2 Important Global Information Systems**

- 1. International Federation of Library Associations And Institutions (IFLA)
- 2. United Nations Educational, Scientific and Cultural Organization (UNESCO)
- 3. International Nuclear Information System (INIS)
- 4. International System for Agricultural Science and Technology (AGRIS)
- 5. Medical Literature Analysis And Retrieval System (MEDLARS/MEDLINE)
- 6. Information Service for Physics Engineering and Computing (INSPEC)
- 7. BioSciences Information Service of Biological Abstracts (BIOSIS),
- 8. International Communication Association (ICA)
- 9. International Labour Organization (ILO)
- 10. International Organization for Standardization (ISO)
- 11. World Health Organization (WHO)
- 12. World Intellectual Property Organization (WIPO)

# **IN-TEXT QUESTIONS**

- 1. International Federation of Library Associations and Institutions (IFLA) was established -----in the year
- 2. ..... is the programme launched by IFLA
- 3. International MARC format (UNIMARC) was launched by------
- 4. INSDOC was established in the year ------

# **1.3 UNITED NATIONS EDUCATIONAL SCIENTIFIC AND CULTURAL ORGANISATIONS (UNESCO)**

UNESCO was established by the United Nations in 1946, which is endowed with the responsibility of supporting the library, documentation, information, archives, book production, copyright, and related activities. And with a view to establishing education, science, and culture and its development also to maintain peace, brotherhood spirit in the world. UNESCO headquarters is situated in Paris.

# **1.3.1** Aims and Objectives of the UNESCO

The objectives are:

- a. To contribute to world peace, security, and international understanding by promoting education, science, and culture among the nations of the world;
- b. To foster respect for justice, rule of the law, and basic freedoms for all people;
- c. To give momentum to developmental activities in the member-states through operational assistance.
- d. To help promote, human rights, and international understanding through developing international intellectual cooperation, advancing development through operational assistance to the Member Countries.

#### **1.3.2** Activities of UNESCO

The activities of UNESCO can be summarised as below:

1. Development of Public Library paid fully through the public library. For this in the year 1949, attention to adult education and literacy program UNESCO published UNESCO Public Library Manifesto'. In the year 1972 it was revised.

#### **UNESCO** established many libraries:

- a. Delhi Library by cooperation with Indian Government in the year 1954;
- b. Mandaline Public Library in the year 1959;
- c. Engu-Nigeria-A regional Centre;
- d. Medellin (Colombia)

# 2. International Exchange of Publications

To facilitate exchanges, UNESCO has prepared conventions on the international exchange of publications, while for the compilation of bibliographies it has launched in cooperation with IFLA, an ambitious project, Universal Bibliographic Control (UBC).

# 3. International Organizations (FID, IFLA & UNESCO)

UNESCO influenced the development of public libraries in many of its Member States. The various UNESCO seminars, conferences, expert missions and publications on public libraries gained acceptance for the idea that they were an effective and essential means of passing on the wealth of human knowledge and contributing to economic and social development.

#### 4. Establishment of Public University and National Libraries

The UNESCO championed the cause of Public Library movement in the Third World. Its faith in Public Libraries as means of continuing education and cradle of democracies, providing objective knowledge and information without any restrictions, is reflected in its publication 'UNESCO Public Library Manifesto' (1949), revised in 1972). It established Pilot Public Libraries in Enugu (Nigeria), Medellin (Colombia) and New Delhi (India). It conducted several regional seminars at Brazil, Lebanon, Nigeria and India with the support of the member states on the theme of public libraries including the 'Regional Seminar on Library Development in Asia' at Delhi in 1960.

# 5. Training in Library Work

**Training and Orientation:** In order to provide trained and professional librarians to the member nations, UNESCO organized refresher courses seminars, symposiums, workshops, etc. Subject experts were sent to the member nations. To improve education policy and system, seminars and symposiums. UNESCO started schools of library science in Dakar (Africa Senegal) French speaking country, Ghana, Jamaica, and Uganda. Dakar University (Sengegal) and BonnesAyas University, they have started research centers for library science.

UNESCO's action in this field takes the form of meetings of experts, specialized courses, the setting up of regional training centres like those in Dakar (Senegal), Kampala (Uganda), Legon (Ghana) and Kingston (Jamaica), and schools of librarianship, the sending of experts and consultants to Member States, the granting of fellowships and the organizing of courses for teachers in schools for librarians and archivists. These programmes have contributed to the improvement of the courses given in these schools and to the opening of additional schools and have helped to create awareness of the fact that the improvement of library services is hampered if governments do not give priority to the training of librarians, documentalists and archivists.

#### 6. Support to University and Special Libraries

The development of the services provided by this type of library in the various Member States is the goal of an ongoing series of activities that includes seminars, technical assistance missions, grants, publications, etc. Aims and functions, their place in university life, the techniques to be employed in administering the various services and determining the budgets they require. An instance of such activities is the Regional Seminar on the Development of University Libraries in Latin America, held at Mendoza (Argentina), in 1962 whose recommendations, particularly in regard to cost indicators and the identification of indices of

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participation in university budgets, were instrumental in improving this type of library in Latin America.

#### 7. Support to Documentation Centres

Until that time, UNESCO's activities had covered every type of library and documentation unit. They were carried out through the Libraries Division, which was a part of the former Department of Cultural Activities, before that Division became the Department of Documentation, Libraries and Archives within the Communication Sector. Owing to the increasing requirements of scientific and technological research, however, the Organization introduced new International Organizations (FID, IFLA & UNESCO)programmes in the Science Sector for the purpose of stimulating and developing scientific and technological documentation centres. Many such centres were organized in various Member States, as mentioned by Pérez-Vitoria in an article 'UNESCO's contribution to the development of scientific and technical documentation centres.'

#### a. PGI (General Information Programme)

During the period of 1976, UNESCO introduced the new General Information Programme (PGI) that merged the NATIS and UNISIST programmes. The primary responsibility of PGI is to promote use of computer and communication technology in library and information services, information networks, and the provision of online method of information sharing and exchange between different locations around the world. It is making efforts to supply microprocessor systems along with simple and easy to handle software packages for application in library and information fields in the developing countries.

#### b. NWICO (New World Information & Communication Order)

The UNESCO is helping the developing countries to strengthen their communication systems by its programmes of New World Information and Communication Order (NWICO) and the Inter-governmental programmes for the Development of Communication (IPDC). The UNESCO developed a Regional Network for Exchange of Information and Experience in Science and Technology in Asia and the Pacific in 1984 with the goal of fostering regional cooperation, gaining a better understanding, and socioeconomic development in Asia and the Pacific regions (ASTINFO). Another network, known as the Asia Pacific Information Network in Social Sciences (APINESS), was founded later in 1986.

#### c. ISORID (International Information System on Research in Documentation)

For the objective of collecting and reporting information on research activities in documentation, libraries, and archives carried out at different institutions around the world, the UNESCO has also established the International Information System on Research in Documentation (ISORID). Under the Science and Technology Policies Information Exchange System (SPINES) programme, a clearing house has also been established to process information

on science and information policies of various countries. Furthermore, it developed databases and information systems including the International Bureau of Education Documentation and Information System (IBEDOC) and the Data Retrieval System for Documentation in the Social and Human Sciences (DARE).

#### d. UNISIST & NATIS

NATIS (theconcept of a national information and library system) and UNISIST (the concept of an international system for the transfer of information) together constitute UNESCO's greatest contribution in the field with which we are concerned helping to place documentation, library and archives services upon national, regional and international foundations. The goals, scope and purposes of NATIS and UNISIST had been approved by the UNESCO General Conference at different sessions and the principles underlying them were the Organization's response to the growing, complex and pressing problem of how to bring the bibliographical and documentary resources of mankind within the reach of everyone all over the world without limitations of any kind.

#### **IN-TEXT QUESTIONS**

- 5. United Nations Educational Scientific and Cultural Organisations (UNESCO) was established in the year ------ and HQ is-----
- 6. UNESCO Public Library Manifesto was Published during ------
- 7. Book Coupon System is introduced by-----
- 8. Data Retrieval System for the Social and human sciences is setup by----

#### 1.4 INTERNATIONAL ORGANIZATIONS (FID, IFLA & UNESCO)

Archives (ICA) has enabled the Organization to extend its programs of activities with the support of the human and technical resources of these organizations. In its turn, it has helped them by means of subventions and working contracts to maintain and intensify their activities on behalf of the development of an extension of documentation, library, and archives services. This collaboration, in the form of coordination of programs and constant consultations on matters of common interest, combined with all types of national, regional, or international meetings organized by UNESCO-seminars, workshops, conferences, and courses, and the publication of important works on the state of documentation, library, and archives services throughout the world, has greatly helped to strengthen this international 'family,' thus facilitating the exchange

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of ideas and experience and creating bonds of personal friendship conducive to the national and international expansion of documentation, library, and archives services.

The shortage of suitable books in vernacular languages is a familiar problem in many countries. Elsewhere, in the Spanish-speaking countries for instance, a flourishing publishing industry places the country among the world's leading book producers but there is a shortage of books of use in lifelong education, especially for persons of low educational level. UNESCO has carried out very thorough studies of this question and in addition to publishing works of great significance on the book, situation has organized a series of regional meetings to study this difficult matter in the light of the conditions peculiar to each geographical area.

# **1.4.1** Publications of UNESCO

The following are some of the important publications of UNESCO.

- 1. Copyright Bulletin (Quarterly)
- 2. Impact of Science on Society (Quarterly)
- 3. UNESCO COURIER (Monthly)
- 4. UNESCO Journal of Information Science, Librarianship and Archives Administration (Quarterly) (Formerly UNESCO Bulletin for Libraries).
- 5. UNISIST Newsletter (Quarterly)
- 6. World Guide to Library Schools and Training Courses in Documentation, 1981)
- 7. UNESCO Chronicle (Monthly).

# 1.4.2 Services of UNESCO

- > Principles and Structure of Documentation, Library and Archives Services
- > Internationalization of Documentation, Library and Archives Services
- Professional Training
- Book Promotion

# **1.4.3** Some of the information networks of UNESCO are:

- 1. Network of UNESCO Chairs in Communication (ORBICOM )
- 2. Asia Pacific Information Network (APIN)
- 3. Association of Computer Centres for Exploiting Sustainable Synergy (ACCESS )
- 4. Regional Information Society Network for Africa (RINAF)
- 5. Network of Associated Libraries (UNAL UNESCO)
- 6. Internet-based Virtual Library (MEDLIB)
- 7. Information Society Programme for Latin America and the Caribbean (INFOLAC)

# 1.4.4 UNESCO's Activities by Region/Country

- ✓ Africa
- $\checkmark$  Asia and the Pacific
- ✓ Arab States

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- ✓ Europe and North America
- ✓ Latin America/Caribbean
- ✓ Other World

# 1.4.5 UNESCO's Activities by Theme

# The different themes under which UNESCO carries out its different activities include:

- a. Archives
- b. Community Media
- c. Community Multimedia Centres
- d. Creative Content (Radio, TV, etc.)
- e. Education and Information Communication Technologies
- f. e-governance
- g. Ethical Issues Related to Information Society
- h. Freedom of Expression
- i. Independent Press
- j. Information Society
- k. Information for Community Development Systems and Programmes
- 1. Information Literacy
- m. Information Process Tools
- n. Legislation in Information Society
- o. Media Education
- p. Libraries
- q. Media Development
- r. Preservation of Documentary Heritage
- s. People with Disabilities and ICT
- t. Public Domain Information
- u. Public Service Broadcasting
- v. Recycling IT Equipment
- w. Communication and Information Training
- x. Youth and Information Society

# **1.5** United Nations International Scientific Information System (UNISIST)

agricultural information policies and services is the objective of the UNISIST program. UNISIST program was started in the year 1973. a transitional period in UNESCO's efforts in the field of libraries, documentation, and information was recognized. A conceptual framework called UNISIST placed a strong emphasis on the knowledge of science and technology. UNISIST was created with the dual goals of organizing recent trends toward interaction and acting as a catalyst for the essential progress in scientific information. The fundamental objective was to create a decentralized, flexible network of services and information based on mutual

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participation. The UNISIST Study Report (1971), a working document of the UNISIST International Conference, outlined the major tenets upon which this World Science Information System was founded.

According to this Report indicates that UNISIST motivates interoperability, cooperative agreements, cooperative development, and maintenance of technical standards to facilitate the exchange and development of trained manpower, a decrease in administrative and legal constraints to the flow of scientific information, guidance to countries that actively sought direct exposure to current and future information services, and the unrestricted transfer of published scientific information and data among scientists.

#### **1.5.1 PGI-General Information Programme**

In order to develop the General Information Programme (PGI), UNISIST and a preprogram emphasizing on the development of documentation, libraries, and archives were merged in 1976. The former UNISIST Steering Committee was replaced by an Intergovernmental Council with 30 Member States, that coordinated the planning and execution of PGI. It was assumed at the UNISIST II Conference (1979) that the establishment of PGI had brought about such a significant advantage, such as a decrease in the number of differences in UNESCO's conversations with Member States on problems relating to information transfer, infrastructure development, education, and training, as well as an integrated approach to the planning and development of information systems. The types of activities carried out under each of the five PGI sub-programmes are as follows:

- The ISO Standards Handbook I: Information Transfer, 2nd ed. 1982, is a tool for processing and transferring of information. Second edition of the Reference Manual for Machine-Readable Bibliographic Descriptions, 1981. Reference Manual for Machine-Readable Descriptions of Research Projects, Institutions, and Organizations, 1982. 3rd edition of the Common Communication Format, 1993.
- ii) Development of Databases: The International Assessment of Software Packages in the Information Field and the Application of Microcomputers to Information Sharing, two useful inventories, and studies, have been published. The Computerized Documentation System/Integrated Set of Information Systems (CDS / ISIS) Software has been scaled down and made available to non-profit organisations in developing countries for charge in a small or micro version by UNESCO. About 50 database creation projects have been started within the PGI framework, and all these initiatives have received assistance with software, consultation, equipment, and training.
- iii) **Regional and international collaborative programmes:** PGI aims to strengthen national capitals for exchange of information, develop the necessary procedures for sharing expertise and resources, and supervise the coordination of regional activities in the collaboration and related to the transfer domains. Examples of such regional programs include APINESS, the Asia-Pacific Information Network in Social Sciences,

and ASTINFO, the Regional Network for the Exchange of Information and Experience in Science and Technology in Asia and the Pacific information network.

- iv) National Information Network and Policies: According to UNESCO, national information policies should be used as a framework for developing each nation's information infrastructure. The publication of the document "Information Policy Objectives: UNISIST Proposals" in 1974 was one attempt in this direction. 113 potential S&T policy goals were mentioned in this publication. "Guidelines on National Information Policy: Scope, Formulation and Implementation" also included updated rules.
- v) Developing a Workforce for Information Priority is given towards training both information professionals and information users under the PGI Programme. Through developing teaching resources, training teachers, and providing specialized refresher courses, the goal is to improve national and regional training programs.

# The objectives of the UNISIST are as follows:

- 1. To enhance the function of the organizations that constitute the chain of information transfer;
- 2. Development of specialized manpower;
- 3. To the development of organizations and policies for scientific information;
- 4. To promote the development of the infrastructure for scientific and technical information in developing countries;

# **1.5.2** Activities of UNISIST are as follows:

The UNISIST programme, standards, guidelines, policies, and procedures for processing information and transfer are being integrated and implemented through worldwide.

- I. **Standardization of Bibliographic Description:** The UNISIST/ICSU working group has prepared a draft manual (Reference manual for machine-readable bibliographic description).
- II. **Control of Serials and Abstracting / Indexing Periodicals:** The computer-based information lender system known as international Serial Data System(ISDS). has been developed to be have absolute authority over periodical publishing
- III. **Broad System of Ordering (BSO):** The BSO was developed as a switching mechanism to link different individual categorization and thesauruses in the process of information transfer due to the enormous variety of classification schemes that present.
- IV. Handbook and Manual: This has been suggested to provide a comprehensive handbook for services providing scientific documentation and information in developing countries. The handbook was first released in 1977.
- V. **National Focal Point:** The development of the main focus for scientific information agencies for each country has received special attention.

# 1.5.3 Publications of UNISIST

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- 1. UNISIST published their newsletter quarterly
- 2. UNISIST Reference Manual

The ICSU and ICSU—AB member services assisted the collaborative Working Group on bibliographic descriptions, of UNISIST and ICSU-AB creating the original UNISIST reference manual for machine-readable bibliographic descriptions in 1974.

- a. To give a comprehensive working manual for the international standardisation of the structure and relevant information in computer-readable bibliographic descriptions created by A&I services and others.
- b. To UNISIST Reference Manual is intended for use by producers of computerized bibliographic data bases. Their adoption of its conventions will serve to improve both intellectual and physical access to information.
- c. To conventions, the database producers will facilitate the exchange of bibliographic records among themselves, thereby reducing or eliminating unnecessary redundancy in their efforts to serve their user communities.
- d. To processing of these standardized bibliographic records by libraries, information dissemination centres and others will be simplified.

The maintenance and development of the UNISIST Reference Manual is the major responsibility of UNI BID, established by the British Library under a contract with UNESCO, and operating within the general conceptual and operational framework of the UNISIST programme. The Centre's objectives are:

- T o maintain the UNISIST Reference Manual, i.e. to issue amendments and additions as these become necessary.
- > T o promote the use of the UNISIST Reference Manual.
- T o any extent necessary, make provision for suitable training in the use of the UNISIST Reference Manual.
- To provide an information service on existing machine-readable systems of bibliographic description.
- T o participate in the co-ordination of activities, including research and development, within the field of standardization of procedures of bibliographic description created for the use of the information community.
- T o co-operate with other agencies or organizations operating within the framework of the UNESCO General Information Programme and UNISIST.

# **1.5.4** Content of the UNISIST reference manual

The UNISIST Reference Manual is intended to be comprehensive, covering all forms of literature and non-print materials likely to be processed by its users. At the moment it covers serials monographs, reports, theses and dissertations, patent documents and conference publications.

- A n extension to cover bibliographic description of translations will soon be added.
- Some preliminary work has been done on a possible extension to cartographic materials, standards and records of research projects. Further extensions are being considered for: synoptic publications; deposited materials; microforms; audio visual material, e.g. films, cassettes; legislative and related material; offprints; reprints; computer software on magnetic tape; technical drawings; trademarks; non-bibliographic data bank material; technical trade catalogues.

# **1.5.5** UNISIST Guidelines and ISO Standards having some Degree of Applicability to Archives and Records Management

This list contains all UNISIST guidelines and ISO standards that are referenced in the present report and that relate in any respect to archives and records management. Those with two asterisks are either entirely applicable to archives and records maintenance almost or entirely. Those indicated by the a single (\*) are now only substantially applicable. Those who don't include a (\*) either are theoretical or only informally suggestive of future prescriptive work that might be undertaken in support of archives and records maintenance. Standards and guidelines that are unnecessary or completely irrelevant to the management of archives and records are excluded.

The elements are organised in this POLICY, PLANNING, AND REPORT, within which they first appeared.

#### In this report, POLICY, PLANNING, AND EVALUATION are arranged.

- ✓ The 1975 Guidelines on the Planning of National Scientific and Technological Information Systems
- ✓ The 1978 publication Guidelines for the Evaluation of Information Systems and Services.
- ✓ International Library Statistics and 1979 Guidelines for the National Bibliographic Agency and the National Bibliography (ISO 2789-1974).
- ✓ Information Processing Flowchart Symbols (ISO 1028-1973).
- ✓ Guidelines included In Flowchart Symbols in Visualizations in Information Processing (ISO 2636-1973).

#### **1.5.6** Staffing and Education, Training and Development of Personnel

- ✤ Guidelines for the Information Studies of Curriculum Development, 1978.
- Guidelines for the Scientific and Technical Information and Documentation Training Courses, Seminars, and workshops 1975.
- Guidelines for the Evaluation of Training Courses, Workshops and Seminars in Scientific and Technical Information and Documentation, 1975.
- A Course in Administration for Managers of Information Services: Design, Implementation and Topical outline, 1976.

#### **IN-TEXT QUESTIONS**

- 9. General Information Programme (PGI) was developed by-----
- 10. United Nations International Scientific Information System (UNISIST) is known as.....
- 11. PGI and UNISIST programmes merged in the year ------

The International Federation of Library Associations and Institutions (IFLA) is one of the major associations that represents the interests of library services, and information services, and their users worldwide. It was established in 1927 at the international conference in Edinburgh, Scotland. It has 1600 members spread over around 150 countries. In 1971, IFLA was established in the Netherlands. Its headquarters are generously located in the Royal Libra, the National Library of the Netherlands, in the Hague. In 1976, the name of the organization was extended to the International Federation of Library Associations and Institutions. IFLA is an independent, international, non-profit organization that is not directed by any government.

#### 1.6.1 Aims and Objectives of IFLA

These objectives of the IFLA as follows:

- 1. To enhance worldwide cooperation and understanding in the field of librarianship;
- 2. To promote a broader understanding of the significance of quality information services of the libraries.
- 3. To enhance international cooperation, research, and improvement throughout all disciplines through the exchange of ideas.
- 4. bibliography and also to provide a forum for the exchange of ideas and discussion of various problems facing the library profession all over the world;
- 5. It intends to furnish guidelines and standards for various types of library activities including the presentation of bibliographical data, training programmes of library personnel and research.

#### **1.6.2** Structure of the IFLA

- a. **General Council:** Members of the Executive Board and representatives selected by IFLA member associations help compensate the General Council.
- b. **Executive Board:** The one President, six vice presidents, and the treasurer constitute of the Executive Boardand is elected by the General Council on a proposal by the Consultative Committee. The election is for 3 years with possible re-election for one more term.
- **c. Consultative Committee:** The Consultative Committee is an advisory body, consisting of the members of the Executive Board, the chairmen, and secretaries of sections, committees, and international members.

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**d. Programme Development Group:** IFLA Program Development Group was established in 1969 as an advisory body for the Executive Board on professional problems. The members are appointed by the Consultative Committee for 3 years.

# Divisions and Sections IFLA has 8 Divisions which include type of libraries, library activities and regional activities of IFLA. These are:

- 1. Libraries supporting General Research
- 2. Libraries Providing Services to the Public
- 3. Special Libraries
- 4. Services and Collection
- 5. Control over bibliography
- 6. Governance of bibliography
- 7. Research and Education
- 8. Local Initiatives

#### The work of the 8 Sections is carried out through 47 Divisions of IFLA, which are:

- 1. National Libraries / Government Libraries
- 2. Academic libraries and other libraries in use for general research
- 3. Library and Research Services for Parliaments
- 4. Social Science Libraries
- 5. Geography and Maps Libraries
- 6. Science and Technology Libraries
- 7. Public Libraries Systems and Programmes
- 8. Libraries Serving the Disadvantaged Persons
- 9. Libraries for Children and Young Adults
- 10. School Libraries and Resource Centres
- 11. Bibliography
- 12. Cataloguing
- 13. Acquisition and Collection Development
- 14. Document Delivery and Resource Sharing
- 15. Government Information and Official Publications
- 16. Serials and other Continuing Resources •
- 17. Rare Books and Manuscripts •
- 18. Preservation and Conservation
- 19. Libraries Buildings and Equipment
- 20. Information Technology
- 21. Statistics and Evaluation
- 22. Education and Training
- 23. Library Theory and Research
- 24. Africa
- 25. Asia and Oceania
- 26. Latin America and the Caribbean
- 27. Health and Biosciences Libraries

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- 28. Classification and Indexing
- 29. Art Libraries
- 30. Libraries for the Blind
- 31. Library Services to Multicultural Populations
- 32. Reading
- 33. Management and Marketing
- 34. Audiovisual and Multimedia
- 35. Reference and Information Services
- 36. Genealogy and Local History
- 37. Mobile Libraries
- 38. Newspapers
- 39. Management of Library Associations
- 40. Women's Issues
- 41. Information Literacy
- 42. 4 Continuing Professional Development and Workplace Learning
- 43. Library History.
- 44. Library and Information Science Journals
- 45. Metropolitan Libraries
- 46. Knowledge Management

#### In addition to the above, IFLA has also set up 4 Discussion Groups. They are:

- 1. Law Libraries
- 2. New Professionals
- 3. Quality Issues in Libraries
- 4. e-leaming

# 1.6.3 Publications of IFLA

In addition, the following periodical publications are published:

- 1. IFLA Journal (Quarterly);
- 2. International Cataloguing (Quarterly);
- 3. IFLA Annual Report;
- 4. IFLA Directory (Annual); and
- 5. IFLA News
- 6. IFLA publication series on Bibliographic Control

# 1.6.4 Activities of IFLA

# 1. MARC Programme

The IFLA realized the importance and role of the Machine Readable Cataloguing (MARC) data in the information retrieval activities of library world and launched an international programme and the International Machine Readable Cataloguing Office for the development of this new technique and the activities concerned with it.

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#### 2. Universal Bibliographic Control (UBC)

The Universal Bibliographic Control (UBC) Programme was a major activity taken up by the Federation in 1971. This programme encourages the use and exchange of standardized bibliographic descriptions. The IFLA International Office for UBC established in London in 1974 achieves the objectives of this programme by standardizing the form and choice of

# 1.7 SUMMARY

#### 3. Universal Availability of Fublications (UAF)

The IFLA took up the Universal Availability of Publication (UAP) Programme in 1973. This program aims at improving the availability of published material in whatever form it is, to the intending users wherever they are without any hindrance. This program not only provides information on various documents but also gives access to all these documents.

# 4. ISBDS

IFLA developed and published in 1974 the International Standard Bibliographic Description for Monographic publications ISBD (M) as the basis for rules of the description of monographic materials in AACR2. In 1975 IFLA and the Joint Steering Committee for the Revision of AACR (JSC/AACR) jointly developed the General International Standard Bibliographic Description ISBD(G). It serves as a framework for the description of all types of publications in different media ensuring a uniform approach to bibliographic description.

- 5. Action for Development through LibrOaries Programme( ALP)
- 6. Preservation and Conservation (PAC)
- 7. Alliance for Digital Strategies (ICADS -IFLA-CDNL)
- **8.** IFLA UNIMARC

9. Free Access to Information and Freedom of Expression (FAIFE)

10. Committee on Copyright and other Legal Matters (CLM)

11. Committee on Standards (COS)

# The Divisions of IFLA are:

- a. Library Types
- b. Library Collections
- c. Library Services
- d. Support of the Profession
- e. Regional Activities

In this lesson, we discussed about few international organizations that function on the global level in different fields. The majority of countries gradually comprehended the benefits of preserving international relations in some domains through international organizations after World War II. This is because the information services accessible to users were almost always

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insufficient, which created problems for library professionals when attempting to access information. Through assisting in the coordination, promotion, and development of relevant information for the international organizations carried on the responsibility of recognizing these problems in the attempt to bridge the gap. Governmental and non-governmental organizations, as well as some professional voluntary organizations, are among these organizations.

# **1.8 ANSWERS TO IN-TEXT QUESTIONS**

1	1927	7	UNESCO
2	UBC	8	UNESCO
3	IFLA	9	UNESCO
4	1952	10	World Science Information
			System
5	1946 and Paris	11	1976
6	1948	12	1976

# 1.9 SELF ASSESSMENT QUESTIONS

- 1. Discuss the role of Global Information Systems in disseminating information.
- 2. Explain the programmes and Activities of UNESCO
- 3. Explain the programmes and Activities of UNISIST
- 4. Explain the programmes and Activities of IFLA.

# **1.10 REFERENCES**

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- 11. www.unesco.org

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# LESSON 3.2 INIS, AGRIS, INSPEC AND MEDLARS

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# **STRUCTURE**

- 1.1 Learning Objectives
- **1.2** International Nuclear Information System (INIS)
- **1.3** International System for Agricultural Science and Technology (AGRIS)
- **1.4** Information Services for the Physics and Engineering Communities (INPEC)
- 1.5 Summary
- 1.6 Answers to In-Text Questions
- 1.7 Self-Assessment Questions
- **1.8 References**

# **1.1 LEARNING OBJECTIVES**

After reading this lesson, the student will be able to:

- Learn the basics of the Global Information Systems
- Identify the kinds of Global Information Systems in different disciplines and their role in information dissemination.
- Familiarize with different types of information systems at the global level.
- Understand the significance of different Global Information Systems

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# **1.2** International Nuclear Information System (INIS)

International Energy Agency (IAEA) sponsored International Nuclear Information System (INIS) in Vienna, Austria. It started operating in April 1970. It is a collaborative, decentralised computerised abstracting and indexing system that provides comprehensive coverage of published literature on the non-proliferation of nuclear energy. Modern computerized technology. At present 132 countries are the members of INIS. It collects all the information provided by the members, processes, merged and redistribute in both machine-readable form and print form. Scientific and technical reports, conference proceedings, patents, and theses are among the conventional and non-traditional (grey literature) papers with bibliographic references and full text available in the INIS repository.

International Nuclear Information System (INIS) provides a database with more than 4.4 million bibliographic records, 2 million of which are full-text documents. Over 100000 new records are added each year. New technologies were used for collecting the information, processing, preserving and disseminating which includes digitization, automated classification, the deployment of modern databases and search engines, artificial intelligence and machine learning and harvesting. In the year 2020, 1.7 million unique visitors made over 2.5 million searches, viewing 4 million web pages. The INIS collection is made freely accessible online since April 2009 worldwide. The information is directly downloaded from INIS servers or through URL or DOI links provided as a part of the INIS bibliographic record. As it is open and free accessible by the researchers, students, government officials, journalists and the general public.

The subject covered by the INIS is based on the requirements and regarding the peaceful application of nuclear science and technology. The needs of the global user community are relevant, as are the interests and operations of the International Atomic Energy Agency. Nuclear reactors, reactor safety, nuclear fusion, uses of radiation and radioisotopes in medicine, agriculture, industry, and pest control, as well as nuclear chemistry, nuclear physics, and material science, are the key topics covered. In order to facilitate exploring and searching the collection, INIS maintains a multilingual thesaurus in Arabic, English, Chinese, French, Japanese, German, Spanish, and Russian. It provides translations for thousands of scientific and technical terms.

#### **Restructuring of INIS**

On January 20, 2012, the IAEA Director General gave his approval to the Department of Nuclear Energy's (NE) general reorganisation. This includes establishing a separate Nuclear Knowledge Management Section and the Nuclear Information Section (NIS). The new Nuclear Information Section consists of

- ➢ IAEA Library Unit
- Systems Development and Support Group

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➢ INIS unit

It is possible to improve current information goods and services and create new ones as a consequence of the restructuring and development of NIS, all with the goal of improving organizational efficiency and effectiveness.

# **Objectives of INIS**

The main objective of INIS is to use a modern computer and micrographable technologies, and provide comprehensive nuclear revelation and abstracting services.

- > To promote the sharing of Scientific and technical information peaceful use of atomic energy.
- > To promote scientific cooperation and atomic energy-related professional development.
- > To collect, process, preserve and disseminate nuclear information.
- ➤ To increase awareness among members about how crucial it is to keep an effective and efficient system in place for handling nuclear information resources.
- > To assist the member states by providing training programs and capacity building.
- > To give assistance and information services to the IAEA and its member states.

# **INIS Salient Features**

- 1. It is computer-based IR system
- 2. It is a dynamic and flexible system.
- 3. It is and international co-operative venture.
- 4. It is document retrieval system.
- 5. It is an indexing and abstracting service.
- 6. It works with maximum decentralization and minimum centralization.
- 7. It ensures high quality of input.
- 8. It uses its thesaurus for subject indexing.
- 9. It ensures communication with its participants.
- 10. It is a mission-oriented system (as against a discipline-oriented system).
- 11. It offers machine readable information service.
- 12. It achieves compatibility and co-operation of national information system in science and technology.
- 13. It has formulated standards and rules in the field of information science
- 14. It uses modern techniques in the field of information processing.

# **INIS Products and Publications**

**INIS Atom Index**: a semi-monthly journal with semi-annual and annual cumulative indexes derived from the INIS database. It is an abstract journal containing indexes to authors, report

numbers, corporate names, subjects and conferences. The INIS Atom Index in magnetic tape format is available to the INIS Liasion Officers of the members of the states only.

**INIS Reference Series:** The INIS Reference series is published by the IAEA since 1969. It is a set of documents which contain standards, rules, formats, coder and authority lists used by the participants in the decentralized INIS program. It is an important tool for users, such as indexers, cataloguers, abstracters or searchers.

**IAEA- INIS/ETDE Thesaurus:** "A thesaurus is a terminological control device used in translating from the natural language of documents, indexes or users into more constrained 'System Language' (document language, information language)". It is a multilingual thesaurus which translates the technical scientific terms used for searching the information from the collections. It is quite useful for semantic and multilingual searches. The INIS/ETDE Thesaurus contains more than 30,000 terms and has developed as a result of systematic study.

#### **INIS Non-Conventional Literature**

The Scientific and technical reports, patent filings, conference papers, theses, and dissertations that are not widely accessible are all included in the non-conventional literature.

#### **INIS Services**

#### **Outreach and Promotion**

In the respective nations, the Liaison Officers are in charge of promoting the INIS and planning promotional events. By providing the promotional and informational materials, the INIS secretariat assists.

The activities include:

- Provision of promotional materials to hosts;
- Promotion at IAEA and other nuclear conferences, meetings, symposia and exhibitions with online and/or other demonstrations;
- > INIS advertising in professional journals;
- > Preparation and distribution of brochures, information sheets, and other promotional tools;
- > INIS entries published in directories world-wide
- Publishing articles in professional journals;

# **Training and Distance Learning**

The training courses for the International Nuclear Information System are created to achieve a number of goals,

- > Encouraging in exchange of scientific and technical information
- Establishment and improvement of a national information infrastructure in Member States

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- Responsiveness to Member States' needs
- High quality and coverage of the INIS Database
- Maximum utilization of INIS output products
- Transfer of modern information technology

#### **IN-TEXT QUESTIONS**

1. International Nuclear Information System (INIS) started operating from

2. International Nuclear Information System (INIS) is situated in \_\_\_\_\_

3. The INIS database is made accessible freely online since \_\_\_\_\_.

4. Agricultural Sciences and Technology (AGRIS) was established in \_\_\_\_

#### Presently the INIS Training Program includes:

#### **1. INIS Training Seminars**

The IAEA organizes training seminars for the INIS members every year at Vienna. The seminars stress using INIS output products and INIS input abilities, and they are funded and staffed by INIS. The IAEA is in charge of planning all aspects of the seminars, including the criteria for selection, abstracting, descriptive cataloguing, indexing, retrieval, marketing, and promotion. The major goal of the training activities is to help INIS members train new employees who will be preparing input and using output products.

#### 2. INIS Distance Learning Program

The INIS Distance Learning Program offers thorough directions on how to prepare input for subject analysis and bibliographic description as well as how to use the INIS database. The curriculum is freely available on CD-ROM for individualized, independent study for INIS Centres staff members.

#### 3. Technical Co-operation Assistance

The INIS Secretariat helps developing nations participating in INIS establish and operate nuclear energy information systems through the IAEA Department of Technical Cooperation.

#### **>** Regional Training

The IAEA Technical Co-operation Department and the INIS Secretariat jointly sponsor regional training. It usually relates to projects for technical cooperation and is hosted by a member nation in the region.

#### Fellowships and Scientific Visits

In collaboration with INIS, the IAEA Technical Co-operation Department also sponsors fellowships and scientific visit. A Fellowship is intended for junior staff members in Member States and provides on-the-job training. It usually lasts two to three months in a single location. Designed for senior employees in a Member State, a Scientific Visit lasts one to three weeks and takes place in multiple locations.

#### **INIS Web Services**

The maintenance of connections to websites on the Internet in a variety of subject areas, from nuclear science and technology to all other IAEA-related activities, is included in the INIS online services. In addition to this, INIS provides topic access to the IAEA website's content as well as that of numerous other important multinational and international organisations in the field of nuclear science and technology.

#### **Alert Services**

Users who are genuinely researching current and up-to-date information in the sphere of nuclear science and technology are offered alert services based on INIS products in the form of SDI service. The national INIS Liaison-Officers of the various INIS members offer these services. The alert services take the form of individualised searches that are conducted based on each user's unique subject interest assessment.

#### **Document Delivery Service**

International Nuclear Information System has established several INIS national centres. to provide the document delivery services, and these centres make full-text versions of INIS nonconventional literature accessible to users in each INIS member state. But the users of that specific INIS member state are the only one who can utilise this service. When a request comes in from a nation without such a facility, the Knowledge Preservation Group is contacted to provide the requested service.

#### **INIS in India**

Since INIS's establishment, India has taken a constructive role in it. The National Centre in charge of INIS activities in India is the Bhabha Atomic Research Centre (BARC), Bombay, Library and Information Services Division. BARC is a government research centre for nuclear science and technology that is part of India's Department of Atomic Energy. The Center has done a good job of gathering data on the issue, transferring it to a centralised processing facility, then receiving and disseminating the results to the users throughout the country. From the Indian center, a number of 54554 records have been input from 1970-Sep 2013. The average number of records input in the last five years is 1967, except in the year 2013. More than 2000 records have been input from the year 2011 onwards. The collection of literature in the centre is from various sources of the country which includes conferences, journals (print/online/open sources), books/monographs, and technical reports.

#### Objectives

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The national centre in authority of all INIS activities in India is the Library Centralized management Services (L&IS) of the Bhabha Atomic Research Centre in Bombay. Its primary objectives include;

- > To create computer expertise in the preparation of input and use of output from machinereadable media.
- To select, categorize, index, abstract and report the bibliographic description of items falling the subject scope of INIS
- > To scan, identify and collect nuclear science literature producers in the country

# Activities

Some of the activities of the INIS inputting Centre, India are:

- a. INIS DVDs service Area Network (LAN) and online INIS through online getaway of BARC,
- b. Selective Dissemination of Information (SDI),
- c. Demo-Cum-Training on INIS Database,
- d. Distribute of INIS Brochures and promotional materials at conferences/symposia in India,
- e. Conducting training programmes on setting up INIS Inputting Centers in other member countries,
- f. Document Delivery Service, for example, countries like Brazil, Canada, France, Korea are regular requesters
- g. Development of INIS supporting software tools:
- h. INIS Libsoft (for converting DVD-ROM bibliographic data to MS Excel sheets), and
- i. Libdata: a software tool (Winfibre matrix file support with features like reverse author name with affiliation, insert automatic country code in tag).
- j. Arranging INIS Database demonstration at various conferences/symposium/poster presentation,
- k. Nuclear News Collection: This involves selection of nuclear and Department of Atomic energy related news from subscribed newspapers, their digitalisation in order to provide the scientists and engineers in the BARC campus through LAN as a current awareness service (CAS), and
- 1. SIRB-Scientific Information Resource Bulletin: A Monthly News Bulletin published as a promotional activity of subscribed and open Database including INIS, conference proceedings, journals, and other digital resources within the center.

# **1.3International System for Agricultural Science and Technology** (AGRIS)

#### Introduction

The Food and Agriculture Organization (FAO) of the United Nations launched the International Information System for the Agricultural Sciences and Technology (AGRIS) in

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1974, encouraging international collaboration for information sharing in and access to agricultural science and technology. AGRIS started fully functioning in 1975 with the first issue of AGRINDEX and was inspired /modelled on the INIS pattern to promote information exchange and to bring together the world literature dealing with all aspects of agriculture. Initially, AGRIS was gathering bibliographic references for a central database using the technologies that were available. Since the Internet's advent in the late 1990s, a network of centres known as AGRIS has been promoting the flow of information on agricultural science and technology by using common standards and methodologies. The Current Agricultural Research Information System (CARIS), AGRIS, and FAO are all currently running programmes. AGRISisacooperative systeminwhichparticipating membercountriesaddreferencestotheliteratureproducedwithintheircountryirrespectiveofthelanguage.

The AGRIS provides free access to more than 13.5 million records about publications in the field of food and agriculture in 90 different languages. It also facilitates access to journals, books, articles, monographs, databases and grey literature which includes unpublished scientific and technical reports, theses, dissertations and conference papers in the area of food and agriculture. In AGRIS /CARIS programmes more than 242 national, international and intergovernmental centres have participated.

# **Objectives of AGRIS**

- The creation of a single, thorough, up-to-date inventory of agricultural literature from around the world that reflects agricultural research findings, food production, rural development, and will assist users in identifying issues with all facets of the global food supply.
- Providing specialized subject retrieval services, deliveringdocumentsonrequest, current awareness and selective dissemination of information services to users who need agricultural information in order to meet their information needs.
- Functioning with new and existing specialized secondary information services so as to increase efficiency and eliminate unnecessary duplication.

#### **Products and Services**

The AGRIS database, covering international agricultural literature is available online through ESA/IRS, DIMDI, DIALOG Information Services, Inc and the International Atomic Energy Agency. It provides multilingual keyword search option for retrieval of information. With the help of coordinating centre and some national and regional AGRIS centres online access and SDI Services are also available. The coordinating centre in Rome offers the AGRIS output tape to participating centres on a monthly basis.

# 1. AGRIS CD-ROMs

Large amounts of information are stored and retrieved using electro-optical technology on a CD-ROM (Compact Disk Read-Only Memory). A range of CD-ROMs are used to distribute the entire collection of AGRIS data:

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- AGRIS CD-ROMs: all of the information gathered, preserved on archival CD-ROMs, and one current CD-ROM with the most recent information gathered (quarterly updated).
- AGRIS FHN CD-ROM: consists of data gathered from all AGRIS CD-ROMs in the areas of food and human nutrition (semi-annually updated).
- AGRIS FORESTRY CD-ROM: consists of data obtained from all AGRIS CD-ROMs in the areas of forestry and primary forest products.
- AGRIS and AGRIS FHN CD-ROMs created by SilverPlatter Information Ltd. utilising data prepared by AGRIS Processing Unit Vienna; information is retrieved using the SilverPlatter programme WinSPIRS.
- AGRIS FORESTRY CD-ROMs are created by WAICENT/FAOINFO of the Library and Documentation Systems Division (GIL) of the FAO; retrieval software HEURISKO (based on CDS/ISIS) is also included.
- From AGRIS CD-ROMs, the current software (WinSPIRS, HEURISKO) allows various searching operations to meet various user search requirements:
  - Searching free text in different description fields
  - Limiting search operators (less than, greater then, range, etc.)
  - Searching by subject category codes, authors, publication year, publication language, etc.
  - Logical search operators (OR, AND, NOT, WITH, NEAR)
  - Searching by descriptors defined in the AGROVOC Thesaurus
  - Lateral searching (forward/backward)
  - Truncation of words (to retrieve all variants)

# 2. AGRIS Database On-line

On-line access to the global AGRIS database is provided by:

- a. AGROVOC Thesaurus (FAO/WAICENT, FAO Web Server)
- b. DIALOG (Palo Alto, USA): non-USA portion only
- c. AGRIS DATABASE ON-LINE (FAO/WAICENT, FAO Web Server)
- d. DIMDI (Cologne, Germany)

# 3. Information Services on Request

APU Vienna provides the following services at user request in printed or magnetic form.

- a. Users can request the AGRIS Processing Unit to keep them informed of any new AGRIS entries on particular topics of interest to them through the selective distribution of information (SDI) service.
- b. Retrospective searches through the entire data base;
- c. National bibliographies, which include all entries created in a country as well as those published outside that are about that country. Agrindex master copies can be created on a high-resolution laser printer and are ready for photocopying or offset reproduction.
- d. Specialized cooperating centres, like the FAO divisions or the CGIAR IARC, can also create subject bibliographies upon request.

# 4. Other Services

- a. AGRIS working methodologies are developed and distributed.
- b. Developing and dissemination of the AGROVOC Thesaurus

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- c. Software for AGRIS input data preparation (AGRIN/AGCHK) is being developed and distributed.
- d. Distribution of the UNESCOs CDS/ISIS database software for PCs.
- e. AGROVOC Thesaurus
- f. Agrindex (AGRIS monthly bibliography in English, French and Spanish; only up to December 1995)
- g. Training materials (AGRIS Reference Series)
- h. Products available on FTP Server (APU Vienna):
- i. Current monthly AGRIS output file
- j. Other products on Web Server (APU Vienna): AGRIS Reference Series
- k. Training material and courses

#### **IN-TEXT QUESTIONS**

5. The national centre in charge of INIS activities in India is \_\_\_\_\_

6. First version of AGROVOC was published in \_\_\_\_\_.

- 7. The Headquarter of the National Institutes of Health (NIH) is situated at
- 8. MEDLARS was established in the year \_\_\_\_\_.

#### AGROVOC

With the assistance of FAO member nations, the extensive multilingual agriculture thesaurus AGROVOC was created. It aims for continuous updating and enhancement and is used for indexing data in agricultural information systems. In 1982, AGROVOC's first version was created and disseminated to all AGRIS centres. FAO updates the vocabulary in cooperation with national AGRIS centres. For the consideration of FAO subject specialists, centre staff makes suggestions for new terms for the database. The selected terms by the experts were added to AGROVOC. Through the FAO/AGROVOC website, new words and corrections may also be proposed. The new AGROVOC is currently accessible online.

#### **Limitations in AGRIS**

An assessment of AGRIS was conducted in 2000. It was observed that the network had only partially succeeded in accomplishing its objectives. Limitations in AGRIS were found in these areas:

- i) incomplete coverage,
- ii) independent systems,
- iii) difficult access to the original documents and

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iv) structural and institutional constraints.

A new strategic vision has been formed as the AGRIS system strives to decentralise data processing, prioritise national capacity creation, and enhance autonomous administration of national agricultural information.

To overcome from these limitations, AGRIS joined Coherence in Information for Agricultural Research for Development (CIARD) in 2009, a global project of international partner organisations (such as DFID, CIARD, GFAR, etc.) dedicated to boosting the benefits to the general public resulting from investments in agricultural research and innovation for development.

The basic principle agreed by CIARD's stakeholders is that information should be made "available," "accessible," and "applicable" to the public. FAO is supporting this idea via its AGRIS portal. In addition, all CIARD parties agree that it is important to respect the roles played by national, regional, and international institutions while working together to create more interconnected information collections and services.

According to the new vision, the AGRIS search engine should be able to retrieve and interpret a wealth of diverse information sources including full-text documents, threads from discussion fora, blog entries, news articles, and organizational, regional, national, international information (re)sources. Partnerships with established search engine technology leaders such as Google, Yahoo or Scirus will be explored in order to provide customized search capabilities.

#### **Open AGRIS:** the New AGRIS Linked Open Data Model

The linked dataset produced by converting AGRIS data to RDF contained 80 million triples. Additionally, AGRIS is listed as a dataset in the Data Hub at <u>http://thedatahub.org/dataset/agris</u>.

# **Open AGRIS**

With the goal of expanding AGRIS knowledge by offering as much information as possible about a subject or bibliographical resource, OpenAgris is a web application that gathers data from many online sources. OpenAgris can interlink with many existing datasets using Agrovoc as its backbone, displaying as much information as possible about a given topic, such as statistics about fish species or the geographic distribution of plants. These datasets include DBPedia, the World Bank, Geopolitical Ontology, the FAO fisheries dataset, AGRIS serials dataset, etc. In this approach, OpenAgris will function as a centralised portal that compiles all data available on the Internet for a particular subject, field of study (in the agriculture sector), or bibliographic reference.

The following four internal FAO RDF are the basis of OpenAgris:

a. **The AGRIS records dataset**: It is the straight translation of records from AGRIS XML to RDF. This new dataset has more than 130 million triples, compared to the more than 5 million XML items in AGRIS.

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b. **The Agrovoc RDF dataset:** The most extensive multilingual agricultural lexicon in the world, AGROVOC has about 40,000 concepts in 22 languages, encompassing subjects in agriculture, forestry, and fisheries as well as universally relevant ones like land use, rural lifestyles, and food security.

c. **The AGRIS journals dataset**: since approximately 75% of AGRIS database records are journals articles, we built a dataset of more than 22,000 agricultural journals with complete information about each journal (ISSN, start date, frequency, publisher...)

d. The AGRIS centers dataset: It includes details on data suppliers, making AGRIS the information's source.

#### AgriMetaMaker

It is a web form created with the Drupal content management system that makes it easy to generate metadata. In a few minutes, one can manually create new references and enter the data. The relevant fields must be filled up for the documents, saved for future use, as many as necessary added, reviewed and edited, and finally exported to the computer. Once the same data delivered to FAO/AGRIS, is made available in the AGRIS database.

# **IN-TEXT QUESTIONS**

9. INIS, AGRIS, INSPEC and MEDLARS are \_

10. The first issue of AGRIS was \_\_\_\_\_

11. \_\_\_\_\_ is the world's largest medical Library.

12. Restructuring and development of INIS was done during\_\_\_\_

#### Services in India

established this organization.

Indiahasbeen actively participating in AGRIS from the very beginning of its inception. The participation and the second s AGRIS/CARISinstitutionfromIndiaisthe ting AgriculturalResearchInformationCentre.Onanaverage,3500bibliographicentriesare submittedtoAGRISdatabaseasIndianinputeveryyear. FAO sends updated machine-readable AGRIS Research outputs the Agricultural Information Centre to every month. retrievalisthenprovided to agricultural scientists requiring information in the country. A computerized SDI serviceisalsomadeavailabletoagriculturalresearchersofIndia. For the purpose of exchanging and disseminating knowledge on science and technology, the Food and Agricultural Organization (FAO)

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#### SUMMARY

The Food and Agriculture Organization of the United Nations developed the International Information System for Agricultural Sciences and Technology. AGRIS offers comprehensive bibliographic coverage of the literature in agricultural science and technology. The Food and Agriculture Organization (FAO) of the United Nations has put together AGRIS, which provides a global perspective on important agricultural research. Over 135 participant countries' diverse facets of agriculture, such as forestry, animal husbandry, aquatic sciences, fisheries, and human nutrition, are addressed. Unpublished scientific and technical reports, theses, conference papers, government publications, and other original content are included in literature. Each year, 130,000 records with keywords in English, French, and Spanish are added.

#### Medical Literature Analysis and Retrieval System (MEDLARS)

The National Institutes of Health (NIH), which operates from its headquarters in Bethesda, Maryland, includes the National Library of Medicine (NLM) of the United States. The NLM is the world's largest medical library. MEDLARS was established in the year1964 in NLM. It is a bibliographic database of life sciences and biomedical information. It is a computerized storage and retrieval system. The first computerized issue of Index Medicus began functioning along with MEDLARS. Index Medicus is the monthly subject or author index guide for the articles published bv NLM. MEDLINEistheNationalLibraryofMedicine'sbibliographicdatabase, which includes information on medi cine which includes nursing, dentistry, health caresystem, veterinary medicine, and preclinical sciences. MEDLINE is accessible from LNM gateway and PubMed. In 1971, an online version called MEDLINE ("MEDLARS Online") become available as a way to do online searching of MEDLARS for remote medical libraries.

MEDLINE is the U.S National Library of medicine's premier database which contains over 23 million (2016) references to journals articles in life sciences with a concentration on biomedicine. The records in MEDLINE are indexed with NLM Medical Subject Headings (MeSH). The journals are selected for MEDLINE are based on the recommendation of the Literature Selection Technical Review Committee (LSTRC), an National Institute of Health- chartered advisory committee of external experts analogous to the committee that review NIH grant application. Some other journals and newsletters are selected based on NLM initiated reviews such as history of medicine, health services research, AIDS, toxicology and environmental health, molecular biology, and complementary medicine that are special priorities for NLM or other NIH components.

The subjects covered by MEDLINE is biomedicine and health, broadly defined to encompass those areas of the life sciences, behavioural sciences, chemical sciences, and bioengineering needed by health professionals and others engaged in basic research and clinical care, public health, health policy development, or related educational activities. MEDLINE also covers life sciences vital to biomedical practitioners, researchers, and educators, including aspects of biology, environmental science, marine biology, plant and animal science as well as

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biophysics and chemistry. Increased coverage of life sciences began in 2000. The publications covered by MEDLINE are the scholarly journals, newspapers, magazines and newsletters which are useful to some particular users of the NLM, also for other community users.

# MedlinePlus (<u>http://medlineplus.gov/</u>)

It is NLM's website for consumer health information. The site offers uptodate health information which is available anytime, anywhere for free. The resources are selective from NIH and other government and professional organizations in the US.

# PubMED

It is a free search engine that mainly accesses the MEDLINE database, which contains references and abstracts on subjects related to the life sciences and biomedicine. As a component of the Entrez information retrieval system, the database is maintained by the National Institutes of Health's (NIH) National Library of Medicine (NLM).

# PubMED Central

The National Library of Medicine (NIH/NLM) of the United States offers a free collection of journal articles from the biomedical and life sciences. As an archive, PMC is made to ensure that all of its content is always available, even as technology advances and current digital literary formats may become dated. NLM is of the opinion that constant and active use of the archive is the best strategy to ensure the accessibility and viability of digital content throughout time. The core element of PMC is that all of its journal literature should be freely accessible.

# **1.4** Information Services for the Physics and Engineering Communities (INPEC)

Information Services for the Physics and Engineering Communities started in the year 1967, by the Institute of Electronic Engineers (IEE), United Kingdom. It is one of the biggest and most prestigious bibliographic information services which is accessible in English. It offers access to the world's scientific and technical literature in physics, electrical engineering, electronics, communications, control engineering, computers and computing and information technology. The database, which is updated annually, includes books, reports, dissertations, conference proceedings, and scientific and technical publications. INSPEC has trained and experienced employees ready to scan the abstracted and indexed articles for the database collection. It contains more than 20 million records of research literature, 4,500 journals indexed.

The subject covered in INPEC are mainly physics, electrical/electronic engineering, computing, control engineering and information technology, other than these subjects it also

covers areas such as material science, oceanography, nuclear engineering, geophysics, biomedical engineering and biophysics.

#### **INSPEC Products and Services**

The Institute of Electronic Engineers (IEE) is well known and well-liked throughout the world for its wide range of print and electronic publications, which include books, journals, magazines, conference proceedings, and more. These publications cover many different fields of electrical and electronic engineering, such as telecommunications, computing, power, control, radar, circuits, materials, and more. It also publishes the writing regulations and a number of related documents. It also produces the INSPEC bibliographic database, which covers literature in the fields of physics, electronics, electrical engineering, computing, control and information technology.

#### **Electronic Format**

- ➢ Inspec Archive
- > Online database for remote access to information from INSPEC.
- ➢ Inspec Web
- InspecOndisc (CD-ROM)
- > Site licences and direct data services for in-house and remote access information system.
- INSPEC Specialised Databases- It includes 3 subject oriented databases in the areas of photonics, biomedical technology, and information and communication technology.

# **Abstracting Journals**

**INSPEC** Abstracting Journals

- Computer and Control Abstract
- Electrical & Electronic Abstract
- Physics Abstracts
- IT focus: Update on Information Technology (fourth journal)

All together form the Science Abstract series of journals from IEE. In these abstract journals contain all most all of the 350,000 short summaries of the papers, they contain all the information entered into INSPEC database. The abstract is in English language, with the language of the source paper indicated if it is other than English.

# **Current Awareness Services**

Three current awareness journals namely Current Paper on Computer and Control (M), Current Paper in Electrical and Electronic Engineering (M), and Control Papers in Physics (SM) are design to meet the needs of scientists and engineers whose papers provide the title of articles and details of source documents for paper published in the world's technical literature. The articles are arranged for ease for scanning.

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#### **INSPEC** online

The INSPEC on-line database contains details of the world's information published since 1969 in all areas of computing control, electrical engineering, electronics, physics and information technology. It is currently being increased at the rate of more than 200000 abstracts of newly published research and development reports annually, and now contains over 2.5 million records. Each record is indexed in four ways to provide ease of retrieval

- Classification Codes from the INSPEC Classification
- Controlled Indexed terms from INSPEC Thesaurus
- Free Language keywords to reflect the terminology used by the authors
- > Treatment Codes to indicate the authors' approach to the subject

#### **SDI Service**

INSPEC SDI is a user-made service which matches the interest 'profile' of the scientists, engineers or managers against the information added to the INSPEC database each week. Electronic Materials Information Service (EMIS), IEL-IEEE/IEE Electronic library full-text of IEEE and IEE publications with INSPEC index, are the other services provided by the INSPEC.

# 1.5 SUMMARY

International Nuclear Information System (INIS), Agricultural Information System (AGRIS), INSPEC and MEDLARS are the most popular and reputable information systems in the fields of Nuclear Science, Agriculture, Physics and Medical Sciences. Various databases used by these Global Information Systems for the benefit of the member library. The collection includes comprehensive publications, bibliographic references, and both conventional and non-conventional or grey literature. These global information systems provide news and information such as events, presentations, training, newsletters, or informational materials.

# **1.6 ANSWERS TO IN-TEXT QUESTIONS**

1	1970	7	Bethesda
2	Vienna, Austria	8	1964
3	2009	9	Global Information Systems
4	1974	10	AGRINDEX
5	BARC	11	NLM
б	1982	12	2012

# 1.7 SELF-ASSESSMENT QUESTIONS

**1.** What is Information System? Write a detailed note on the Global Information Systems.

е

- 2. Enlist the different Global Information Systems. Explain any of them in detail.
- 3. Write a detailed note on the activities and products of INIS.
- 4. Discuss in detail the activities and products of AGRIS.

#### **1.8 REFERENCES**

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# UNIT 4 – RESOURCE SHARING, LIBRARY NETWORKS AND LIBRARY CONSORTIA

# Lesson- 4.1 PROGRAMMES AND ACTIVITIES OF INFLIBNET AND DELNET

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# **STRUCTURE**

1.1 Learning Objectives

- 1.2 Introduction
- 1.3 INFLIBNET
- 1.4 Major Activities of INFLIBNET
- 1.5 DELNET
- 1.6 Summary
- 1.8 References

# **1.1 LEARNING OBJECTIVES**

After learning this Lesson, the student will be able to

- Learn the basic concepts of Networking.
- Identify different kinds of Networks and their role in information dissemination.
- Familiarize with different types of networking at the National level.
- Understand the significance of Information products.
- Discuss the issues involved in putting resource sharing into practice.

# **1.2 INTRODUCTION**

No library or information center can say it is financially and collection-wise independent in this age of exponential information expansion and resource limits. A user unaware of the issue requests that all pertinent papers be made public. The union catalogue

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was the libraries' sole hope for acquiring these materials through Interlibrary Loan (ILL). Due to geographical, postal, and governmental hurdles, it might take days or months to get a single document. This new era of library collaboration is made possible by the explosive growth of communication technologies. Recent events prompted efforts on a national and regional scale to network libraries so that their resources may be better shared. Several libraries and information networks have been established to facilitate library collaboration and offer a wide range of services such as Internet access, electronic mail, a centralized database for storing information, etc. In these systems, the union catalogue is converted into an OPAC (Online Public Access Catalogue), and the digital collection is linked with the OPAC, resulting in the development of digital libraries. Two or more libraries and other involved in a shared pattern of information exchange, organizations through communications, for some functional purpose" is how the National Commission on Libraries and Information Science (NCLIS) defines a network in its National Programme Document (1975).

The term "network" is commonly used to refer to a system whereby users have access to resources, data, and services from several libraries and other institutions. Regardless of where they are legally based, libraries commit to providing the same service to one another as they do to their respective communities. Their ability to communicate with one another might be improved using modern technologies like the computer and the telephone. The UNISIST II working document is "A group of inter-related information systems connected with communication facilities, which are collaborating through more or less formal agreements to conduct information handling activities to give improved services to the users." Furthermore, therefore, library networking facilitates collaboration across different libraries. In order to pool resources, organize consortia, subscribe to the same journals, and so on, these libraries are linked by various forms of electronic communication.

#### **Need for Library Networking**

The development of library networks has been made possible by developments in information technology. But why create library networks in the first place? The following are some reasons why creating a library network is essential: More and more information is being produced today in electronic form:

**Information is kept on print, film, magnetic, and optical storage medium**. Today, the vast bulk of information is produced electronically.

**Information is accessible through both online and offline databases and is also provided in bibliographic form.** Online library catalogues are becoming more prevalent, and the majority of indexing and abstracting services are currently accessible there. This encourages networking among libraries.

**Internet:** The production, publication, storage, transmission, and consumption of information have all changed significantly as a result of the internet. Libraries may create networks and share their resources thanks to the Internet.

**Quick access to information:** It is challenging for an individual to manually access the precise and necessary information from the large amount of information available. Using a

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computer makes it easier to analyze, access, and look up crucial information. To access information that is distantly placed, networks are necessary. The networked libraries have made resource sharing more practical by reducing the restrictions of travel time and distance. **NATIONAL LIBRARY NETWORKS** 

There are a number of library networks operational at national level. These are based on different criteria, e.g. clientele, subject, geographical area, etc. Some of the important networks are listed below:

# **1.3 INFLIBNET**

In 1991, the University Grants Commission started a major programme called the INLIBNET Centre. At first, the programme was meant to update libraries and information centres and set up a way for people to share and get information. This was done to help scholarship, learning, and academic pursuits. In May 1996, the centre was set up as an autonomous, independent InterUniversity Centre (IUC) of the UGC, New Delhi with the goal of coordinating and putting in place a high-speed network that connects all university libraries in the country using the latest technology. The Center's main activities and services include automating academic libraries, encouraging academic libraries to share resources, promoting information access, and supporting scholarship. The Centre acts as a hub for connecting libraries and information centres in India's universities, colleges, and research and development centres. The goal is to improve scholarly communication.

The Center has made great strides in its ongoing programmes, which are meant to keep up with trends and new technologies in information and communication technology (ICT). The Center has also started a number of projects to help the academic world. For its work, the INFLIBNET Centre won a number of awards. For example, the project "National Library and Information Services Infrastructure for Scholarly Content (N-LIST)" won the Jury Choice Award at e-INDIA 2010 for the year 2010, Manthan South Asia 2010 for the year 2010. The project N-LIST" won the Digital Skoch Inclusion Award for the year 2011. The project Shodhganga, which is a collection of Indian theses, won the Jury's Choice Award at e-INDIA 2011 for the year 2011.

# **Objectives**

The objectives of the Centre, as per the Memorandum of Association (MoA), are as follows:

• To work with and involve key agencies in creating and establishing communication infrastructure to improve the capacity of information transfer and access in support of scholarship, learning, research, and academic endeavors;

- In order to avoid unnecessary duplication of effort, it is necessary to set up an information and library network, which will consist of a computer communication network connecting LICs at universities, R & D Institutions, Deemed to be universities, Information Centres (UGC), Institutions of National Importance and Colleges etc.
- To advocate for and facilitate the standardization of computerization throughout library and information service operations and services;
- To create and promote common standards and norms for library techniques, methods, procedures, computer hardware and software, and services in order to maximize the use of shared resources through the sharing and exchange of information;
- With the goal of improving the nation's information management and service capacities, we are working to create a national network that will connect libraries and information centres all around the country.
- To create an online union catalogue of serials, monographs, books, theses and dissertations, and non-book materials (multimedia, computer data, manuscripts, audio visualsetc.) in libraries across India to make their document collections more accessible;
- Through the Sectoral Information Centres of NISSAT, City Networks, UGC Information Centersand others as well as through the establishment of gateways for online access to national and international databases held by the national and international information networks and centres, we aim to make available bibliographic information sources with citations, abstracts, etc.
- The goal of this research is to find novel ways to save digital representations of important knowledge written in various Indian languages.
- In order to minimise unnecessary duplication in purchases, libraries should collaborate on tasks like cataloguing, ILL, catalogue creation, and collection growth.
- To locate sources wherever they are available and obtain it through the INFLIBNET and union catalogues of documents so that users all over the country, no matter their location or distance, can access information about serials, theses/dissertations, books, monographic and non-book resources;
- As a means of providing online information services, it is necessary to compile databases of projects, institutions, and experts.
- So that the country's libraries, documentation centres, and information centres may pool their resources and better support the regions that are less well-endowed, we must promote collaboration among them.
- In order to set up, run, and maintain INFLIBNET, there is a need to develop human resources and train them in the field of computerized library operations and networking. Helping scientists, engineers, social scientists, academics, faculty, researchers, and students talk to one another via email, file sharing, teleconferencing, and other digital means.

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- Establish an appropriate control and monitoring system for the communication network at various levels; Conduct research and design systems for communications, computer networking, information handling, and data management.
- To work together with Indian and international organisations, libraries, and information hubs in the field related to the Centre's goals; To foster research and development and build the infrastructure required to generate technologies; To work in tandem with Indian and international universities, libraries, information centres, and other organisations working in fields related to the Centre's mission.

# MISSION AND VISION

- Make use of cutting-edge computing power to establish an online community of scholars and academic resources with the end goal of improving people's ability to gain access to and use of information through increased levels of preservation, innovation, and cooperation.
- Ensure that all academics, regardless of institution, have easy access to high-quality, peer-reviewed electronic resources, with a particular emphasis on the services, tools, procedures, and practices that enhance the usefulness of this data.
- Make improvements to educational institutions' ICT framework by providing more services.
- Create methods, systems, and applications that provide users to access data in a digital format at any time and from any location with a reliable and easy-to-use access management system.
- Create guides to help students choose appropriate materials and online tutorials to help them learn how to use e-resources.
- Encourage all educational institutions to establish open access digital repositories to save the educational and research materials they produce.

# **GOALS OF INFLIBNET**

- Library automation should be achieved in all educational institutions.
- Using an online, real-time library environment, create consolidated catalogues of all the documents that are now available.
- Make it simple and convenient for academic institutions to access scientific, peerreviewed electronic resources.
- University administrations should push towards the digitization of archival materials and the production of digital content (such as e-theses &dissertations, e-articles, electronic versions of working papers, annual reports, statistical reports, state-of-the-reports technical reports, etc.).

- Encourage the establishment of open access digital repositories at academic institutions for the storage of content resulting from the aforementioned procedure.
- Learn the ins and outs of creating and managing digital content as well as digitizing processes and digital archives.
- In order to accomplish the aforementioned objectives, it is necessary to provide instruction on the practical use of the new technologies.

E-Consortium	Open Access	Projects and	Library Automation
	Initiatives	Services	
e-ShodhaSindhu	Shodhaganga	e-PG Pathshala	IndCat: Union
			Catalogue
ShodhaShuddi	Shodhagangotri	Vidwan Database	SOUL
N-List	IR@INFLIBNET	Vidya-Mitra	
Infistats	INFOPORT	IRINS	
INFED			

# **1.4 MAJOR ACTIVITES OF INFLIBNET**

# e-ShodhaSindhu:

The INFLIBNET is a project of the Indian Ministry of Education that gives students at universities, colleges, and government-funded technical institutions in India access to electronic materials. The Ministry of Education (erstwhile the Ministry of Human Resource Development) formed e-ShodhSindhu by merging three consortia initiatives, namely the UGC-INFONET Digital Library Consortium, the National Library of Information Science and Technology, and the Institute of Engineering and Technology Information Network. The 12 (B) and 2 (f) status are mandatory for Centrally funded Technical Institutions, like IISc, IISERs, IITs, IIMs etc., Universities, and Colleges to have access to the e-current ShodhSindhu's and archived content, which includes more than 10,000 peer-reviewed and core journals in different disciplinesand a number of full text and bibliographicdatabases from a large number of aggregators and publishers.

# ShodhaShuddi

Since September 1, 2019, all Indian universities and institutions have had access to Plagiarism Detection Software (PDS) thanks to a programme called "ShodhShuddhi," which was launched on the advice of the National Steering Committee (NSC) of e-ShodhSindhu. Over a thousand different types of institutions are uncovered viz.

• Central Universities

- State Universities
- Deemed to be University
- Private Universities
- Centrally funded Technical Institutions (CFTIs)
- Inter University Centres (IUCs) of UGC
- Under this initiative, Ouriginal (formerly Urkund) a Web Based Plagiarism Detection Software system is being provided to all users of Universities and Intuitions in the country.

# N-List

The e-ShodhSindhu Consortium, INFLIBNET Centre, and the INDEST-AICTE Consortium, IIT Delhi are collaborating on a project named N-LIST, which will allow subscription to e-resources subscribed throughINDEST-AICTE resources for universities and subscription to e-ShodhSindhu College students, researchers, and teachers at other beneficiary institutions can use the N-LIST project's server(s) set up in the INFLIBNET Centre to gain access to electronic materials. After being verified as legitimate users, college students and faculty can utilize the INFLIBNET Centre's servers to gain access to e-resources and download the articles they need directly from the publisher's website.

#### **N-LIST: Components**

The project consists of four distinct parts, including the following: I subscription and provision of access to selected e-Shod Sindhu e-resources to technical institutions (IITs, IISc, IISERs, and NITs); ii) subscription and provision of access to selected INDEST e-resources to selected universities; iii) subscription and provision of access to selected e-resources to government-aided colleges; and Activities I and ii) above are jointly managed by the INDEST and UGC-INFONET. Activities iii) and iv) above are handled by the INFLIBNET Centre, Gandhinagar. Additionally, the INFLIBNET Centre is in charge of creating and implementing the right software tools and procedures for authenticating authorized users.

#### Infistats

The InfiStats Utilization Statistics Portal was created by the INFLIBNET Centre in order to track the usage statistics of the many e-resources made available to the member institutions of the e-Shah Sindhu Consortium. Through SUSHI Protocol,InfiStats gathers the COUNTER usage for each member. The InfiStats portal imports the usage data from the publishers' websitedirectoly. The InfiStats interface offers member institutions with levels of search options to consume data. The institutions can also log into this site to track the utilisation of the centrally funded e-resources made accessible to them. The InfiStats site now gives the ability to incorporate and track the consumption of self-subscribed resources by member institutions.

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<b>IN-TEXT</b>	QUESTIONS
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1. Library Cooperation, Inter Library Loan, Library Consortia, .....?

2.INFLIBNET Headquarter is in .....

3.E-ShoshaSindhu is related to .....

4.Shodhaganga is related to .....

5.e-PG Pathshala is an initiative of Ministry of .....

6.Vidwan is a database of .....

# INFEED

The first Federation in India, the INFED (INDIAN Access Management Federation) has embraced Shibboleth, a standardOSS for authenticating authorised users from Institutions and providing them with easy access to e-resources without geographical hurdles.

Under the e-ShodhSindhu, the INFLIBNET Centre offers universities and colleges in India with access to academic e-resources as one of its key responsibilities. The INFED is a centralised body which helps to collaborate with member institutions and access control mechanism employing standardised rules and metadata for attribute interchange.

# Shodhaganga

Theses and dissertations are widely recognised as a valuable and distinct source of knowledge, and are sometimes the only source of academic work. Grey literature (Theses & Dissertations) continues to be an untapped and underutilised asset. The UGC Notification (Minimum Standards & Procedure for Award of M.Phil. / Ph.D. Degree, Regulation, 2009 Amendment made on 2016) dated 5th May 2016 requires researchers in universities to submit the electronic versions of their theses & dissertations in order to advocate open access to Indian academic works to the academic community at the global level. The provision of e-theses online through centrally managed digital archives would not only provide easy access and archiving of Indian doctoral theses, but will also aid to raise the standard and quality of research. This would solve the severe problem of research output. According to the Regulation, the INFLIBNET Centre hosts, maintains, and makes the digital repository of Indian ETDs accessible to all universities and other institutions.

In Sanskrit the term "Shodh" means "study and discovery." The "Ganga" river is the holiest,

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biggest, and longest in the Indian subcontinent. Shodhgangais a storehouse of Indian academic intellectuals output managed by the INFLIBNET Centre, Gandhinagar. The Shodhganga@INFLIBNET is built on DSpace, an OS Digital Repository Software created by MIT in collaboration with Hewlett-Packard (HP). The DSpace employs protocols and interoperability standards that are internationally recognised. Shodhganga offers a platform for research community across India to deposit their theses online and make them available on open access mode for the benefit of scholarly community. The repository is capable of capturing, storing, preserving, indexing and disseminatingETDs submitted by the researchers.

#### Shodhagangotri

The Sanskrit term "Shodh" signifies "study and discovery." "Gangotri" is one of the greatest Himalayan glaciers and the source of the Ganges, the holiest, largest and longest river in India. The Ganges is a symbol of ancient culture and civilisation, since it is eternally aged, always flowing, eternally loving, and beloved by its people.

Under the "ShodhGangotri" initiative, research scholars in institutions are required to submit an e-copy of the approved synopsis submitted to universities at the time of registration for the Ph.D. programme; the initiative has been expanded to include MRPs/PDFs/Emeritus Fellowship, etc. On the one side, the repository would expose the patterns and orientations of research undertaken in Indian institutions, and on the other, it would prevent research duplication. Later, "ShodhGangotri" abstracts would be matched to "ShodhGanga" theses in full text. Therefore, after the full-text thesis has been submitted for a summary, a link to the full-text theses will be supplied from "ShodhGangotri" to "ShodhGanga."

#### **IR @ INFLIBNET**

The INFLIBNET Centre has established an IR called IR@INFLBNET using DSpace, OSS. It organizes two conferences namely CALIBER and PLANNER. The papers published in these conference proceedings are uploaded into the IR. The Repository also includes other materials like news paper clippings and course materials.

#### INFOPORT

InfoPort is a Subject Gateway for Indian ElectronicResources. The INFLIBNET Centre encourages open access to academic information from India. The InfoPort is intended to act as a gateway to all Indian scholarly sources. The gateway provides access to the diversified Indian intellectual output on the Internet that supports search, browse, and multiple listing. The InfoPort catalogues online materials of Indian origin on a variety of themes that are freely accessible through a rigorous testing and review procedure. The Centre intends to engage with college and university librarians and researchers in the discovery and selection of resources. Different topic groupings make up the cosmos of knowledge. The world of knowledge, according to the Dewey Decimal Classification, is dispersed between

000 and 999. InfoPort is organised according to DDC classification, subject indexing, and alphabetical subject arrangement.

The InfoPort includes Indian Internet resources in the following categories:

- Electronic books,
- electronic journals and reference sources including dictionaries, directories, maps etc.;
- Institutional repositories, resource gateway, etc.
- Wikis, blogs, etc.;
- Teaching and learning website;
- Lecture Notes, Magazines,:
- Portals;
- Audio, video and other multimedia learning resources;
- Libraries, archives and museums;
- News and media services including newspapers, online news services,;
- Websites listing current events and activities;
- Websites of Major Research projects, especially those supported by national funding bodies such as UGC, DST, DBT, AICTE, MHRD, DOT, etc.;
- Teaching and learning projects website, especially those receiving Government funding;
- Universities, colleges, Research and Development Labs, institutions and e-learning websites.
- Indian publishers and subscription agents; and
- Listservs and discussion groups, especially those having online archives.

# e-PG Pathshala

e-PG Pathshala is an initiative of the Ministry of Human Resource Development's National Mission on Education through ICT (NME-ICT), which is being carried out by the UGC. The curriculum-based, interactive e-content in 70 courses spanning all disciplines of Natural & Mathematical Sciences, Social Sciences, Arts & Humanities, Linguistics and Languages have been created by subject experts from Indian R & D Institutions and Universities. Every subject has its own group of lead investigators, content authors, paper coordinators, Language editors, Content reviewers, and multimedia specialists.

# e-Adhyayan (e-Books)

e-Adhyayan is a platform to provide 700+ e-Books for the Post-Graduate Courses. All the e-books are derived from e-PG Pathshala courses. It also facilitates play-list of video content.

# UGC MOOCs (Online Courses)

UGC-MOOCs is one of vertical to produce course on Post Graduate subjects in SWAYAM (Online Courses, An MHRD initiatives). UGC is one of the national coordinators of SWAYAM & INFLIBNET is technical partner for UGC-MOOCs.

#### e-Pathya (Offline Access)

e-Pathya is one the verticals of e-PG Pathshala which is software driven course / content package that facilitates students pursuing higher education (PG level) in distance learning as well as campus learning mode. It also facilitates offline access.

#### **VIDWAN Database**

VIDWAN is the major database of profiles of Academicians / scientists/ Experts / Teachers employed by India's foremost Universities and Research &Development organisations engaged in teaching and research. It includes essential details like the expert's academic history, experience, scholarly publications, Awards, Projects undertaken, researcher identities (Ids like Scopus ID, Researchers ID, Google Scholar ID, etc.) The database was created and is maintained by the INFLIBNET. TheNME-ICT (National Mission on Education via ICT) funds for this project. The database will aid in the selection of panels of experts for different committees, task forces, constituted by Ministries/Government entities for monitoring and evaluation reasons.

# IN-TEXT QUESTIONS 7.IRINS is a product of ...... 8.CALIBER is the national convention organized by. .....

9.SOUL is ..... software

10.DELNET was started in .....

11.NACLIN is organized by .....

12. The ultimate aim of DELNET is to provide ...... service

#### Objectives

- Quickly and easily provide information about experts to peers, prospective collaborators, funding agencies, policy makers, and research scholars in the country;
- Identify peer reviewers for articles and research proposals;
- Discover prospective collaborators for ongoing research projects;

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- Establish direct communication with the experts who possess the expertise required by users;
- To facilitate information exchanges and networking among scientists.

#### Vidya-Mitra

Vidya-mitra is an online learning platform launched by the NME-ICT, Ministry of Human Resource Development (MHRD), New Delhi. Through a single interface, the portal enables learners to search and browse all stored information, including audio/video learning resources, textual materials, and multimedia-enhanced materials, among others. In addition, this portal provides facetted search, use statistics, project-based access, and My-Space.

#### IRINS

The INFLIBNET Centre, home of the Information and Library Network (INFLIBNET), has created a web-based Research Information Management (RIM) tool called IRINS. The portal allows universities, research institutions, and individual faculty members and scientists to aggregate, curate, and publicise their scholarly communication efforts, therefore laying the groundwork for the development of a scholarly network. Free software-as-a-service versions of IRINS are made accessible to Indian universities and research institutes.

Human resources, course management, grant administration, institutional repository, open and commercial citation databases, academic publishers, etc. might all be integrated with the help of the IRINS. Various forms of academic identification, including ORCID ID, ScopusID, Research ID, Microsoft Academic ID, and Google Scholar ID, have been included into the system for the purpose of consuming scholarly publications.

# IndCAT

If you are looking for books, theses, or serials from major Indian academic libraries, go no farther than IndCat, a free online union catalogue. Information on books, theses, and serials may be found in the IndCat, along with their location and availability. Records are made available in common bibliographic forms like MARC and MARCXML. Psychology, statistics, politics, economics, law, public administration, education, commerce, linguistics, mathematics, astronomy, physics, chemistry, biology, life sciences, botany, zoology, medicine, engineering, agriculture, management, architecture, sports, literature, history, computer science, etc. are all included. The combined catalogues will be accessible via a user-friendly web interface. When it comes to copy cataloguing and retroconverting bibliographic records, the IndCat is invaluable. It may also be utilised for facilitating interlibrary loans and expanding library holdings.

The INFLIBNET Centre has created state-of-the-art integrated library management software called Software for University Libraries (SOUL) to meet the unique needs of

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academic libraries. It was designed to function in a client-server architecture and has a focus on ease of use. All major bibliographic formats, networking protocols, and circulation models are supported by the programme. The programme was developed to automate all library housekeeping tasks after extensive research, debates, and deliberations with the country's top specialists. The programme works for any library, including small public libraries and large university libraries. During CALIBER 2000, the initial version of the programme, called SOUL 1.0, was made available to the public.

In January of 2009, users were able to download SOUL 2.0; the most recent version, SOUL 3.0, was made available in February of 2021. The new SOUL database is compatible with the most recent releases of both MS-SQL and MySQL (or any other popular RDBMS). MARC 21 bibliographic format, Unicode-based Universal Character Sets for multilingual bibliographic data, and NCIP 2.0 and SIP 2 based protocols for electronic monitoring and control are only some of the worldwide standards that SOUL 2.0 complies with.

#### CONVENTIONS

# • CALIBER: CONVENTION ON AUTOMATION OF LIBRARIES IN EDUCATION AND RESEARCH

In 1994, the INFLIBNET Centre began hosting a biannual gathering called the Convention on Automation of Libraries in Education and Research Institutions (CALIBER) in partnership with institutions around the country. Research and technical works, case studies, technological updates, etc., relevant to the convention topics and subthemes of the given year are encouraged to submit high-quality papers for consideration at the convention. Library and information professionals, educators, information technology specialists, consultants, and users engaged in library automation and networking, as well as information producers, have a rare opportunity to meet face-to-face at this conference. Twenty-two conferences have been hosted thus far in conjunction with various educational institutions. The 22nd CALIBER, also known as the 13th International CALIBER, will take place in partnership with BHU, Varanasi, Uttar Pradesh, India, from November 17-19, 2022.

#### PLANNER: A NATIONAL CONVENTION FOR NORTH EASTERN REGION

Since its inception in 2003, the Promotion of Library Automation and Networking in North Eastern Region (PLANNER) conference series has served as a forum for discussing and finding solutions to concerns specific to the region's libraries. Those working in libraries and information technology in the Northeast can benefit from meeting and networking with their peers at this convention, as well as professionals from other parts of the country. Since 2003, seven North-Eastern universities and colleges—including NEHU (Shillong), Manipur University (Manipur), Assam University (Silchar), Mizoram University (Aizwal), Gauhati University (Gauhati), Nagaland University (Dimapur), Tezpur University (Tezpur), Sikkim

University (Sikkim), Dibrugarh University (Assam), Tezpur University (Tezpur), Tezpur University

#### **Publications:**

INFLIBNET Publishes major publications such as:

1) Annual Reports – Gives the information regarding the annual activities of the INFLIBNET Centre.

2) Newsletter – Gives the information regarding the monthly activities of the INFLIBNET Centre.

3) University Directory – It is a complication of contact details of university Vice Chancellors, Directors, Registrar and Librarian etc.

#### **Books Database:**

The bibliographic data for books that have been submitted to the Union Catalogue of Books by the various member universities is made available. This database includes a wide variety of publications that universities typically group together as part of their book collections, including monographs, reference books, conference proceedings, textbooks, and more. Millions of scholarly articles and dissertations from its affiliated institutions are available here.

Bibliographic entries can be downloaded from the Union book database in MARC21, CCF, or ASCII format. Bibliographic entries retrieved in MARC21 format are compatible with SOUL 2.0 and other library management systems. Therefore, IndCat not only acts as a Union Catalogue of books available in university libraries, but also as a virtual catalogue for each of the universities that contribute to it. Both GujCat and NeRCat are IndCat branches that are specialised for browsing the catalogues of specific libraries within India's state of Gujarat and the eight university libraries located in the country's north-eastern region, respectively.

#### **ThesesDatabase:**

Reference materials for Indian doctorate dissertations are collected and made available in a single location: the union catalogue of theses. In 1995, 52,000 records from 82 academic institutions were used to kick off the project. Over 2.64 billion entries from roughly 350 institutions are now available in the database.

#### SerialsDatabase:

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The bibliographic data for journals to which universities subscribe is kept in the union catalogue of serials, which is divided into three sections: serials holdings, current serials, and e-journals. Over 33,000 unique titles are catalogued in the serials database, and library holdings data from participating institutions is also included. Title, publisher, frequency, publication year, homepage URL, topic headings, holdings information, and names of the universities are all included in each bibliographic entry for serials.

**CEC's Video Database:** The CEC Video Database is a joint project of the INFLIBNET Centre and the Consortium for Educational Communication (CEC), with the stated goal of making available to scholars and the general public details on the CEC-created video programmes. Educative programmes made by the CEC and its 17 EMMRCs are catalogued in the database, which has over 15,000 citations.

To encourage cooperative cataloguing and reduce unnecessary duplication of efforts, the Centre has created an application named "Online Copy-Catalogue System" (OCS). On the one hand, libraries can use a portal called "Online Copy Catalogue System (OCS)" to search and read bibliographic records of documents in IndCat and then download the records they're interested in into SOUL 2.0 or other MARC21 compatible software. However, if a document is needed but is not in the IndCat, it may be easily added using the interface. At the same time as this new entry is being recorded in the IndCat, it is also being saved in the locally connected LMS.

Information about Current Research Projects in India. (http://www.inflibnet.ac.in/researchproject/).

The Research Project Database documents the work of professors at colleges and universities around the country. Regularly, researchers working on MRP grants from the UGC upload reports to the database, which already comprises over 15,000. Users can access both digital and printed versions of the project reports on site at the INFLIBNET Centre.

# Open Journal Access System (OJAS) @ INFLIBNET (http://www.inflibnet.ac.in/ojs/)

The Open Journal Access System at the INFLIBNET Centre is a digital platform for hosting electronic versions of journals in open access mode, complete with integrated submission, peer-review, editing, layout design, and publication procedures. The OJAS @INFLIBNET initiative promotes the use of the OJAS @INFLIBNET by academic institutions publishing print journals to host free, open access, electronic versions of their publications on the INFLIBNET Centre's server.

# **Bibliometric and Scientometric Studies**

The Bibliometrics Group was formed to investigate the effect of electronic library resources on academic output in India. Each participating institution's research profile is currently in the making. A university's strengths and weaknesses, international and national

collaborations in various fields of study, the correlation between the number of articles downloaded from e-resources and the number of research articles produced by researchers, and the impact of research as measured by citations received and the H Index are all factors that go into these profiles. The citation and source information are both retrieved from Web of Science. Fifty academic institutions' research profiles are complete.

#### Human Resource Development and Consultancy

The Centre's mission includes providing training for university and college library staff in the use of information and communication technologies. The centre often hosts conferences, training programmes, workshops, and seminars on topics such library automation, networking, e- resource awareness, theses repositories, institutional repositories, etc. Universities and colleges all throughout the nation are working with INFLIBNET to host Regional Training Programmes for Library Automation (IRTPLA) and User Awareness Training Programmes. Human resource development initiatives in India include holding national and international conferences every other year; these events are known as PLANNER in the North-Eastern areas and CALIBER in the rest of the country. It also offers library-specific SOUL Installation and Operations Training. integrated publishing system. OJAS @INFLIBNET is a free service provided by the INFLIBNET Centre that promotes academic institutions to publish electronic versions of their journals on the INFLIBNET server.

#### Implementation of Web 2.0 Technologies at the Centre

The INFLIBNET Centre has implemented the following Web 2.0 and Library 2.0 interactive and collaborative technical capabilities, marking its arrival in the new era of digital libraries. Every one of the Web 2.0 applications employed is free and available to the public. The INFLIBNET Centre has incorporated many Web 2.0 / Library 2.0 technologies, such as Chat (http://www.inflibnet.ac.in/chat/), Blogs (http://www.inflibnet.ac.in/blog/), Wikis (http://www.inflibnet.ac.in/wiki/), Streaming Media & Social Network (http://in.youtube.com/inflibnet), RSS Feeds Aggregation Service.

#### **Integrated e-Content Portal**

As part of the National Mission of Education via ICT, the INFLIBNET Centre is creating a web-based "Integrated e-Content Portal" for every e-content project. More than 55 projects on e-content are being developed in various disciplines like Engineering, Arts & Humanities, Science, Social Sciences etc.by means of various Indian institutes/universities/colleges under NME-ICT.

Through the portal, students will be able to access various types of hosted content, such as audio/video lessons, written lessons, multimedia enhanced lessons, etc., with a simple search and browse function. This portal would also have "my account" and "my space"

functionality, as well as faceted search, syllabus-based search, use statistics, and the ability to create a custom learning experience.

INFLIBNET Centre also worked on the institutional repository for the National Institute of Occupational Health (NIOH), the Library Automation Project of Gujarat University, and the construction of the UGC website and the automation of its programmes.

# 1.5 DELNET

Starting in January 1988, the Delhi Library Network is supported by NISSAT, the Department of Scientific and Industrial Research of the Government of India. The network was officially incorporated as a society in July 1992. The National Informatics Centre of the Government of India's Planning Commission and the India International Centre in New Delhi are leading the charge to spread the word about this.

DELNET's primary goal was to "foster cooperation among libraries" by providing "computerised services to the users to coordinate efforts for acceptable collection growth and reduce duplication wherever possible." There were only 31 institutions that could be considered institutional members in the outset, with three more being associate institutional members. All of these 31 institutions were located in Delhi. In time, more and more people joined. As its membership expanded beyond the Delhi area, the organization's name had to be changed. As a result, the Delhi Library Network became the Developing Libraries Network on September 13, 2000. Due to the update, the network's reach has greatly increased from its previous confines in a single city to encompass people from all over the globe.

The number of people that are part of DELNET right now is increasing rapidly. As of November 1, 2001, there were 276 member libraries, up from 153 between 1997 and 2000.

# **Objectives of DELNET**

- The establishment of a library network, the accumulation and dissemination of information, and the provision of digital services for patrons are all means toward the end of facilitating cooperation and sharing of library holdings.
- Information science and technology research, development of new systems in the field, implementation of research findings, and publication of findings.
- To assist affiliated libraries in all aspects of information management, including acquisition, preservation, dissemination, and use.
- It is important to work together to ensure that collections are growing in the most effective way possible, and to eliminate duplication of effort whenever feasible.

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- The goal is to create a centralised online union catalogue of all the books, serials, and non-book materials held by the collaborating libraries, and to assist the creation of referral and/or research centres.
- To encourage and facilitate the human or automated distribution of papers.
- The goal of this project is to create a bibliographic database for books, serials, and other non-book resources.
- The goal is to create a repository of projects, experts, and organisations.
- To have access to and keep functioning mechanical and electronic means of transmitting and receiving electronic mail as quickly as possible.
- Sharing resources with other libraries and information networks on a local, national, and global scale.
- Hold conferences and seminars on a national scale.

# Facilities from DELNET

DELNET is providing the following facilities to its members:

# **DELNET Databases:**

- (a) **Union Catalogue of Books CCF:**Delnet online union catalogue has 10,26,827 bibliographic records. It is continuously updated and the request for inter library loan can be placed through the online system.
- (b) **Union catalogue of books -** MARK format: Delnet union catalogue of books in MARC book format presently has 27,231 records.
- (c) **Union list of current periodicals:** DELNET has created union list of current periodicals in science and technology, social sciences and humanities. This database is available online to DELNET users. It now lists 16,497 periodicals and is regularly updated and new titles are added annually.
- (d) **Union catalogue of periodicals**: union catalogue of periodicals maintained by DELNET presently contains 15,487 records, which include full holdings data of the libraries.
- (e) **Database of periodical articles**: this can be searched under the title, author, compiler, name of periodical and subject. At present the database contains 2,18,218 records.
- (f) **CD-ROM Databases**: it is a compilation of bibliographic database of CDROMs available with the member libraries. It has 1,214 records.
- (g) **Union list of Video Recordings**: this is a database of videocassettes available in DELNET member libraries and has about 2,278 listings.
- (h) **Union list of Sound Recordings**: this union list consists of audiocassette records available in member libraries. This has 708 listings.
- (i) Database of Urdu Manuscripts: this list 210 manuscripts available in Delhi libraries.
- (j) **Database of Theses and Dissertations**: A database of theses and dissertations submitted to Indian Universities, which covers various subjects, has been started. The database has 16,587 records.

- (k) **Indian Specialists Database** who is who: this database now has 2000 records. Entry can be searched under the name area of specialization, subjects interests, languages known, etc.
- (1) **Union list of Newspapers**: this database of newspapers records the title, name of editor, place of publication, email address and web address of internet edition.
- (m)**Serials Management Libraries**: a database containing nearly 800 serials, received in various management libraries has been made online.
- (n) **DEVINSA Database**: Development Information Network for South Asia (DEVINSA) is a special database on socio-economic issues. It has nearly 20000 records of periodical articles, books and unpublished materials on socioeconomic issues.
- (o) **Profile of member libraries**: a directory containing information about the member libraries is available.

#### Access to Database through INTERNET

- (a) DELNET provides access to the following database and listervs through INTERNET/NICNET.
- (b) GISTNIC: DELNET provide access to GISTNIC database of the NationalInformatics Centre.
- (c) LOC: DELNET provides online access to the library of congress catalogue.
- (d) NLM: DELNET provides online access to various databases of the National Library of Medicine like Medline, AIDSline, Popline etc.
- (e) U.S. Patents: the online access to full text US Patents.
- (f) Index to The Hindu: Delnet is providing index to The Hindu online newspaper to its users. One lakh indexed news items are available covering its 1996-98 period of the Chennai edition.
- (g) NET HAPPENINGS
- (h) IFLA
- (i) LIBJOBS
- (j) BOOK REVIEWS FROM INTERNET
- (k) Current contents

#### National Bibliographic Database

In 1998, as a pilot project, DELNET compiled the national bibliographic database with funding from the Indian government's department of culture. Between the Punjab University in Patiala and the International Institute of Tamil Studies in Chennai, fifty thousand book recordings were generated. Current compilation efforts may be found at Andhra University, the Asiatic Society of Bombay, and the Asiatic Society of Kolkata.

# **DELNET – AICTE MOU**

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DELNET and the All India Council for Technical Education (AICTE) have signed a Memorandum of Understanding (MOU) to update and connect through DELNET all technical institutions in India that have been granted AICTE approval.

# **Training Programs**

DELNET arranges tutorials, workshops, lectures and training programmes every year time to time besides a National Convention on Library and Information Networking (NACLIN)

# Software Development

DELNET has development some library software such as:a) DEL-DOS: It is based on the DOS Platformb) DELMARCc) DEL PLUS

# **Other Services**

a) **Retro-conversion:**Delnet undertakes retro-conversion projects periodically.

b) **Referral center:** Delnet maintains a referral center to provide reference facilities to participating libraries.

c) **Database creation:** DELNET assists the participating libraries in creation of bibliographic databases. It also provides technical assistance to member libraries in handling IT applications in libraries.

d) **ILL Online:** ILL requests can be registered online for books. It is an optional service and an amount of Rs. 4000/- per year plus delnet photocopying charges has to be paid.

e) **E-mail:** DELNET provides, RENNIC E-mail and INTERNET Facilities. It is also an optional service.

f) **Internet TCP/IP connectivity:** full Internet TCP/IP connectivity is given to members in Delhi through NIC.

# **Publications**

# i) The DELNET Newsletter

DELNET'S mission of promoting library networking and raising knowledge of current events is furthered through this publication. It is also used to update subscribers about DELNET'S development in several areas.

# 1.6 SUMMARY

In this Unit, you will learn the basics of pooling your resources with others. It provides a synopsis of the issues and goals associated with pooling resources. Understanding the development of resource sharing from library collaboration to consortia might be aided

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by a description of the topic's historical context. The development of library networks has been a windfall for libraries since it has given substance to the idea of resource sharing. Getting papers sent quickly and efficiently across great distances is a major difficulty that has been resolved. The importance of library networks and why they exist are presented to the student. Consortiums of libraries, the most recent innovation in this field, have at last been implemented.

# 1.7 ANSWER TO IN-TEXT QUESTIONS

1	Library Networking	7	INFLIBNET
2	Gandhinagar	8	INFLIBNET
3	e-resources	9	Library Automation
4	Theses and Dissertations	10	Delhi
5	HRD	11	DELNET
6	Teachers / Scientists	12	Computerized

# 1.8 SELF-ASSESSMENT QUESTIONS

1.Define resource sharing. Describe its need.

- 2.Discuss the advantages of resource sharing.
- 3.Differentiate between library cooperation and resource sharing.
- 4. Enumerate the objectives of resource sharing.
- 5.Explain the concept of library consortia.
- 6. What is INFLIBNET and Discusses about any of its five activities?
- 7. What is DELNET and Discusses about any of its five activities?

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# Lesson- 4.2 CSIR E-JOURNALS CONSORTIUM, UGC- INFONET DIGITAL LIBRARY CONSORTIUM

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# **STRUCTURE**

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 The Council of Scientific and Industrial Research (CSIR) Consortium
- 1.4 UGC- Infonet Consortium
- 1.5 Summary
- 1.6 Answers to In-Text Questions
- 1.7 Self-Assessment Questions
- 1.8 REFERENCES

# **1.1 LEARNING OBJECTIVES**

After reading this lesson, the student will be to:

• Get familiarize with the Resource sharing, Library networks and library consortia.

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- Know how a library consortium is gaining importance in the 21<sup>st</sup> century.
- Understand the different library consortia available in India.
- Analyse how UGC-Infonet helped academic community by extending access to wide variety of e-resources.
- Apply different pricing models for the subscription to e-resources.

# **1.2 INTRODUCTION**

The influence and impact of Electronic publishing and telecommunication have led to emergence of library consortia and it increased in both number and function over the last decade. The development of Library consortium is seen from the history of library cooperative efforts and the library consortium providing services to its remote users through licensed access to electronic materials. The concept of consortia approach was advised by Dr. S. R. Ranganathan, father of Indian Librarianship in his book "Five laws of library science". The fifth law "Library is a growing organism" which leads whole world to look of consortium. The term consortium is a collaboration of homogeneous organizations working towards the same goals. By joining a consortium, a individual library can expand its reach globally with more resources and services. Consortia are essential in the current environment, especially for libraries. The library consortium is a virtual way to address the various issues that libraries face through proper coordination and optimum utilization of library resources by balanced use of funds.

# **Understanding Consortia**

In last two decade concept of consortia gaining popularity among the librarians, scholars, and publishers. The term consortium is derived from the Latin word for fellowship and the '*Consortia*' is the plural form of '*Consortium*' which often used as singular form. The meaning of consortia is coming together of separate groups for a specific purpose. There are similar terms such as collaboration, coalition, cooperation, alliance which denotes concept of consortium. Consortium is not a local or state system of public libraries, but such systems may agree to access electronic resources on behalf of their respective institutions. Simply, the consortia run to gamut from relatively informal cooperative founded just to realize economies of scale in purchasing, to highly-organized, centrally-staffed, centrally funded organization; intended to share the resources, and engage in all manner of collaboration within the member libraries.

According to Oxford English Dictionary, Consortium means a "temporary cooperation of a number of powers, companies, etc, for a common purpose. It is an association of similar type of organization/ institution who are engaged for producing and servicing the common things for providing services for a specific purpose of its users".

A definition by American Heritage Dictionary (3<sup>rd</sup> ed., 1993) considered the term –"a cooperative arrangement among groups or institutions. More straightforward description of library consortia would be organizations of libraries formed to realize the benefits and opportunities of collaborative activity.

Therefore, the common focus of all definitions are "coming together of libraries having common interests and needs, to achieve a common goal that is beyond what an individual library could achieve on its own".

#### Aims of the Library Consortia

The consortium is a coordination of mutually agreed institutions which support and assist interlibrary communication, teaching and resource sharing among different multi-type library membership. The goal of a consortium today has changed from the sharing of resources to the exchange of expertise across libraries, and it also considers the necessity for libraries to share their resources in order to maximise their effectiveness.

#### Need for library consortium

- Now a day's academic libraries facing new challenges and opportunities in managing and purchasing serials within their limited budgets due to changes in scientific publication and publisher pricing policies. Therefore, a shared infrastructure or firm to share the resources among libraries is crucial to solve the current serials crisis.
- A large number of scientific journals are abandoned every year as a result of the ongoing price rise for scientific information and the lack of funding of academic libraries.
- In the present context, access to materials is valued more than building a substantial library collection, especially if the access is continuous. The consortium makes it feasible for libraries to benefit from increased access to electronic materials at a low cost and with the best possible licence terms.
- The cost of journal subscriptions is constantly rising, and the budget gradually decreases every year.
- Consortium enables libraries to get benefit from expanded access to electronic resources at a low cost and with the best licence terms.
- More number of journals through e publishing (print journals are migrated to ejounals)
- Effective document delivery services, otherwise the article has to be scanned.
- Economical cost of savings for library budget.
- Up to date information since it takes less time for publication
- Greater buying power and increased access to e-resources
- Because of the rapid pace of technological advancement, there is constant demand for new hardware, software, and educational and training resources.

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# Salient features of Library consortium

The salient features of library consortium may be narrated as under

- They solve the various issues of libraries encountered so they can provide users a variety of services.
- Due to the increasing global population growth, they meet the demand for knowledge from a large number of people.
- They adapt to publishing the newly created knowledge in various forms.
- Due to the library's financial situation, consortium gather all materials published at the national and international levels.
- Consortium reduce the language barriers i.e. primary documents are being published by the developed countries like USA, UK, France, Japan etc, and among them the non-English speaking countries produce majority of scientific literatures in their mother languages.
- The licence must be signed by all parties and a single payment made by one of the participants or through an agency.
- It was more convenient for publishers to negotiate with members through an agent, who raised unique invoices for each member and received a single payment from publishers. Statistics on usage by institutions may be gathered to determine how frequently users access subscriptions to all titles.

# Principles to govern the consortia

The important principles for governing them are listed below:

- Flexibility to pick your own vendor, library management tools, and member libraries with whom to exchange resources.
- Flexibility in terms of managing and control of library resources and enforcement of collection policies.
- Flexibility to open up access to more information using a portal that displays images of your library
- Flexibility to enable to share print and electronic resources
- Flexibility to allow users of your library to search and reserve materials from other member libraries as well as from your own, in addition to allow users of other member libraries to search and request materials from your library.

# **Functions of Library Consortium**

The basic functions provided by the consortia are:

- The sharing of all resources of the library like manpower, reading materials, services etc.
- Establishing connections to the World Wide Web and the internet
- Giving an opportunity to access to electronic resources.

Every library is unique in terms of its collection, user information demands, working procedures, source of funding, information processing, etc. Standing on a shared platform, a consortium can adopt the numerous steps of tasks or functions for effective functioning, which are:

**Agreement for establishment:** to reach shared goal, a specific agreement must be made among participating libraries. All libraries should operate in a way that makes them mutually exclusive, but they must also adhere to the consortium's overall objective. Consequently, it is necessary to constitute the Management Committee.

Administration of Library Consortium: a statutory body made up of library heads is very essential to be formed in order to manage the consortium smoothly. Each library will provide the Chief Coordinator with information about its resources for handling new equipment, database, user services, and collection.

# **Benefits of Library Consortia**

Access to a wider variety of electronic materials is available at a substantially reduced cost through consortium-based subscriptions. The Consortium has attracted substantially decreased subscription fees with the most favourable conditions of agreement because to the combined efforts of its partner institutions. The Consortium is designed as an open-ended initiative wherein other institutions can join and benefit from both the favourable terms of licences and the massively reduced subscription rates. The consortium model provided better licence terms for use, archival access, and preservation of subscribing electronic resources, which would not have been possible for any individual institution. To utilize the full the consortia model's major advantages, the participating libraries have to consider the following basic requirements:

- The library should possess computers with minimum storage capacity and with up to date configuration.
- The institute may have intranet facility integrated with library network.
- Linkage to library in the institute website or a separate website for library in order to list and link the accessible resources so as enable the users by right dissemination .

- High level of coordination and mutual relation between ICT unit of the institute and library personnel is warranted
- Minimum of moderate level of ICT Skills of library personnel on Internet , e resources , networking is immense to educate the user for optimum use .
- Though there will be central coordinator of the consortia, association with publishers, aggregators and librarians are required at an extent.
- High bandwidth, static IP and quality internal network facilities ( cable network with optical fibre , WiFi , etc. ) have to be ensured .
- The librarian and senior library staff must be familiarized with all the resources which are to be accessed through consortia and to have appropriate information literacy program among users to enhance the use of the consortia.
- Mutual understating and effective coordination at times is a prerequisite for successful implementation of the consortia.
- Budgetary provision for consortia may be legitimized through the license agreement committee or management of the institutions.

# **IN-TEXT QUESTIONS**

1. The concept of Consortia is related to \_\_\_\_\_

book of Dr. S R Ranganathan emphasized on library consortia

Law of Library Science leads to concept of Library Consortia

4. The term consortium is derived from \_\_\_\_\_ word

\_\_\_\_\_ is the one of the major reasons for E-resources consortia

# The benefits of consortia

2.

3.

5.

**Promote Resource Sharing:** Members of consortiums can share a range of resources in addition to financial assets. According to Helmer, consortiums "for libraries give shared expertise, access to new electronic and print resources, professional growth, and new funding sources. The resources that can be shared by consortia include the following.

- Distribution of catalogues, delivering collections and creation of contents and collection development.
- Distribution of digital/ electronic resources and encourage archiving of electronic resources and its storage.
- Allocation of staff expertise, sharing risk, giving out success and professional glamour.
- Development of Library Services to the Users
- Enrich the Quality of Library Services: Since from 1990s, A significant national focus was placed on increasing the quality of library services even while reducing operating

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expenses. Libraries turned to consortiums as a method to encourage best practises, share information about them, and lower the per-unit cost of delivering basic services. It effectively combines the library services.

• Increase Financial Benefit:Gaining financial benefit is one of the most common reasons for libraries to join consortia. "All library consortia have one goal in common utilizing their collective financial resources to gain greater economic control over their marketplace," says one researcher.

**Encourage for Discussion, Collective thinking and Leadership:** Being a member of a consortium has many intangible advantages, such as the encouragement of discussion and group thinking. Shoaf points out that the value of increased communication between libraries cannot be overlooked. Another crucial component of library administration is leadership. A consortium may manage more than just costs by giving its members the leadership that need to work together for the benefit of the educational environment, the institution's financial stability, and the standard of services provided to library patrons.

**Demonstrate Reduced Cost:** Any actions made by a library to save expenses in a limited budgetary position might be viewed positively by stakeholders and the general public as a means of maximising the resources available to libraries. Consortia function as an agent on behalf of the member libraries to negotiate collective purchase prices for information resources that are lower than what each one institution could achieve on their own. This reduces the cost of member library operation. Therefore, in order to maximise their resources within a limited budget, it investigates new ways to combine global resources among the collaborating libraries.

**Facilitates the ' Change Management:** Change management is one of the hardest problems that libraries are now dealing with. The risks involved in making decisions are increasing, and there are less resources available, both financial and human. A consortium of libraries is very helpful in managing the transformation. Typically, the change management process involves a number of steps. These actions each carry a considerable risk. The process of reducing such risks and maximizing the opportunities is known as change management.

**Provides Training and Workshop:** Libraries need to be aware of developing concerns in order to handle change. The consortium can play a crucial role by organising new initiatives, such as schools of library computerization, classroom library plans, and library improvement plans, as well as by organising training sessions for current staff members.

**Enables Better Access:** Encourage the use of methods that are more efficient, quicker, and less expensive for giving information searchers access to electronic information sources. Access to electronic resources can be expanded across institutions at a reduced cost or at the lowest possible cost for the subscription.

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**It Facilitates Better Management:** Consortia help to manage the electronic information resources by consolidating its collections and services, while saving libraries the trouble of managing print resources.

**Sustains the Pressure:** The strain of a shrinking budget, rising user demand, and rising resource costs is fully achieved by library alliances.

**Protects from Duplication:** The amount of time, money, and effort spent duplicating materials can be reduced, while access and savings can be increased. By offering collective technical expertise in general or even detailed and specific levels of assistance, to member constituents, a consortium also safeguards duplicate manpower expert, guide, online serial-control manager, system analyst, network manager, problem counsellor, architectural consultant, etc.

Accelerates Sustainable Growth of Libraries: The combined forces of consortia members make it possible for libraries to benefit equally from increased access to electronic resources at the most favourable prices and terms. Additionally, it demonstrates the advantages of providing value-added services like Document Delivery and Search Interfaces in addition to discounted membership rates. Finally, it improves the uniform growth, standardisation, and compatibility among the member libraries. All of them point to the sustainability of libraries' growth.

# DISADVANTAGES OF LIBRARY CONSORTIA

Consortia participation needs initial investments in licences and information and communication technology, which creates a finance issue. We have the issue that the majority of libraries at the beginning of the year allocated practically all of their funding to the ongoing operations and services, allowing little space for decisions concerning further investments during the course of the year. This is a very dangerous decision to make in the rapidly evolving world of electronic publication.

Secondly, the savings offered by not handling the print edition of the journals are not a benefit that libraries are prepared to take advantage of. Their workforce is not trained to handle electronic documents, and their work tasks are still focused on the physical document. Since publishers often charge for off-consortia delivery of materials in either print or electronic format, many libraries are reluctant to participate into consortia arrangements.

Thirdly, there will regularly be investments required for locally based consortiumbased central hardware setup, mounting of data, development of interfaces, administration of

access, etc., but those issues are specifically to be solved not by a single library but in collaboration between the participating libraries.

# **Consortia Issues**

The activity of the library consortium is a complicated one that requires the full cooperation and coordinated efforts of the librarians, their administration, and the publishers. In the modern world of scholarly information, they constitute up a crucial trinity. There are countless problems with consortia, including focusing on and locating the resources, continuous online access, permanent access to back issues, pricing, licencing, subscription payments, copyright and archiving solutions, etc. Another urgent challenge is developing and deploying the appropriate IT infrastructure.

- **Resources Identification:** Finding the best product that all of the consortium's members can agree on is more or less a difficult challenge. This is mostly because each and every member will have their own wish list of information products and services, however in the event of an ideal homogeneous group; the overlap between the products will be on the higher end.
- **Technology Infrastructure:** Every participating library must plan ahead and obtain the necessary information technology and communication infrastructure to ensure the proper delivery of information resources.
- **Pricing Issues:** The bulk of publishers of scholarly literature do not conform to any standards, hence this whole area is considered to be grey. Most of the time, the cost of the journals is too high for many of our libraries, and the only method that could offer a useful, workable solution is a consortia approach. Publishers are asked to provide the consortia with their best prices during the discussions. There are other pricing strategies used, but it's crucial that the price the publisher offers is one that the participating libraries can afford. Additionally, it needs to guarantee constant access to the resources.
- Access related Issues: Publishers offer a variety of access ways of getting to their materials, and these options vary depending on the situation. Access authentication methods that are common among them include IP-based or User ID/Password-based methods. The consortium's ultimate goal is to provide uninterrupted and hassle-free access to scholarly content.
- Licensing and Copyright Issues : The E-Journal subscriptions and access models, in contrast to the print paradigm, only permit licencing of the content / product for a predetermined amount of time, which imposes numerous constraints and obligations on the licensee. Numerous challenges that are being discussed by librarians, users, and publishers require global attention and solutions.

- Archival Issues: Unfortunately, the consortia in India have not yet given this area the attention this so desperately needs. Archiving and long-term preservation of the priceless treasure of knowledge the consortium is gathering have to be done for future generations. Since technology is developing quickly and becoming obsolete practically at the same rate, it is imperative that these expensive informational resources be carefully saved and maintained over an extended period of time.
- **Sustainability Issues:** When compared to a library consortium's long-term survival and sustainability, developing and launching it may be the simpler part. To achieve the specified objective, the consortium's management and members must work incredibly hard to develop and construct solid models.
- Usage and Usability Issues: The consortium's ROI (Return on Investment) is determined by the enhanced usability of the pricey information products, which is ultimately reflected in the host institutes' research productivity. The success or failure of any collaboration is determined by the sincere efforts of the consortium, the administration, the researchers and faculty, and the librarians.

The other concerns may be listed as given below:

- **Consortia without Legal Entity:** Since the consortium of libraries will be involved in collecting subscription/membership fees from the participating libraries in order to make payments to the electronic publishers, it is necessary for the consortium to have a legal entity with permission and authority to deal with establishments like banks. For the purpose of securing foreign exchange on behalf of the member libraries, the consortium must negotiate with banking institutions like RBI.
- **Problems in Budget Allocation and Funding:** These are usually tricky problems, Being a member of a consortium entails transferring a portion of the library's budget to the consortium, although it is rarely possible to know the accessible resources' consortia subscription costs in advance. Depending on the number of participating members and the licencing arrangement, even consortia costs can vary greatly. As a result, there are issues with budget allocation to individual libraries because they are unable to foresee potential price bundles for consortium resources at the time of budgeting. Consortia may not be aware of the total number of participants or the terms of the resource negotiations, making it difficult to predict the precise concessions offered to the participating libraries.
- **Problem in Transfer of Funds:** To create a successful shared subscription, the consortiums from several participating libraries must be combined together. However, in actuality, the strict administrative, financial, and auditing restrictions always cause issues with money transfers. Determining the assets and volume of access compared to the payment is where the audit issue most frequently arises. Audit often permits payment for
a library subscription only against proforma, such as invoices from the publisher, vendor, society, etc., but not from a consortia. However, for any consortium subscription, the publisher will only send a combined invoice to the consortium's administrator and not to the consortium's member libraries. Unless the consortia itself is able to create an invoice in this case, regulations and procedure may not allow member libraries to pay the subscription cost of the consortium. This raises the issue of formalising the consortium, and audit hardly ever permits payment against such invoices.

- Lack of Awareness and Understanding: Particularly in India, librarians are reluctant to completely support the development of consortia among libraries because they do not fully understand the concept of consortia-based subscription to electronic resources. They sometimes lack a strong understanding of the benefits of consortia and frequently miss out on possibilities. Even many libraries have the tendency to think that their financial support for a consortium may not be adequate for the advantages they receive.
- **Problems in Local Decision Making & Control:** There is concern that joining a consortium will adversely affect local decision-making, autonomy, and control. Virtually, the library authorities occasionally express their disapproval of consortiums. In addition, libraries won't be free to substitute any existing item for a new one after they've already committed to it.

# 1.3 The Council of Scientific and Industrial Research (CSIR) Consortium

The National Knowledge Resource Consortium (NKRC), established in year 2009, is a network of libraries and information centres of 43 CSIR and 26 DST institutes. NKRC's origin goes back to the year 2001, when the CSIR set up the Electronic Journals Consortium to provide access to 1200 odd journals of Elsevier Science to all its users. Over a period of time, the Consortium not only grew in terms of the number of resources but also in terms of the number of users as more like-minded institutes evinced interest to join the Consortium. Today, NKRC facilitates access to 5,000+ e-journals of all major publishers, patents, standards, citation and bibliographic databases. Apart from licensed resources, NKRC is also a single point entity that provides its users with access to a multitude of open access resources. The Consortium envisions emerging as a leader to serve the R&D sector with much needed information to strengthen the research and development system in the country.

The CSIR consortium was set in 2001, to support Science and Technology research in India. Scientific laboratories affiliated with India's Council of Scientific and Industrial Research (CSIR) are engaged in basic and applied research across a variety of fields. Many laboratories have well-stocked libraries, and some of them serve as the primary information hubs for various fields and as consultant libraries on a national level. Many of the libraries that belong to these laboratories offer access to electronic journals using cutting-edge technology. The National Institute of Science Communication and Information Resource (NISCAIR), a constituent organisation of CSIR formed by the merger of INSDOC and NISCOM, provides strategic information support in addition to each laboratory's wellestablished library or documentation centre. The entire S&T workforce of CSIR and its

constituent units can now access globally accessible electronic journals due to a consortia approach that's been set up by NISCAIR to support CSIR research and development efforts. As a first step, INSCAIR has signed a contract with Elsevier Science on behalf of CSIR to access its over 1,500 e- journals. INSCAIR also plans to expand its information resource base by subscribing to more and more publications that are published internationally. By establishing suitable arrangements on a consortium basis with the other E-journal providers, the CSIR consortium increased its access.

## **IN-TEXT QUESTIONS**

6.In\_\_\_\_\_year the CSIR E-journal Consortium was set up.

7.\_\_\_\_\_ consortium was launched to support Science and Technology in India.

8.\_\_\_\_\_ launched E-journal Consortium for academic environment in India.

9.\_\_\_\_\_ year UGC- INFONET Digital Library consortium was launched in India.

10.\_\_\_\_\_ of Bibliographical Databases covered under UGC-INFONET Digital Library consortium.

# 1.4 UGC-INFONET CONSORTIUM

The University Grants Commission (UGC) has launched a new programme called the UGC INFONET Digital Library Consortium to improve academic libraries in India. The Honourable Dr. A P J Abdul Kalam, the then-President of India, officially launched it in December 2003, very soon after the UGC-Infonet programme had connected universities to the Internet that year. It is a national endeavour to provide the academic community in India with access to scholarly electronic resources, including full-text and bibliographic databases in all subject disciplines. It makes it easier for academia in the nation's to access top-notch online resources to enhance teaching, learning, and research.

The Consortium offers current and archived access to nine bibliographic databases and more than 5,000 core, peer-reviewed publications from 23 publishers and aggregators across nine distinct disciplines. In the first phase, 50 universities received access to all significant e-resources in 2004. In three phases, it has now been expanded to 157 universities.

The UGC-INFONET Digital Library Consortium is the largest consortium in India in terms of users. It has a goal to connect with all universities and institutions that are associated with those universities.

# AimsandObjectives

The UGC INFONET Digital Library Consortium's major goal is to give academic institutions lower subscription rates to high-quality electronic resources, such as full-text and bibliographic databases. The major aims and objectives oftheUGC-InfonetDigitalLibraryConsortiumareasfollows:

- To give a wide number of access to scholarly electronic resources at considerably reduced subscription fees and under the most advantageous terms and conditions among academic institutions, including universities and colleges
- To encourage users' quick and effective access to scholarly content and to develop and encourage ICT use in Indian universities' teaching and learning
- to make the Consortium's benefits available to its associate members, such as private universities and colleges
- to provide training in the use of electronic resources to users, librarians, researchers, and faculty members of the institutions in order to maximise their use.
- topromoteuseofe-e-resourceswithgradualdecreaseinprintsubscription;
- topromoteinteractionandinter-librarycooperationamongsttheparticipatinguniversities;
- toevaluate the usage of the subscribed resources and to identify new resources that are required to be esubscribed under the programme;
- tobringqualitativechangeinteaching,learningandresearchwithanaimtomeettheever growing challenges of globalizationofhighereducation;and
- toincrease there search productivity of the institutions both interms of quality and quantity of publications

**Electronic Resources:** The Consortium has access to electronic resources that encompass all of the main academic disciplines. It covers a wide range of resources, such as electronic journals, bibliographic databases, and reviews published by academic societies, university presses, institutional publishers, and private publishers. The Consortium has subscriptions to 10 bibliographic databases and 19 full-text electronic resources from 23 publishers and aggregators. According to the National Steering Committee's proposal, the member institutions are given varying levels of access to these resources depending on their requirements and activity profile.

# **Full text resources**

Electronic full-text resources include complete articles and their bibliographic information. The consortium has full-text e-resource subscriptions with the American Chemical Society, American Institute of Physics, Oxford University Press, Cambridge University Press, Cell Press, Springer Link, JSTOR, Project Muse, and other academic societies, university presses, commercial publishers, and aggregators. Electronic journals are included in all full-text resources to which the Consortium has subscribed.

## **BibliographicDatabases**

References to publications that have been published in journals, conference proceedings, or book chapters can be found in bibliographic databases. The majority of bibliographic databases include links to the full-text of the articles' abstracts.

## ElectronicResourcesSubscribedbytheUGC-INFONETDigitalLibraryConsortium

S. No.	ElectronicResources	URL	No.of Jrnls.	No. ofUn iv.	Phase
Full	-textResources				
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			1		
1.	ACS	http://www.pubs.acs.org/	31	100	I& II
2.	AIP	http://www.scitation.org/	18	100	I& II
3.	APS	http://www.scitation.org/	10	100	I& II
4.	AnnualReviews	http://arjournals.annualreviews.or g/	33	100	I& II
5.	Blackwell	http://www.blackwell-	797	60	I& II
6	CUP-STM	http://journals.cambridge.org/	224	100	I& II
0.	CUP-HSS	http://journals.cambridge.org/		50	I& II
7.	CellPress(Elsevier)	http://www.sciencedirect.com/	34	50	I
8.	Emerald– Lib.Sci.	http://iris.emeraldinsight.com/	29	60	I& II
9.	Instituteof Physics	http://www.iop.org/EJ/	46	100	I& II
10.	Jstor	http://www.istor.org/	729	64	I& II
11.	Nature	http://www.nature.com/	1	50	I& II
12.	OUP	http://www.oxfordjournals.org	202	75	I& II
13.	PortlandPress	http://www.portlandpress.com/pp/ default.htm	8	50	Ι
14.	ProjectEuclid	http://projecteuclid.org/	21	50	Ι
15.	ProjectMuse	http://muse.jhu.edu/journals	389	100	I& II
16.	RSC	http://www.rsc.org/	26	100	I& II
17.	SIAMJournals	http://epubs.siam.org/	14	50	Ι
18.	SpringerLink	http://www.springerlink.com/	1236	125	I– III
19.	Taylor&Francis	http://journalsonline.tandf.co.uk/	1076	80	I& II
Bibl	iographicDatabases				
20.	JCCC	http://jccc-		150	I- III
		infonet.informindia.co.in/			
21.	MathSciNet	http://www.ams.org/mathscinet		50	Ι
22.	SciFinderScholar	http://www.cas.org/SCIFINDER/S CHOLAR/index.html		20	Ι
23.		http://www.rsc.org/Publishing/C		100	I& II
	AnalyticalAbstracts	urrentAwareness/AA/index.asp			
24.		http://www.rsc.org/Publishing/C		100	I& II
	Catalysts	urrentAwareness/CCR/About.as			
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25.		http://www.rsc.org/Publishing/C		100	I& II
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27	ProductUpdates	http://www.weige.com/D_11:1:/C		100	τρτ
21.	Chamical Useranda	nup://www.rsc.org/Publishing/C		100	1& 11
	inIndustry	urrentAwareness/CHI/Index.asp			
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28.		http://www.rsc.org/Publishing/C	100	I& II
	LaboratoryHazards	urrentAwareness/LHB/index.as		
	Bulletin	р		

# 1.5 SUMMARY

The goal of a library consortium is to amplify the capabilities and effectiveness of its member libraries through collective action, including, but not limited to, print or electronic resource sharing, reductions in costs through group purchases of resources, and professional development opportunities. This unit highlighted the importance of Library consortia especially CSIR E-Journals Consortium and UGC-Infonet Digital Library Consortium.

# 1.6 ANSWERS TO IN-TEXT QUESTIONS

1	Resource Sharing	6	2002
2	Five Laws of Library	7	CSIR E-journal Consortia
	Science		
3	Fifth Law	8	UGC
4	Latin	9	2003
5	Shrinking of Budget	10	Nine

# 1.7 SELF-ASSESSMENT QUESTIONS

1. What is Library Consortia? Library Consortia has become necessary for libraries. Justify.

2.UGC-Infonet Digital Library Consortium is boon for academic community. Discuss.

3. Write a detailed note on the importance of CSIR E-Journals Consortium.

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# UNIT V: INFORMATION SERVICES AND INFORMATION PRODUCTS

# Lesson -5.1 INFORMATION SERVICES

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"Information professionals fall into two camps.

There are those who believe that information is *always* measurable. There are those that believe information is *never* measurable."

asurable.

(Penniman 1988)

# STRUCTURE

1.1 Learning Objectives.

- 1.2 Introduction
- 1.3 Documentary Sources
- 1.4 Non-Documentary Sources
- 1.5 Types of Information Services
- 1.6 Summary
- 1.7 Answers to In-Text Questions
- 1.8 Self-Assessment Questions

1.9 References

# **1.1 LEARNING OBJECTIVES**

After reading this lesson, the student will be to:

- Gain knowledge of the value of literature searches in research and development operations
- find pertinent material in both the print and electronic sources
- Describe the value and necessity of information services.

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- Determining the many kinds of systems that can be used to deliver information services;
- Increasing the effectiveness of these information services.

# **1.2 INTRODUCTION**

The expected information is what people can find by searching or browsing. Professional information services should concentrate on discovering, analysing, and coordinating the demands of diverse possible user groups in order to meet users' needs. This procedure serves as the foundation for certain of the information service levels. Data and information can be transformed into knowledge via high-level information services. Highlevel information services are currently needed to meet the expanding and shifting needs of library users, who are increasingly more interested in knowledge than in accessing, storing, and retrieving information. Information technologies are simultaneously evolving into knowledge technologies. It is now possible to offer knowledge services in libraries. Thanks to new emerging technology.

In recent years, the phrase "knowledge services" has become more popular. Of course, the meaning of this phrase is obvious. It speaks of using the internet to access services. The word "knowledge services" should, however, be taken to signify more. It alludes to various components, including the architecture, standards, technology, and models that enable knowledge services. A method of utilising and processing substantial amounts of information resources into valuable knowledge that demonstrates both the content and structure of that knowledge is known as providing knowledge services. They are navigable and unravelable by users. A decent map is necessary for successful navigation at all performance levels. Both repositories and the human brain contain knowledge.

# 1.1 Information:

Resources and assets are both terms used to describe information. It is regarded as a resource in the form of a body of factual knowledge or as a series of acts with the capacity to elicit a response that results in adaptive behaviour. It is crucial for the advancement of both personal and societal development. This is why having access to the appropriate information or owning accurate and pertinent knowledge is essential to solving the numerous issues that affect both individuals and the country.

# **Properties of Information:**

• Information is unbiased. The idea of objective information is supported by mathematics and science. This might be accurate in a formal, abstract situation. It frequently isn't true the actual world.

- Information is arbitrary. What is knowledge to me may not be knowledge to you. Who decides what information is reliable and what is not?
- Time-based information exists. In the future, something that wasn't information today might start to be. What was knowledge in the past, however, might not be knowledge in the future.
- Information is transient. Information may be valuable once and never again.
- Information cannot be changed. There are no identical, interchangeable components in information.
- Sharing information does not make it less valuable.
- Not all information is additive. There isn't twenty times as much material in twenty volumes on the same subject.

# I) Documentary Sources

- S&T Research Periodicals
- Trade and Business Periodicals
- Trade and Business Catalogues, Directories, Companies' Websites
- Handbooks and Manuals
- Advertisements
- Patents
- Standards
- Statistical Sources

# **II) Non-Documentary Sources**

- Consultants and Consultancy Organisations
- Information Analysis Centres
- Patents Attorneys
- Trade Representatives

# **DOCUMENTRY SOURCES**

# a) S&T Research Periodicals

For instance, if an engineering business requests the most recent research data on a specific chemical process, a search for pertinent papers in S&T publications must be conducted to locate the necessary data.

# b) Trade and Business Periodicals

It is necessary to search for relevant articles in trade and business journals in order to respond to questions about the most recent information on trade and business. In order to identify the primary source, which is where the actual information is located, secondary and tertiary sources are checked. Many full-text and secondary information sources are available that give access to trade and business-related information.

## c) Trade Catalogues, Directories and Websites

When building and launching new products or resolving everyday issues, engineers and technical staff frequently need information on the availability of machinery, components of machinery, tools, materials, etc. These people frequently ask for the company's name, address, and the names of its dealers and agents. Trade publications and catalogues, a company's website, and business and trade directories may all quickly and simply answer questions on this type of information.

### d) Handbooks and Manuals

When handling factual, data-finding, and how-to types of technical questions, reference librarians employ handbooks and manuals as vital reference aids. They are also often utilised by engineers and technicians who are in the workforce. They are sometimes referred to as manuals. Despite being presented in a brief and simple manner, the content is illustrated with numerous diagrams, graphs, equations, formulas, principles, symbols, tables, methods, etc. They have a constrained range since they deal with intricacies of a niche subject intended for a selected few specialists.

### e) Advertisements

Advertisements are produced by businesses and other organisations to market their goods and services. Contents can range from a simple list of a product to a thorough description of it. The adverts can be found online, in trade publications, newspapers, books, radio, and television. For managers of competing businesses, these advertisements, particularly those in trade publications, occasionally provide information on a company's new path of development, the creation of a new department, or the expansion of a certain area of the business. The majority of trade periodicals with a lot of ads offer an index of the advertisers and their addresses.

## f) Patents

Companies that invest heavily in research and development will need to patent their discoveries in order to protect them, and they'll also want to know if any patents of a similar sort have already been issued. By using the bibliographical resources utilised for searching the patents, a reference librarian can respond to inquiries about searching published patents. However, preparing the patent specification or commercialising a patented innovation require the assistance of a specialist who is knowledgeable about both the drafting and legal elements of patents. These professionals are referred to as patent attorneys. Telephone directories occasionally contain a list of patent attorneys. For instance, a list of patent and trademark attorneys can be found in the yellow pages of the Delhi telephone directory.

#### g) Standards

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Standards are necessary to guarantee the calibre, dependability, and uniformity of a given goods or services. The producers of goods with a large market and export potential are constantly searching for standards to guarantee the acceptance of their goods both domestically and abroad. Standards and specifications are documents that advocate for the following: i) Minimum performance and quality requirements for goods and services; and (ii) Optimal conditions and practises for operations in science, industry, and commerce, including the production, assessment, distribution, and utilisation of materials, goods, and services.

There are essentially two types of standards: Fundamental standards and technical standards are listed in order. Measurements of length, mass, time, temperature, different types of energy, force, or other types of quantifiable fundamental entities are considered to be fundamental standards.

Standards and specifications are formulated by: i) Companies; ii) Trade and Professional Associations; iii) Government Agencies; and iv) National and International Standardisation Bodies.

#### h) Statistical Sources

Information on industrial production, agricultural production, export and import statistics, marketing data, and data reflecting these topics is frequently requested in technical questions. The Ministry of Statistics and Programme Implementation under India's Central Statistical Organization is in charge of overseeing the nation's statistical activities. Its duties include compiling consumer price indices, conducting annual surveys of industries, conducting economic censuses, compiling the index of industrial production, and disseminating statistical data, among others.

# **1.4 NON-DOCUMENTRY SOURCE**

#### a) Consultants and Consultancy Organisations

Technical enquiry service encompasses the services provided to industries by consultants and consultancy organisations. These services cover everything from the marketing of the items to the feasibility assessment for starting an industry. Among the crucial services provided are Feasibility studies, market research, development plans, site selection, tender evaluation, project reports and evaluation, plant design, PERT/CPM, construction oversight, equipment procurement and inspection, process expertise, employee training, material management, marketing and sales promotion, plant maintenance, and plant modernization, among other things. Depending on the project, the consultancy business may undertake one or more of the aforementioned services or all operations related to the establishment of a new industry, product development, and its marketing.

#### b) Information Analysis Centres (IAC)

The Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE) is an IAC that conducts research and produces various information analysis products and services in various economic sectors, such as agriculture, energy and infrastructure, industry, corporate, capital market, investments, trade, etc., based on economic and business data of India. The datasets and research from CMIE are made available as well-designed services. These are offered in both print and electronic formats. Business Beacon, Economic Intelligence Service, Industry Analysis Service, PROWESS (Corporate Database), CapEx (database on active investment activities in India), India Trades, Mergers and Acquisitions, Indian Harvest, etc. are a few of its services and databases.

#### c) Patents Attorneys

Attorneys with expertise in patent law. They take care of all legal facets of patents. They can assist the inventor with the preparation of the patent application, submission of the patent application, restoration of expired patents, acquiring licences under compulsory terms or revocation, and notices of patent surrender. They have a wealth of knowledge processing patent paperwork, so they can respond to numerous technical questions about patents. The Controller General of Patents, Designs, and Trademarks maintains a register of patent agents (CGPDTM). Names and addresses of Indian patent agents registered with CGPDTM are published in the official gazette, newsletters, and other publications of the Controller General. They are also kept on file in the Controller General's "Register of Patent Agents."

#### d) Trade Representatives

For the purpose of promoting the sale of their products, numerous commercial concerns frequently hire trade representatives. These sales representatives meet with potential customers, present the company's various products, provide samples, demonstrate the products, offer discounts, and occasionally bargain with the customer over the price of the product and other terms and conditions like supply terms, warranties, payment terms, annual maintenance contracts, etc. As a result of their professional experience, these trade representatives can respond to some technical questions about product specifications, consumer desire for particular products, availability of certain products, etc.

# **1.5 TYPES OF INFORMATION SERVICES**

#### **Information Services:**

Information services encourage the use of library resources, connect users with library materials, and satisfy users' information needs. Depending on the type of library and

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the type of user that a library or information centre is designed to serve, the breadth and scope of these services varies.

i) Active or Anticipatory Information Services

ii) Passive or Responsive Information Services

Anticipatory information services are offered in anticipation of the demands from the users while passive or responsive services are provided in response to a request from the users

## Information Analysis and Consolidation Service:

Information analysis and consolidation, also known as an information consolidation product, an IACR product, or simply an information product, is user-friendly and can be printed or digitally stored. When such a product is periodically released, it is commonly referred to as a service, such as an abstracting service, an indexing service, or a digesting service. In accordance with the definition provided by the National Institutes of Health, this process entails "selection, evaluation, analysis, interpretation, and synthesis of a body of information in a clearly defined specialised field with the intent of compiling, digesting, repackaging, or otherwise organising and presenting pertinent information in a form most authoritative, timely, and useful to the differential requirements of the different categories of users." It is clear that information analysis is necessary before consolidating work can begin, and that the new output that results from consolidation work invariably differs from the original in terms of structure, format, and/or medium.

### **Referral Service:**

A kind of reference service where a person looking for information is pointed toward a company or subject matter expert outside the library where the information may be accessed. It is evident from the preceding statement that referral services are a subset of reference services and may even be an extension of reference services as no document is provided. The person looking for information is pointed in the direction of a company or an authority who can probably provide it. The concept also implies that the library does not have the information.

There are no restrictions on this service. The range is infinite. Based on the sources close at hand or in the memory, the service may be offered on any topic to any user—literate or uneducated, male or female, young or elderly, at any location—a secluded village or a bustling town, at any time. Union catalogues are among the instruments that support referral services. Union catalogues are available for books, periodicals, and other bibliographic resources. A union catalogue lists all of the libraries' collections. It is typically organised alphabetically by author, document title, etc. The names of the libraries that hold each document are typically listed under it in abbreviated form. In addition to title, sponsor, place of publishing, date of beginning and ending (if the journal has discontinued publication),

volume numbering, etc., any inconsistencies are documented in the union catalogue of publications.

## **Reference Service**

Reference service, is the process of helping readers to identify sources of information in response to a particular query, problem or assignment to be done.

Ranganathan has defined reference service as a personal service to each reader in helping her/him to find the document, answering the particular query, pinpointedly, exhaustively and expeditiously. Ranganathan has also emphasised that the reference service aims at "providing the right book to the right reader at the right time."

The reference service may be provided through the following modes or ways:

- Face-to-Face Reference Service
- Reference Service through Telephone
- Virtual Reference Service

The Reference Service may be classified into two types based on the time taken to attend to the query.

- i. Short-range Reference Service: The short range reference service is completed within half an hour. E.g. Full form of UNESCO, What is Tunami?. Such questions may be answered within a minute or so.
- ii. Long-range Reference Service: The Long range reference service may take one hour, 1 day, 1 year or even years together. E.g.: Information Seeking Behaviour of P.G. students of Science discipline in the Universities of North India.

## **Translation Service**

Universality is a distinct characteristic of science is one of the key traits that it shares with scientific writing. Regardless of their country of origin or language, scientific laws developed through scientific methods of investigation are global. Therefore, scientific truths cut beyond language, cultural, political, and sociological boundaries. The advancement of science is supported by the scientific literature, which contains this knowledge. Since scientists around the world have a fundamental need for easy access to S&T information, the findings of scientific research must be made known to them, regardless of the language in which they are published. After the Soviet Union launched "Sputnik," a renowned American scientist reportedly said, "Either we will have to learn physics, or we will have to learn Russian."

Up to 186 countries throughout the world publish the findings of S&T research in a variety of languages. The Chemical Abstracts keeps track of the chemistry literature written in more than 50 different languages. The spread of S&T literature across several languages

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has been a major source of worry for research scientists. No nation, regardless of how technologically developed it may be, can ignore the research done in other nations. The percentage of literature published in languages other than English is thought to be between 40% and 50%.

# **Tools for Translators**

It has been observed that professional translators spend considerable amount of their time consulting technical (monolingual, bilingual and multilingual) dictionaries, to find suitable technical terms while translating S&T documents. They have long been wanting to have sophisticated computer-based translation tools to speed up translation process. These segments may be individual words or multiword phrases. A translator can translate, save, and reuse sentences and sections by using TM. The previously translated text can be used again when the translator encounters similar or identical information. Even if there isn't an exact match, the version shown can still be used with little modification. These tools are ideal for assisting translators working on technical documents and texts with specialised vocabularies. The following are some additional benefits of TM: i) Consistency in common meanings, phrases, and terminology when multiple translators collaborate on a single translation project; ii) Simplifying and speeding up the whole translation process; and iii) Lowering the cost of long-term translation.

There are 4 main vendors of translation workstations- i) Trados, ii) STAR AG Company (Transit), iii) IBM (The Translation Manager), and iv) LANT in Belgium (The Eurolang Optimiser previously sold by SITE in France).

# **Document Delivery Service**

## Definition

Regardless of the location or format of the original, Document Delivery Service (DDS) is actually concerned with the provision of document(s) to users on demand, whether the original or its copy in print or non-print form. The majority of information services, including current awareness, SDI, indexing and abstracting, literature search, etc., strive to direct users to the documents that are most likely to contain the needed information. In contrast, DDS actually finds the necessary document and gives it to the requester in either the original or a copy, printed or not. DDS is a crucial service because its effectiveness directly affects the value and significance of other access services. For instance if a user, alerted by a current awareness service, requires a document and efforts are not made to supply the same to him/her in time, then the availability of any alerting service however efficient it may be, will have no value for him/her. Thus, DDS adds value to other information services.

# **Types of Document Delivery Systems/Models**

The availability of electronic bibliographic databases offering "instant" access to information and simple access to library catalogues (OPAC) around the world on the Internet, as was mentioned in the section above, has increased users' expectations for both timely and 100% delivery in addition to raising the demand for original documents. On the other side, libraries are finding it harder and harder to meet client needs from their own resources due to the exponential growth of published material, rising publication costs, and shrinking library budgets. Despite these restrictions, libraries have managed to discover ways to satisfy the needs of their customers. The libraries have made improvements to their interlibrary lending services and resource sharing. Some of the efforts made by the libraries are improvement in inter library loan services, resource sharing among libraries of common interests, development of specialised document delivery centres, and more recently of joining library consortia to provide access to full-text electronic resources to their patrons.

# **Examples of Document Supply Centres**

- British Library Document Supply Centre (BLDSC)
- Document Delivery Service of NISCAIR (Formerly INSDOC)
- Electronic Document Delivery Systems
- Article Delivery Over Network Information System (ADONIS)
- Inter-Library Loan Service of Online Computer Library Centre (OCLC ILL)
- DOCLINE: ILL System of National Library of Medicine, USA

# **Current Awareness service:**

The current awareness service gives the correct user the right information at the right time when they need it. It provides the user with current information to keep them informed. As soon as a document is received in the library, it is promptly examined and abstracted with the precise information according to the users' programmes. In order to make each thing visible to the user in need, the information is also being recoded. who are associated with such data. The Current Awareness Service has numerous unique qualities that should be noted in order to present the scientists with the most recent and relevant information.

CAS is described as a "Documentation periodical listing the papers existing during the period covered, and without being picked to meet the requirements of a particular reader or of a specific topic under inquiry," by S.R. Ranganathan. It makes an effort to swiftly inform its clientele of all new ideas being developed in their fields of expertise and adjacent fields.

# Type of Current Awareness Service:

**Current Awareness Bulletin:** 

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It is also known as Information Bulletin/Library Bulletin. It may cover the following information:

- General information about the library e.g. new members of the library staff, new telephone numbers, new services, etc.
- General news items (items culled out from newspapers relating to libraries)
- Announcements of forthcoming meetings and conferences.

### Table of Contents (TOC) List Service:

According to the users' areas of interest, photocopies of journal contents pages are given to them through this service. Although content pages can be provided as soon as the material is received, a weekly or monthly bulletin is more common. A table of contents (TOC), sometimes known as "contents," is a list of a book's or journal's chapters or articles, arranged in the order in which they appear inside the book or journal.

#### List of New Arrivals:

The list of new books the library has acquired might be created manually or using the software the library uses. The list is made available to the library's numerous users for browsing.

#### **Routing of Periodicals:**

The periodicals are routed, disseminated, or sent to each client individually as part of this service. The problems are passed from one user to the next until they are eventually returned to the library. The current issue is delivered to the first person on the list with a list of individuals who have requested to see a periodical attached, with instructions to pass it on once the issue has been read. Since there is a delay when an item is circulated or routed among users, this method is no longer widely used in libraries.

#### E-mail Alerts from Databases Subscribed by the Libraries:

By signing TOC alerts provided directly from the publishers, the readers may also be instructed on how to obtain Rich Site Summary (RSS) feeds or email alerts from publishers. Users must typically register on the publisher's website in order to receive notice about the publishing of a new journal. Registration is never charged.

#### **Display of Current Issues of Journals:**

The library may regularly exhibit the most recent issues of journals. The customers can explore the issue to stay up to date on the most recent events. The current issues are typically displayed in libraries on a regular basis.

# **Selective Dissemination of Information:**

A sort of current awareness service called SDI is designed to keep the customer up to date on the most recent developments in the area of his interest. It is a tailored service for a single user or a group of users with similar information demands. It is a rapid service that gives people precise and comprehensive information. According to each user's or group of users' unique information demands, SDI involves screening the document and choosing the content (homogeneous). The primary goal is to keep the user knowledgeable and current in his area of interest.

# **Characteristics of SDI:**

- It is a computer-assisted service
- SDI is concerned with recently published information
- The source of recently published information may be both inside and outside
- The organization's users, such as researchers, scientists, and managers, should receive new or current information
- This information is channelled or directed depends on the nature of each user's interest.

# ADVANTAGE OF SDI:

- It aids in better educating users.
- It gives users access to crucial documents.
- It supports professional, managerial, and academic skills.
- It offers information in a format that is preferred.
- It takes the user closer to the appropriate information.
- Instead of searching for information resources on his own, the information user will have more time to focus on other things.
- The medical librarian gives users access to information whenever it is convenient for them.
- It improves communication between information users and librarians.
- The users will have access to the appropriate data at the appropriate time and location.

# **Cloud Services:**

The ability to harness the power of computers regardless of location has radically changed thanks to cloud services, a new computing service provided over the internet. Cloud services offer a shared pool of resources, including networks, computer processing power, specialised business and user applications, and data storage space. It makes it possible for consumers to access their e-mail, social networking account, or photo service at any time, from anywhere in the globe, for little to no cost. Many businesses and organisations, like Google, Yahoo, Microsoft, and Amazon, among others, are drawn to it and use it for infrastructure solutions. It does not exclude libraries. The features of various technologies, such as utility computing, grid computing, unified computing, web 2.0, service-oriented architecture, and others, are combined in cloud services. Nowadays, it is emerged as one of

the most popular virtual technology for libraries to deliver its services in an effective manner.

### Inter library loan:

In order to meet the needs of its patrons, a library can use the inter-library lending service to ask another library on the network for one or more volumes. If a book is out on loan from the lending library, this can also provide the option to reserve it. It is necessary to establish an effective mechanism for both physical and electronic distribution of materials. The willingness of the member libraries to work together is essential to the service's success.

The Organisation which provides Inter library loan facility are:

- DELNET
- INFLIBNET

## Literature search:

A literature search is a methodical, exhaustive search of all forms of published literature to find a wide range of reliable references pertinent to a certain topic. It is a crucial component of any research project's approach. The success of a research endeavour depends on a comprehensive analysis of the academic literature from the outset; doing the literature search correctly will ultimately save hours of work. A essential talent in and of itself, efficient literature searching will be helpful for any future information gathering endeavour, whether academic or otherwise.

#### Newspaper clipping service:

Newspapers are current awareness media and they provide readers with useful information. Every newspaper is scanned, and any articles deemed interesting are cut and put onto a piece of paper. Then, one or more subject titles are given to the clippings. The library's subscription to the newspapers serves as the sole foundation for this service. According to the users' areas of interest, these clippings are distributed. One lakh newspaper clippings from the domains of Unani medicine, pharmacy, nursing, education, and religion, among others, are kept in the Jamia Hamdard Library's collection.

## Web-based information service:

The newest developments in libraries are web-based services, which provide users a richer search and retrieval experience. Web resources are electronic resources that libraries can access either directly or by joining consortiums. These web resources are full-text documents that are available in the virtual environment of the Internet and are located outside of actual library spaces. Authorized users have 24/7 access to them online through the

Internet from any location of their choice, including their home or place of business. When viewed historically, web-based services have mostly supplanted conventional online services.

## **Digest service:**

A digest is a reduced version of previously published content, like an essay, book, or article. They frequently surpass the longest abstract in length. A digest can occasionally resemble a review piece. A digest can also take the shape of a book. A single article, book, etc. is created by compiling information from one or more sources. It depends on the digest's purpose. Regarding the subject, it might be any subject, including law, education, or another one. It might possibly relate to a particular document form. A digest of a book, tale, play, etc

# Abstracting and Indexing service:

A typical abstracting and indexing service is a bibliographical one that offers publishing bibliographical information along with an abstract, and is frequently commercial in nature. Most of the time, it is accessible both digitally and in print. It occurs in print form as a periodical at regular intervals, such as weekly, fortnightly, monthly, etc. The publication's entries are categorised by class numbers or broad subject headings. There are several indexes available from each abstracting service, including issue, volume, author, subject, etc. It typically receives daily updates in database form. An abstracting service publishes many by-products in addition to an abstracting periodical. As an illustration, Chemical Abstracts Service publishes Chemical Abstracts

# **Reprographic service:**

Reprography as a term began to acquire popularity internationally in 1963. It is characterised by the tiny scale of its employees and comprises photocopying, microcopying, duplicating, and in-plant printing. Techniques for reproducing images on paper include diffusion transfer, physical transfer, fast stabilisation, diazo, thermography, and electrostatography. Reprographic technology has played a significant part in the spread of recorded information and is currently a permanent method of granting access to document resources that are geographically dispersed. The services provided by reprography are crucial to document delivery services.

# **Technical Enquiry**

This service is provided only by the subject experts in the respective subjects unlike Reference Librarian. Technical Enquiry is highly technical in nature. This is the rare services normally provided in Special Libraries / R & D Institution Libraries.

# 1.5 SUMMARY

The four responsive information services-literature search, technical inquiry, document delivery, and translation-were covered in this lesson. It has been noted that these significantly impacted by services are being developments in computer and telecommunications technologies. For instance, the availability of electronic databases gives speed, currency, and a wide range of search choices when conducting literary searches. It took a lot of time and effort to manually compile an extensive subject bibliography. The process takes less time now that we can search using computers. Additionally, it has provided other advantages including detailed searching and free text searches. The technical enquiry service has also been substantially improved by the accessibility of electronic trade and business databases, firm websites, government websites, etc. Libraries and commercial document vendors are collaborating on emerging Electronic Document Delivery Systems (EDDS). There is a global trend toward combining electronic full-text document retrieval with electronic retrieval of bibliographic references. There is a new generation of e-journal service providers. Both publishers and aggregators fall under this category. The issues with document delivery services are getting attention from all around the world, and numerous international organisations are actively working to find solutions. Ad hoc translations have significantly decreased as a result of cuts to funding for information services. As a result, the International Translation Centre and its esteemed journal World Translation Index have been shut down. There are several machine translation (MT) systems for mainframes, personal computers, and Further we have discussed content analysis and its applications in library and information services; customised organisation of information services according to the information needs of users; citation analysis, cito-analytical products and their applications in information services; and both documentary and non-documentary aids to information sources. Various kinds of electronic sources of information, both online based (Internet resources) and offline-based (CD-ROM or Floppy), have also been discussed in this Unit. A fairly detailed section on 'Information Aids' is included, drawing attention to their indispensability, in using a plethora of information sources, in the form of bibliographical tools and reference materials. Using all these resources, tools and techniques, a professional librarian can provide value-added information services to the end users.

# **1.6 ANSWERS TO IN-TEXT QUESTIONS**

1	Information, Technology, and People	7	Translation Service
2	Two	8	Article Delivery Over Network Information System
3	EPIDOS-INPADOC	9	Current Awareness Service

4	Business Information	10	INFLINET and DELNET
5	News and business information	11	Digest service
6	Central Statistical Organisation	12	Making the duplicate content by using the original copy

# 1.7 SELF-ASSESSMENT QUESTIONS

- What do you understand by a technical enquiry? How it differs from general inquiry?
- What is machine translation? Describe different types of approaches used for machine translation.
- Describe how content analysis constitutes an intellectual foundation for library and information services.
- Mention the areas of library and information services, wherein content analysis can be profitably applied.
- Mention the various categories of information sources and their characteristics.
- Explain the need and ways of customised organisation of information services

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# LESSON- 5.2 LITERATURE SEARCH

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# **STRUCTURE**

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Stages in the Search Process
- 1.4 Types of Literature
- 1.5 Developing A Search Strategy
- 1.6 Search Strategy Techniques
- 1.7 Summery
- 1.8 Answers to In-Text Questions
- 1.9 Self-Assessment Questions
- 1.10 References

# **1.1 LEARNING OBJECTIVES**

After reading this lesson, the student will be able to:

- Learn the importance of literature search
- Study the difference between search and browse.
- Familiarize with the different types of literature search
- Develop search strategies / techniques
- Analyze and use different search competencies for the effective search of information.

# **1.2 INTRODUCTION**

Literature searches are systematic, well-organized searches of previously published information to find a wide range of reliable references on a particular topic. There are several reasons to do a literature search, including gathering data for evidence-based guidance, a phase in the research process, and academic assessment. However, the fundamental goal of a thorough literature search is to develop a research question by assessing the body of existing research and looking for any gaps that could still benefit from additional study.

The research problem is sometimes a topic that the researcher is interested in and somewhat knowledgeable about. By concentrating on unexplored knowledge, it has to be directed. The search for something and analysis of pre-existing literature may help to further clarify the research strategy once we have focused in on the problem. A required for the performance explanation of how you anticipate the research to develop is known as a

research hypothesis. It is one of the most crucial resources that helps to respond to the research question. It ought to be appropriate, have relevant elements, and present a query that can be tested and looked into.

The process of conducting a thorough and time-consuming literature search can be planned and managed with the help of a few simple stages. Developing your research questions and conducting your search are the two most important steps. A literature search is conducted to find the best methodology, study design, population sampled, sampling techniques, concept assessment methodologies, and analytic approaches. It helps in detecting flaws or gaps that could be avoided as well as unnecessary influences affecting the outcome. Creating a question that is well-focused is essential for enabling effective research.

Show the similarities of research evidence require good access. One potential method for facilitating quick access to study evidence is through electronic databases. Although library and information services are increasingly ensuring that customers have access to electronic databases, access is not the only the challenge.

### MEANING OF LITERATURE SEARCH

A literature search is a scientific, exhaustive search of all forms of published literature to find a wide range of reliable sources pertinent to a specific topic. It is a crucial component of any research project's approach. The success of a research project depends on a comprehensive analysis of the academic literature from the outset; doing the literature search correctly can eventually save hours of work. A essential talent in itself but, efficient literature searching will be helpful for any future information gathering effort, whether academic or anything else.

For the majority from in literature searches related to an extensive report, dissertation, or research project, books and periodicals serve as the primary source of information. However, many other sources, such as newspaper archives, pictures, original data, and conference papers, will be equally valuable depending on your topic.

# DIFFERENT AIMS OF LITERATURE SEARCH

This type of search has a number of objectives, namely

- To review current critical theories and perspectives
- To list recent research conclusions
- To find potential research models or approaches
- To facilitate comparison with the results of your own research

Being adequately prepared before starting the literature search pays worth because it might be a time-consuming task.

## METHODS OF LITERATURE SEARCH

There are several different literature search techniques that can be employed separately or in combination. Physical literature exploration is still a crucial part of any systematic review search process. For the previous few decades, searching the local as well as the national library for books, journals, etc., was the standard procedure. Technology has advanced to the point that the Internet is now the entry point to a large literature. Using webbased search engines like Google, Google Scholar, etc, or different electronic research databases, you can find articles that describe your study topic or ones that are similar to it. In addition to evidence-based databases for integrated information available as systematic reviews and abstracts, the many databases that are available for literature searches also include databases for original published papers in journals. The majority of services, including SCOPUS, Pro-Quest, and others, are not openly accessible to a specific user.

## PRINCIPLES OF A SEARCH STRATEGY

- Describe the steps involved in the search process.
- Keep track of the databases that were utilized in the search, including the terms that were used in each database.
- List the databases, the number of references that were taken from each database, and the total number of references utilized for the review in a table format.
- Explain why some references were left out.
- Specify the type of literature used, such as reports, surveys, descriptive/overview articles, or qualitative investigations.
- Keep track of the important journals you utilized.

# **1.3 STAGES IN THE SEARCH PROCESS**



# Read all relevant material sourced and identify

25. 6.8.9 (2.8.9) (2.8.1)

# **1.4TYPES OF LITERATURE**

### **Primary literature:**

Primary sources, which are typically published in a peer-reviewed journal, are the genuine publications of an expert's new evidence, conclusions, and proposals (case reports, clinical studies, etc.). Primary literature also includes preliminary reports, congress papers, and preprints.

#### **Secondary literature:**

Systematic review papers or meta-analyses are examples of secondary sources since they derive and assess information from primary source literature.

## **Tertiary literature:**

Collections of information from primary or secondary literature make up tertiary literature (eg., reference books.

# **TYPES OF SEARCH**

Based on the subject of interest, a search might take many different forms. It increases the probability that a search will turn up relevant results.

#### Translating research question to keywords:

The keywords are the foundation of a successful search since they will produce results based on any of the specified terms. To elicit more information, synonyms and alternative phrases should be taken into consideration. Most databases establish common

search terms using controlled word-stock (or keywords). You can search a database thesaurus for some of these alternative keywords. Combining keywords with Boolean operators is another tactic. Keep track of the search terms and strategies you used when researching the literature because you'll need to describe them later when designing your search strategy.

# Phrase search:

Pages that include only the words entered in the phrase, in that precise order, and with no words in between them, will be produced as a result. The three Boolean operators AND, OR, and NOT are named for the mathematician George Boole. When two words are combined using the symbol AND, articles mentioning both words will be returned. The search will be expanded and return more results if you use the 'OR' operator. While combining terms with the word "NOT" will return results that contain the first word but not the second, so focusing the search.

# **Filters:**

Additionally, filters like article types, text availability, language, age, sex, and journal categories can be used to refine the search.

Overall, the suggestions for doing a literature search can be summarized as follows:

- As mentioned above, choose keywords and use them to search for articles in the library and digitally.
- Use the thesaurus to find terms to discover your articles
- Search numerous databases for articles connected to your topic
- Locate a piece of writing that is related to your subject and then look at the terms that were used to describe it and use them in your search.
- In order to save time searching for your papers, use databases that offer full-text articles as often as feasible (for free through academic libraries, on the Internet, or for a fee).
- Start with broad synthesizes of the literature, such as overviews, summaries of the literature on your issue, or review articles, if you are researching a topic for the first time and are not familiar with the research on it.
- Look for studies about your topic in the most current issues of the journals and then go backwards in time. Review more sources by checking the references at the conclusion of the articles.
- Suggest books on a particular subject published by a single author, a group of authors, or volumes including chapters by various authors.
- Find recent conference papers subsequently. Conference papers frequently summarize the most recent scientific advancements. Make contact with the research' authors. Ask them whether they are aware of any studies relevant to your area of interest in a letter or phone call.

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• It is appealing since it is simple to access and because you can download whole articles from the web. However, carefully examine these publications for quality and validity, and be wary of whether they accurately describe

# **STEPS OF LITERATURE SEARCH**

A literary search is a systematic, organized search for the most important literature on a topic. To do a detailed review of the literature, you should:

- Define what you're looking for
- Choose where to look
- Create a search strategy
- Improve your search strategy
- Save your search for later

# **DECIDING WHERE TO SEARCH**

The best technique to find journal papers on a topic is to search subject-specific databases. However, you can also perform a search in the library for popular data sources like official records, grey literature, patents, and statistics.

# Choose a database

Find the databases that are best suited to your topic. A wide variety of evidence can be found using databases, including peer-reviewed scholarly articles published over a lengthy period of time and from a variety of publishers around the globe. Numerous records of research literature, including conference proceedings, communications, and grey literature, are kept in databases like Scopus and Web of Science. For several databases where the Library has a subscription, there are links to full-text articles.

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# **IN-TEXT QUESTIONS**

1. Google is an example of Search ......

2. AND ..... Search

3. OR..... Search

4. A .....is a scientific, exhaustive search of all forms of published literature to find a wide range of reliable sources pertinent to a specific topic

5. In the present context, selective ..... of information has become important.

# 1.5 DEVELOPING A SEARCH STRATEGY

A search strategy is a method for organizing the key terms that will be used to search a database. In order to find relevant results, the search strategy combines the important components in your search field.

Your search plan will take into account it all:

- Potential search terms
- Phrases and keywords
- Abbreviated and extended search term variations
- Topic models (where applicable)

Because each database operates differently, you must modify your search approach for each database. If your study spans a variety of topics, you may want to use multiple distinct search strategies. After reviewing the search results, it is a good idea to test and improve your strategies.

# 1.6 SEARCH STRATEGY / TECHNIQUE

The sections that follow provide some techniques you might use to create your search strategy. Go directly to:

- i. Choosing search terms
- ii. Searching with keywords
- iii. Searching for exact phrases
- iv. Using truncated and wildcard searches
- v. Searching with subject headings
- vi. Using Boolean logic
- vii. Citation searching

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### i. Choose Search Terms

Different words can be used to represent the same ideas, therefore "self-esteem" could also be called "self-worth." Your goal is to think about each of your ideas and make a list of the various ways they might be expressed.

Do the following to come up with other words or phrases to describe your concepts:

- Thesaurus can be used to find synonyms.
- Use a search engine like Google Scholar to look up your concepts, then scan the results for alternate terms and phrases.
- Search for alternate terms, phrases, and subject headers in relevant abstracts or publications (if the database uses subject headings).

Different key terms may be discovered while you search, scan papers, and read abstracts, enhancing your search strategy. You can save time and effort by locating alternate keywords by using truncation and wildcards.

# **IN-TEXT QUESTIONS**

6. Clinical studies are example of ..... literature

7.....can be used to find synonyms

8. Asterisks (\*) are commonly used in databases as the .....

9. Finding papers that have been referenced by other publications can be done by using......

10.A ......gives the possibility to learn more about a topic of interest as well as insight into how that topic has previously been explored by analysts

### ii. Search with Keywords

Free text words and phrases are known as keywords. Strategies for database searches combine free text and subject headings (where applicable). Typically, a keyword search looks for your search terms in the reference's title and abstract. If you simply need a few focused results, you might only want to search title fields. Make sure your spelling is correct because some databases may only search for particular words or phrases. Otherwise, you may miss references.

#### iii. Search for the Exact Phrase

Use quotation marks around words to make them appear next to one another in a precise phrase, like "self-esteem." Searching using a phrase reduces the number of results you receive and improves the relevance of your results. You can typically search for phrases in databases, but if you're unsure, see the database guide.

## iv. Truncation and Wildcard Searches

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To locate variations of your search word, you can utilize shortened and wildcard searches. Finding word singular and plural forms as well as alternative endings is made easier by truncation. Asterisks (\*) are commonly used in databases as the truncation symbol. If you're unsure which symbol to use, look in the database assistance section. Using "therap\*" as an example, you can find therapy, therapies, therapists, or therapists. A wildcard locates different word spellings. You can use it to search for just one character or none at all. If you're unsure of which symbol to use as a wildcard, consult the database help section. For example, "behaviour" in Medline will find both behaviour and behaviour. Wildcards are helpful for discovering both British and American spellings. Sometimes, different symbols can be used to locate a single variable character. Used for model, into the Medline database: "women" will find woman and also women.

### v. Searching with Subject Headings

A database employs database topic heads, which are regulated vocabulary terms, to identify the subject matter of an article. Utilizing pertinent subject headings will improve your search and enable you to locate additional information on your topic. This is so that articles can still be found using subject headings even if they don't contain your key words. For each of the concepts you pick, your search strategy should incorporate both subject headings and keywords. This is particularly necessary if you're working on a thorough study or systematic review. You must look at each database separately to discover the subject titles that are used because they may differ between databases. For instance, you may use the EMTREE thesaurus for Embase and MeSH (Medical Subject Headings) for Medline. RESEARCH GUIDE: To check the subject headings the database indexers assigned that article, click the "full reference" button after searching for a known key paper in the Ovid databases. Then, you may decide whether to include any that are pertinent in your own search approach.

#### vi. Use Boolean Logic To Combine Search Terms

You can experiment with various word or subject combinations by using the boolean operators AND, OR, and NOT. When combining your search words or results, databases frequently display Boolean operators as buttons or drop-down choices that you can click.

The three primary Boolean operators are:

- NOT
- AND
- OR

"OR" is used to locate items that refer to either of the search terms. To discover articles that discuss both of the searched topics, use "AND". A search term or notion is excluded by "NOT". Use it carefully to avoid accidentally missing important references. For instance, if you search for "self-esteem NOT eating disorders," you'll see articles that discuss self-esteem but not eating disorders.

#### vii. Citation Searching

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Finding papers that have been referenced by other publications can be done by using citation search. Make your literature review more thorough by using citation searching (or cited reference searching) to:

- Determine whether articles have been cited by other authors
- Locate more recent papers on the same or related topics
- Learn how a well-known idea or innovation has been confirmed, applied, improved, extended, or corrected
- Find more recent papers on the same or similar topics.

Searching referenced references is possible in the following databases:

- Ovid SP databases
- Google Scholar
- Web of Science
- Scopus

Your literature search can be complemented by looking for cited references. However, take care not to only consider works that have received citations in isolation. To reduce publication bias, a thorough search of the literature is also necessary.

# **REFINE YOUR SEARCH**

Searches frequently return a lot of results. For a systematic review, when you must make sure your search is really thorough, this might be a suitable quantity. However, there are methods you may take to improve your search if it returns a lot of irrelevant results. **Ways to Restrict and Widen your Search** 

Consider the following if your search only yields a few references or if the majority of the references are unrelated to your research topic:

- Double-check your spelling because databases rarely offer auto-correction and will only find what you input.
- Make your search query more general.
- Do you need to check any further databases?
- Could you include further search terms? Search for alternative words and spelling variations.
- Talk to your supervisor about your topic.

If there are too many results, you might need to narrow down and be more particular with your search. Think about it:

- Have you successfully applied Boolean operators? Have you ever used AND when OR was more appropriate, for instance?
- Could you restrict it by a time period?

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• Could you specify a language restriction, such as English only? Utilizing non-English publications reduces bias, but only if the translations are reliable.

## **Use Search Limits**

There are many restrictions available depending on the database. You can restrict your searches in many databases based on the publication year, language, and type of publication. Some might even let you limit your search to a certain kind of query. After you have gathered all the information pertinent to your topic, apply limits to your search. Limits should be applied one at a time so you may observe how they affect your outcomes. Your search may become too narrow if you use too many restrictions. Instead, you might utilize search filters in this situation. See the Medline workbook's "Using Limits" section.

## How Search filters can improve your Search

Search filters are tried-and-true methods for locating particular material. Filters can be used to search results to limit them to RCTs, observational studies, or economic evaluations, among other search restrictions. The Scottish Intercollegiate Guidelines Network (SIGN) website and the Inter TASC website both have examples of search filters. The Boolean operator "AND" is used to add search filters at the end of search strategies. Keep in mind that search filters are database-specific and frequently do not function in other databases. The Cochrane Collaboration created two expert filters for Ovid SP that allow personal account holders to limit search results to randomized controlled trials.

## Search by Hand to Catch anything you Have Missed

Hand searching entails choosing the most important journals in your field and manually or electronically searching each one according to predetermined criteria. Additionally, it can be used to look up sections and chapters in books. You gain access to information that you might otherwise miss. There may be items that are not indexed or are indexed incorrectly, and not all of the materials you need may be indexed by databases, therefore no database search approach is perfect. Additionally, you might have erred a little bit in your search.

# STAGES OF THE LITERATURE SEARCH

A thorough literature search involves going through steps 1–5 in order:

- 1. Background reading and preparation
- 2. Working with your title identifying search terms
- 3. Identifying the resources to search
- 4. Searching using search techniques
- 5. Collating your results

# **1. Background reading and preparation**

Start by reading background material, such as textbooks or subject encyclopedias, to better understand the topic's context and the vocabulary that will be used to discuss it.

Questions you need to ask include:

- Why was this issue chosen for a lengthy study project?
- Is there a seminal book or journal article on it?
- Is the topic currently trending in the media?
- Do you have personal knowledge or experience with it?

Find a short bit of reading to give you a general understanding of the subject that is informed by the aforementioned. An excellent seminal book or journal article on the subject may offer insightful recommendations for additional reading.

# 2. Working with your title - identifying search terms

It's crucial to discover as much of the key terms related to the subject as you can before beginning a literature search. This might comprise:

- Important writers,
- Theories/concepts,
- Significant research findings or laws,
- Major genres or movements

Spend some time considering the language for the draught title of your research; from there, it should be feasible to discover many crucial parts. This is the simplest way to begin identifying such terms. Consider the following for each of the title's essential components:

- Synonyms, or words that have the same meaning but are used differently, such as young adults for youth.
- Related terminology or ideas, such as the words "girls," "boys," "teenagers," etc., when referring to children.

## **3. Identifying the resources to search**

Unfortunately, no matter what subject you are studying, there is not a single informational resource that will provide you with all the information you need for your literature search. However, the library offers a single search tool called One Search that enables you to search a variety of sources at once. This provides access to a wide range of online resources that meet the research requirements of all the many academic disciplines. In reality, though, you should only need to search a relatively small number of resources, even though you will need to carefully consider the sources that are most likely to have the pertinent content.

Use One Search's search function to do a thorough search of all the journal material we have online as an excellent place to start your search. Although this is helpful in locating some beginning references, it does not constitute a thorough and exhaustive search of the

literature. You must conduct a direct search within each resource on your own for this. Choose a database from the A-Z list of databases to do this. The majority of databases mix full text and abstract-only content, with the ability to limit your search to only return full text results. However, other databases only contain full text articles.

## **Different types of databases:**

## Multi-disciplinary journal databases

Journal content for a variety of academic subject can be found in resources like Academic Search Complete and JSTOR. Multidisciplinary databases frequently include both academic peer-reviewed articles and professional and trade periodicals. However, you can typically restrict your results to those from scholarly journals with peer review.

## Subject specific databases

These databases contain journal articles and/or other types of content relevant to a specific subject or group of related subjects. Examples include Psyc-ARTICLES, Education Research Complete, Westlaw and International Index to Performing Arts.

## **Publishers' databases**

In databases like Science Direct, Sage Journals, and Emerald, you can find articles from journals that were published by a certain publishing house. Such resources may be multidisciplinary or specialized.

## Other types of content

Your literature search may also benefit from using a variety of non-journal databases, including those that contain encyclopedias, photos, audio, video, and e-books.

## 4. Searching - using search techniques

The following methods will be used to increase the quality of results after choosing appropriate search terminology and databases to search.

Always use the advanced search (or multi-search box) option instead of the "simple" or "basic" search option (just one text box). You can only use all of the following methods in advanced search.

## • Word endings

Search engines will not always look for synonyms for the same term; for instance, looking for the word cinema will not always turn up cinematics. This might even be true for straightforward variations like cinema and cinemas, which are the singular and plural forms of the same word. Where a word's ending varies, an asterisk (\*) will be used to automatically search for all possible ends.

## • Linking terms together

When using the connecting words "AND" or "OR", you can enter multiple terms in a search engine at once. You can focus your search by using the AND operator to only return results that include both terms. By using the OR operator to join two terms, you can obtain results that include both terms or just one of them.

# • Variant spellings

Only the particular term you enter will be matched in databases. In practise, this means that they might not be able to handle alternate spellings like American/English versions, therefore a search for "color" would not always return results with the American spelling color. To locate either, use "OR" between the two alternative spellings.

# • Exact phrase searching

You should enclose phrase-based search keywords in quotation marks, such as "crime films," "United States," or "film noir." This guarantees that the terms will appear just next to one another in the results' text.

# • Currency

Most databases allow you to filter results to after, before, or between specified publication dates if currency or a specific publication date range is crucial to the relevance of the results retrieved. This might be an effective method for narrowing down the results to those that are most pertinent to your topic.

# • Keywords / subject terms:

The author or the database provider assigns keywords or subject terms to identify the primary subjects covered in the publication. Again, the outcome should be more relevant to your issue if your search terms appear as keywords or subject terms.

## • Searching using more than one search box

Most databases will allow more structured searching by giving the option to use more than one search box – usually the advanced search option.

# 5. Collating your results

Finally, it's vital to evaluate the information you discover and arrange it according to priority. Remove any ancillary materials, and think about storing them apart from your main references. Create an account and bookmark your favourites by using the customizing tools in One Search or several of the different databases. Some allow you to set up email notifications to notify you whenever future results fit your search strategy. Remember that
you can utilise One Search to determine if the complete text of any of your main journal references is still available from another database if it isn't available in full from the database you've searched.

Consider ordering journal articles or volumes through the library's interlibrary loans service if the online databases do not have what you require. It is imperative that you keep thorough records of all searches, sources, and references utilized at every stage. This will be vital for writing out your final bibliography and citations, as well as for maintaining control of your study.

#### SAVE YOUR SEARCH

Keep copies of the relevant records you locate, and if at all possible, keep a copy of your search plan. This will prevent you from having to do the same thing repeatedly.

#### Save the Articles You Find

Save or print any useful article records you come across. Most databases provide you with a few choices, such as:

- Save, generally as a text or RIS file
- Print
- Email
- Direct export to reference management programmes like End Note.

The complete text of the documents typically cannot be downloaded straight from the database. You will need to click on the "full text" links in several databases. You will have the option to download the article if the Library has a subscription.

#### Save Your Search Strategy

You might be able to save a copy of your search plan using the database's free personal account option. By saving your search strategy, you can run it again without having to enter the same information.

#### **Stay Up-To-Date With Database Alerts**

To be informed of any new study, many databases will include auto-alerts. Learn more about services for current awareness. To learn more about each of these features in the Ovid SP databases

## 1.7 SUMMARY

A literature search gives the possibility to learn more about a topic of interest as well as insight into how that topic has previously been explored by analysts. It helps in concept

interpretation, problem detection, and opportunity recognition. In summary, organised and systematic research can help in the creation of innovative studies.

1.8	ANSWERS TO IN-TEXT QUESTIONS		
1	Engine	6	primary
2	Narrows	7	Thesaurus
3	Widens	8	truncation symbol
4	literature search	9	citation search
5	elimination	10	literature search

## 1.9 SELF-ASSESSMENT QUESTIONS

- Differentiate between Browse and Search. Explain the different types of Literature Search.
- Write a detailed note on the methods of Literature Search.
- Search Competencies have become necessary tools to search effective information. Discuss.

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# LESSON- 5.3 DOCUMENTATION SERVICES AND TRANSLATION SERVICES

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Difference between Library, Documentation and Information Centre
- 1.4 Translation Service
- 1.5 Translation Centres
- 1.6 Summary
- 1.7 Answers to In-Text Questions
- 1.8 Self-Assessment Questions
- 1.9 References

# **1.1 LEARNING OBJECTIVES**

After reading this lesson, the student will be able to:

- Study the difference between the Documentation Centre and a library.
- Learn the importance of Translation Service in a Library.
- Familiarize with various types of Translation Services.
- Acquire skills in planning and management of information services and systems.
- Develop skills for creating new information services

# **1.2 INTRODUCTION**

Civilization's development and advances in science and technology have led to a huge expansion of literature. The explosion of knowledge in multi-disciplinary areas was documented in macro documents such as books and in the most recent research magazines, research and technical reports, patents, standards and specifications, trade transactions, circulars, reprints, offprints, etc. The specialists need not just macro papers but also micro materials, such as monthly articles published in specialized publications.

## Definitions

A '**document'** is a single written or printed article that provides proof or information on any topic. It might be a written, audio, or visual record of an idea. The term documentation was first used by Paul otlet for the presentation, collection, retrieval, and exchange activities of documents at the International Economic Conference.In 1934, Paul otlet composed the first treatise on the subject of documentation, the Treaty de Documentation. Thus the term can be traced to the beginning of the 20th century

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**Documentation** refers to the process of identifying, documenting, organizing, storing, and disseminating intellectual material included in a printed or non-printed document.

**Documentation center** play a crucial role in collecting micro-literature, indexing and abstracting it, bringing it to the attention of users, and rapidly disseminating it to those who require it. They are established at local, regional, national and international levels.

#### **Need for Documentation**

**1. For research work** - Government and prominent institutions began researching to satisfy human needs, and for this research, scientists felt the need for various papers.

In addition to completing their study, researchers can also document their findings and provide them to the public. Following the changing needs of the present, the emphasis has shifted from basic research to behavioural research, and individual research has been replaced by collaborative research. Not only has this increased the amount of literature, but it has also given birth to several additional issues. Documentation efforts can only resolve these issues.

**2.** Social need - Dr. S.R. Ranganathan, the Indian father of library science. He highlighted societal need as the primary reason why documentation is necessary. In the past, research depended on the requirements of the researcher, but now it is driven by societal and economic factors. To accommodate the rising population and its requirements, documentation is required. Currently, industrial output and research are dependent on the documentation service. Researchers in one nation should also benefit from study undertaken in other nations, and none of this is possible without documentation.

**3. Communication problems** -In the past, there was very little quantity of research, and as a result, the number of users was also very small; as a result, there was no difficulty with the conveyance of knowledge; but, as the amount of literature and research works have expanded, this problem has arisen. Since then, information communication has encountered problems. With the use of documentation services, the reader's communication problems may be quickly resolved by supplying them with the necessary information.

**4. Literary Explosion -** Since the invention of the printing press and electronics, there has been a dramatic increase in the publication of literature. It required considerable effort to locate the substance of literature that is so necessary at the moment. Consequently, there was a need for documentation service. Documentation techniques, such as abstracting, indexing, photocopying, etc., were utilised to get information about their demand from this published material collection.

**5. Economic challenges -** Literature is currently being written at such a quick rate that no country or library can gather all published research.

**6. Language barrier -** Currently, literature is being produced in around 50 languages throughout the globe, whereas no scientist or individual knows more than two or three.

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#### **Objectives and Purpose**

The primary purpose of a documentation service is to bring recent and current material to the attention of specialized users. The primary objective of the documentation service is to find, collect, organize, and preserve materials that have been indexed and abstracted. It obtains and distributes the document when users request it.

Documentation service is identical to reference service, except that the emphasis switches from macro-documents to micro-documents and from general to specialized readers. The documentation service comprises the following tasks:

- Inform the reader that current information is available via the Current Awareness Service (CAS) and Selective Dissemination of Information (SDI).
- Offering papers accessible at the center.
- Obtaining documents from other libraries via interlibrary lending.
- Reproducing and delivering photocopies of papers.
- Organizing the translation of papers from other foreign languages into the language requested by the reader.

#### **IN-TEXT QUESTIONS**

- 1. The term document was first used by.....
- 2. Documentation service is identical to ...... service, except that the emphasis
- switches from macro-documents to micro-documents and from general to specialized readers.

3. ..... is an organization that (1) selects, acquires, stores and retrieves specific documents in response to requests; (2) announces; abstracts, extracts, indexes documents; and (3) disseminates documents in response to requests for documents or for their contents.

4.....offer a single access point to data from various places, nations .

5. The full form of VINITI is .....

#### **Type of Documentation Centers**

During the 1950s and 1960s, local, regional, national, and worldwide Documentation Centers were created.

a) **Local documentation centers** are expected to offer information services that serve the needs of their parent organization. These are tailored to the particular needs of the consumers.

b) **National documentation centers** are affiliated with research and development organizations, commercial and industrial organizations, and government ministries. They engage in actions outside the jurisdiction of local documentation centers.

c) **International documentation centers** gather, organize, analyze, and disseminate specialized international literature to fulfil the information needs of researchers and academics.

**d**) **Regional documentation centers** are often developed at the national or international level. These are tailored to match the needs of users in a certain location.

In the late 1970s and early 1980s, documentation became secondary to information. It resulted from the proliferation of information sources, services, and digital databases. The databases were remotely accessible. As a result, several new organizations arose to address users' needs, and the emphasis switched from papers to the information inside them. In addition, the information centers gathered, processed, and disseminated data from a single business and other organizations. The information center deals with both published and unpublished data. Currently, documentation and information are used synonymously.

#### **Information Centre**

An information center is an organization that: (a) chooses information, obtains it, stores it, and retrieves it in response to requests; (b) creates information abstractions, extracts, and indexes; and (c) disseminates information in anticipation of and in response to requests. Research and development (R&D) organizations with a high level of specialization often have information centres connected. The Information Center offers a wide range of services to its numerous customers, including a referral service, literature searches, translations, bibliographies, abstracting, etc.

There are varied forms of information centres viz. (a) Information Analysis Centres (b) Clearing Houses (c) Data Centres and Data Banks.

- **Information Analysis Centers**: On request, they gather literature generated in a given field, assess its value, and provide it in a form that is immediately useful to the experts undertaking the research. Before disseminating the data, the center confirms it for validity, dependability, and accuracy. These analysis centers' reports are crucial for identifying knowledge gaps and other weaknesses in research and for strengthening it.
- **Clearing Houses:** They can be established cooperatively or by a local, national, or international organisation. They offer a single access point to data from various places, nations, and tongues. They develop bibliographies of certain fields of study and distribute them to organisations interested in them. If needed, a copy of the available documentation is also supplied.
- **Data Centres and Data Banks:** To respond to specific requests, data centres gather, organise, and store numerical data related to a certain topic area. They gather data to foresee what their users may need in the future. Data banks typically focus on a wider field. They take the acquired data and pertinent literature and extract the raw data. They maintain these structured files at the ready to respond appropriately to user inquiries.

These centers are run by subject matter experts, librarians, and information specialists who organize information for retrieval and dissemination for research. Though the exact personnel vary, these centers may employ research officers, librarians, bibliographers, or certified information officers. In addition to performing the duties of a special library, these centers may also do auxiliary tasks, including technical writing, abstracting, SDI, and client library research.

# **1.3 DIFFERENCE BETWEEN LIBRARY, DOCUMENTATION AND INFORMATION CENTRE**

A library and a documentation/information center are very different. While documentation/information centers offer micro-documents to their clients, libraries offer macro-documents. The sorts of documents, types, and degrees of users, providing information rather than the document, and the provision of services to both internal and external users are some of the ways that libraries differ from documentation/information centers. Documentation and information centers also do information analysis and presentation in addition to the information collection, processing, and dissemination.

Thus, a significant distinction is that although a library merely offers the document's URL, documentation/information centers additionally provide information about the document's contents.

## FUCTIONS OF DOCUMENTATION AND INFORMATION CENTRES

Distributing information material from macro and micro documents to potential users is a key component of documentation and information centers. They carry out several tasks to bring the appropriate information to the attention of the appropriate users at the appropriate time.

- Conduct thorough searches via a variety of materials;
- identify documents/information from a variety of current as well as retrospective literature;
- Gather and compile relevant information per the needs of the users;
- They process the acquired information by indexing and abstracting it,
- They store information appropriately, and
- Retrieve and distribute information to users upon request.

## TYPES OF DOCUMENTATION AND INFORMATIONCENTRES

Documentation and Information Centers fall into three major groups, namely:

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- **By ownership,** i.e., centres owned by government agencies, academic societies, professional organisations, or private organisations.
- **By specialized interests,** i.e., Centres that serve to professionals in various subject areas of study, in mission-oriented initiatives, as well as individuals interested in specialised resources or information.
- **By different levels,** i.e., Centres that operates at the international, regional, national, or local levels.

## SERVICES OF DOCUMENTATION/ INFORMATION CENTRES

With the primary goal of offering a range of information services, documentation/information centers carry out their duties. These services are provided in advance of or in response to user requests. In answer to the users' unique requests, responsive services are given. Contrarily, anticipatory services are offered in advance of user expectations. The different anticipatory and responsive services offered by documentation/information centers include:

## • Responsive Services

- a) Answering queries
- b) Referral services
- c) Compilation of bibliographies
- d) Retrospective search service
- e) Document back-up service
- f) Translation service

## • Anticipatory Services

- a) Current Awareness Service (CAS)
- b) Selective Dissemination of Information service (SDI)
- c) Preparation of indexes and abstracts
- d) Compilation of directories, handbooks, etc.
- e) Compilation of ad-hoc bibliographies
- f) State-of-the art reports

We know that special libraries originated at the turn of the 20th century and subsequently led to the establishment of documentation centers to meet the information support needs of commerce, trade, and commercial organizations, government agencies, and research organizations. Documentation centers represent a nation's information infrastructure and contribute to improving information management, services, and use. Documentation centres also aim to make information accessible to all types of users. There are several types of Documentation centres, each of which plays a significant role and serves the primary function of giving quick access to information on the relevant subject.

We must also consider the link between documentation centres and libraries from other perspectives since their services and other activities are complementary. Welldeveloped information and documentation centres have been built at the world, national, regional, and local sectorial levels. Today's users cannot function without the computerised modem services of documentation centres. With the use of computer and communication technology, well-functioning documentation centres may establish a network that maximises the use of resources and facilitates the flow of information throughout the country for the benefit of the users.

## **1.4 TRANSLATION SERVICE**

Access to published science and technology (S&T) literature is essential for advancing science. Published scientific literature is a foundation for ongoing scientific inquiry in any field. Therefore, researchers everywhere have a fundamental right to access this literature. In practice, this is not the case. Over fifty per cent of the scientific literature is written in languages outside English. This literature is inaccessible to scholars who speak English unless it is translated into English. After World War II, when government-sponsored research received a boost and gained significant impetus, this issue became increasingly apparent. The seven primary languages in which most S&T literature was published were English, Russian, German, French, and Japanese. No nation, regardless of its level of development, could afford to disregard scientific information supplied by other nations.

Consequently, there has been a substantial demand among researchers for translations of research results published in languages other than English. Numerous R&D-affiliated documentation centres and special libraries have begun offering translation services to their scientists on demand. The need for the translation of journal papers was very high. The major abstracting services include S&T literature produced in languages outside English. These abstracting services provide English abstracts of publications published in other languages so that scientists can determine the article's relevance and have it translated if necessary.

Similarly, the key abstracting services in S&T for French- and Russian-speaking scientists include 'PASCAL' and 'FRANCIS' from INIST- CNRS, France in the French language, and 'RefratrivnylZhurnal' from VINITI, former the Soviet Union, in the Russian language. When the former Soviet Union launched the first space satellite, the U.S. administration sought various answers. The apparent Russian success was attributed, in part, to the fact that Soviet scientists used western literature, whereas western scientists did not use Russian literature because they could not understand the language. To address this issue, the National Science Foundation launched a large-scale effort to fund the translation of Russian publications from cover to cover. Since its start in 1952, NISCAIR (Formerly INSDOC) has provided scientists in India with translation services from several foreign languages into English.

The translators carry out document translation. For scientific translations, a translator must have a strong command of both languages and the subject to comprehend the terminology of the given field. Historically, the majority of translation work was performed by human translators. In the 1950s, machine translation (MT) research began with the advent of computers. The application of computers to the task of translating text from one natural language to another is a machine translation. In the past seven decades, machine translation research has produced many MT systems for mainframe computers, personal computers, and the Internet.

#### The Meaning of Translation

According to its literal definition, translation is the expression of the ideas or meaning of a sentence or passage in a language different from the original. The fundamental concept included in a document remains untouched during this procedure; just the language is altered. Transliteration, which involves writing the words of one language using the alphabet of another, is distinct from translation. In transliteration, the pronunciation of the original words is preserved; they are rendered using a different type of script. Researchers usually have micro documents translated, while entries in a multilingual catalogue or bibliography are transliterated.

## **Demand for Translation**

Translation work may be performed based on either present demand or predicted demand. When demand is infrequent and there is no pressing need to offer the material, translation can be performed or acquired on demand. However, when demand is high and it must be provided without delay, translation must be prepared or purchased in advance. To anticipate demand, it is vital to understand the nature of the research projects that will be supported. If necessary, a brief summary of each study can be collected and analysed, and interviews with the researchers can be conducted.

#### **Kinds of Translation**

The same passage or document may be translated differently by different individuals. The quality of a translation depends on the translator's ability to comprehend the meaning of the original text, as well as his expressiveness and vocabulary. Five types of translation are most prevalent:

*Literal translation:* This sort of translation corresponds precisely with the original text. Here, words and phrases are understood in their customary and evident senses. The translator cannot use his own judgement, allegory, or metaphor.

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*Free translation:* Here, words or phrases from the original language are given no weight. The translator expresses in an appropriate language the general meaning and concepts of a document. The translator enjoys freedom of speech.

*Adapted or customised translation:* Here, the translator considers the intended use of the translation and shapes it accordingly. He may avoid unnecessary passage elaboration and, if necessary, enlarge on some issues for the benefit of clarity.

*Technical translation:* In this sort of translation, subject-specific technical jargon is substituted for everyday equivalents. This translation style is favoured by subject-matter experts.

*Translation into/from code language:* Sometimes, a passage or document is turned into a code language (e.g., shorthand) or a code language passage is translated into a spoken or written language.

*Mechanical translation:* This kind of translation is done by a machine and is often an "approximate" version of the original, not an exact one.

#### WHO'S JOB?

The translation task can be performed by a variety of individuals and organisations, including: (1) the reader or researcher himself, (2) the librarian himself, (3) a professional staff translator, (4) a professional freelance translator; (5) a translating agency, and (6) a translating machine. Neither the reader nor the librarian should be expected to undertake the task and unnecessarily spend their time, which could instead be utilised more effectively in their respective fields. In addition, they may lack the expertise of a professional translator. Therefore, the option should be selected from the remaining possibilities.

#### **Certified translator**

A professional translator is one who possesses the necessary skills and qualifications to translate written content from one language to another, and has chosen translation as a full-time or part-time occupation. These translators are frequently selected by numerous libraries. If the volume of translation work in a library is substantial and the need for translations is constant, professional translators may be hired. The alternative is to maintain a list or panel of experienced freelance translators who may be contacted as needed. Even when full-time translators are hired, part-time translators may be needed if the amount of translation or the language are too much for the full-time translators to handle.

#### Qualifications

A person's understanding of a language alone is insufficient to qualify them as a competent translator. Translation work, particularly of technical material, "is a highly

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specialised task that requires the combination of at least two skills: first, knowledge of the language into which the text is to be translated (often referred to as the target language)," and second, "an adequate and competent knowledge of the subject." It is always desirable for a translator to translate exclusively into his mother tongue or a language in which he is equally fluent. It must be emphasised that "subject knowledge" does not refer to a general understanding of a subject but rather a comprehensive understanding of the specific field in which the text to be translated resides. The translator must also be familiar with the subject area's technical jargon. The independent professional translators must likewise possess the same credentials.

## TRANSLATION SERVICE IN S&T: HISTORICAL PERSPECTIVE

Science and technology (S&T) and newer multidisciplinary fields, such as environmental studies, medical electronics, biotechnology, etc., outnumber humanities and social sciences disciplines. Researchers must be informed of the latest developments in these disciplines as soon as feasible. The majority of research and development (R&D) money is likewise allocated to these domains of knowledge. However, the majority of S&T research is conducted in non-English-speaking nations. Published works are the most efficient means of distributing information. The sole answer to enabling access to multilingual information resources is translation.

After World War II, translation services were in greater demand. Several government agencies, public sector organisations, and R&D institutions throughout the globe have implemented in-house translation services to meet their own translation needs. The translation units were a vital aspect of the organization's documentation and information centre. Within the information centre, two types of services were arranged. They are: (i) an in-house translation service that meets the organization's local translation needs from a few foreign languages into English, and (ii) a general translation service that provides translation services from a large number of foreign languages into English or vice versa on a fee-for-service basis to any individual or organisation (e.g., the Foreign Language Translation Service of NISCAIR).

## **1.5 TRANSLATION CENTRES**

The translation process is both expensive and time-consuming. If the translated version of a document is destroyed after satisfying the specific demand, further resources such as time and money may be required if a subsequent demand for the translation of the same document arises. Translations acquired by any information centre may therefore be stored for further use. The result is the creation of translation banks or translation pools or

translation Centres. These translation Centres —maintained at national and international levels—cooperate to share their holdings.

## **Important Centres**

The following are some important translation centresoperating at various levels:

*National Translation Centre (NTC):* The NTC, formerly the SLA Translation Center, is situated at the John Crerar Library in Chicago, Illinois, USA. It keeps up-to-date English translations of materials on natural sciences, physical sciences, medical sciences, and social sciences that have been published all over the world. It currently has over 20 million goods in stock.

*International Translations Centre (formerly European Translation Centre)* - The Technological University of Delft in the Netherlands is home to the International Translations Centre (ITC), formerly the European Translation Centre. It is essentially a global pool supported by 17 countries, including Canada, France, and the United Kingdom. Australia, the United States, India, and other public and commercial institutions work together with ETC.

*British Library's Lending Division (BLL)*—The largest translation pool in Britain is located at BLL at Boston Spa, formerly known as the National Lending Library. Translations of Russian academic publications make up its core collection. It now has over 500,000 translations in its library.

**Transom**—It is a specialist translation pool on atomic energy that was jointly created by the United States Atomic Energy Authority and the European Atomic Energy Community (EURATOM) (USA). The Transom information centre is in Brussels.

## **Translation Indexes**

The centres running the translation pools maintain or produce printed indexes for simple and quick locations of translations. Also shown are union lists of translations. The following is a brief description of several significant such indexes:

Aslib Index of Unpublished Translations—Since 1951, it has been kept on cards and has included English translations of articles from all languages, mostly in the subject of science and technology (now ceased).

*British Reports, Translations and Theses*-It replaces the NLL Transactions Bulletin and the BLL Announcement Bulletin and gives a list of translations acquired in the BLL. It has been issued since 1981 by the British Library's Lending Division. The BLL Review, which includes book translations and cover-to-cover translations, is also published every three months.

*Commonwealth Index to Unpublished Scientific and Technical Translations*—Since 1951, English translations of articles from many languages and across a range of fields, particularly science and technology, have been maintained by ASLIB on cards in three sections: journals, patents, and standards. Over 300 sources in Britain and other Commonwealth nations were used to gather information. It gave location data for around 450,000 translations in 1973. (now ceased).

*Transom Bulletin*—Since 1961, the Transom Information Centre has published a monthly index of publications on nuclear research that have been translated into other languages. It also provides a list of periodicals that have been completely translated.

*Bibliography of Russian Scientific and Technical Literature*— This NTC publication is a retrospective bibliography for the years 1954 to 1956.

Consolidated Index to Translations into English—This index was published by NTC in 1969.

*Index Translationum*— It has been issued yearly by UNESCO since 1932 and only contains translations of works that have been globally published. It has been available online since 1979.

*Index Translationum Indicarum* - It featured cumulative entries for India in the Index Translationum, which were contributed by the National Library, Kolkata, India, and published by UNESCO.

*World Translation Index* - It is a collaborative effort between the International Translation Centre, the French Centre for Scientific Research, and the Commission of the European Communities (in cooperation with National Translation Centre at the John Crerar Library, University of Chicago, USA). It replaces World Transindex and Translations Register Index and has been published since 1987.

*World Index of Scientific Translations and List of Translations Notified to ETC* - It is published every month by the International Translation Centre and contains a list of the center's acquisitions organised by journal titles in the original language.

*National Index of Translations* - It is a quarterly publication of INSDOC (formerly NISCAIR) that offers data on all translations carried out in India by various organisations.

*Bibliography of Translation* - This online bibliography, which was created by the National Translation Mission (India), includes translated works in both the literary and non-literary

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categories (<u>http://www.ntm.org.in/languages/english/bibliography.aspx</u>). In addition, several of these indexes are no longer being published.

## TRANSLATORS ASSOCIATIONS

Numerous nations have active national societies for terminologists, interpreters, and translators that contribute significantly to raising the calibre of translation and creating guidelines. The Indian Scientific Translators Association (ISTA) is committed to advancing scientific translation throughout India. The association's main goals are to promote scientific translators, promote scientific translation training facilities, host conferences or seminars on scientific translation, publish materials, and collaborate with national and international organisations with similar goals.

The International Federation of Translators, Interpreters, and Terminologists is one such organisation at the global level (FIT). Over 100 translation associations from across the world are represented among FIT members. These associations are brought together through FIT, which enables them to gain from accumulated wisdom and expertise. It seeks uniformity for translation quality criteria and strives to harmonise translation standards. Additionally, it fosters the early formation of new translators associations and advocates their foundation in nations where none already exist. FIT and UNESCO continue to conduct business together. (http://www.fit-ift.org/).

#### **IN-TEXT QUESTIONS**

6. A .....is a single written or printed article that provides proof or information on any topic
7. The full form of ISTA is
8. Who is the father of Library Movement in India?
9.Access to published .....literature is essential for advancing science.
10. The full form of NTC

#### LIBRARIAN'S ROLE

Should librarians or other information professionals be assigned the responsibility of translating? Is a controversial topic. Some individuals still believe that a librarian or information worker should be fluent in several languages so that he may translate books for his clients. Some library schools used to teach a foreign language as part of their library science curriculum not long ago. However, it is now widely believed that the actual work of translation does not fall under the purview of the librarian or information worker because,

first, they cannot be expected to be experts in every language and field in order to translate every type of material, and second, they have a variety of other crucial tasks to complete. Because of this, in Ranganathan's perspective, the translation did not properly qualify as a "documentation activity"; rather, it belonged on the "periphery of our sphere of labour." According to him, the librarian's role in this situation would be that of a liaison. In other words, the information specialist or librarian should act as a liaison between the user and the translator. He will accept translation requests or anticipate requests, obtain the translation from an agency or pool, have it done by a qualified translator, and then provide the translation to the user. In other words, the translator will perform the translation task, and the library or information worker will offer the translation service.

## TRANSLATION CENTRES AND TRANSLATION SERVICE IN INDIA

To address their own translation needs for a few languages, governments, public sector organisations, and R&D institutions in science and technology in India have in-house translation facilities. These organisations include BARC, DESIDOC, ONGC, BHEL, MECON, and HAL, to name a few.

## 1.6 SUMMARY

One of the most accommodating services offered by libraries and information centres is translation. There is no question that the phenomenal development of information technology, the expanding Internet user base, the growth of international trade, and the continuous expansion of scientific and cultural collaboration have raised the need for translation services. However, the number of ad hoc translations has significantly decreased due to cuts to financing for information services.

## 1.7 ANSWERS TO IN-TEXT QUESTIONS

1.Paul Otlet

2.Reference Service

3.Documentation centre.

4.Clearing houses.

5.VINITI - All Russian Scientific and Technical Information Institute

6.Document

7. The Indian Scientific Translators Association

8.Dr. S.R. Ranganathan

9.Science and Technology

10. National Translation Centre

## **1.8 SELF-ASSESSMENT QUESTIONS**

1.Differentiate between the Documentation Centre and a Library.

2.Explain the different types of Translation Services.

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3. Translation Service is prerequisite in R & D Libraries. Discuss.

## **1.9 REFERENCES**

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# LESSON –5.4 CAS, SDI, DDS AND INTERNET SERVICES

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## **STRUCTURE**

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- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Current Awareness Services (CAS)
- 1.4 Selective Dissemination of Information (SDI)
  - 1.5 Document Delivery Service (DDS)
  - 1.6 Internet Based Library Services
  - 1.7 Summary
  - 1.8 Answers to In-Text Questions
  - 1.9 Self-Assessment Questions
  - 1.10 References

# **1.1 LEARNING OBJECTIVES**

After reading this lesson, the student will be able to:

- Outline the different information alert services like CAS, SDI.
- Study the different internet services
- Analyse the difference between Current Awareness Service and Selective Dissemination Services
- Analyse the different Internet Services available for the benefit of the user's community.
- Evaluate the internet services provided by the library staff.

# **1.2 INTRODUCTION**

Any competent researcher knows how important it is to always be abreast of the most recent findings in one's area. Daily, works of literature in a wide range of styles and languages are translated into English. Reading a small number of periodicals obtained at the library is not enough to stay abreast of the complete body of literature. Let's say you're curious about conducting a "information usage research." Now, he or she provides three options: I searching the World Wide Web (henceforth Web), (ii) analysing papers that are likely to contain articles on the problem, and (iii) searching abstracting and indexing services available in the relevant field. A researcher using the Internet to gather information will definitely come across useful articles. Because many articles will not be made available online, this is unfortunately not meant to be an exhaustive collection.

It is expected that publications on this topic will appear in periodicals devoted to library and information science. Multiple LIS (library and information science) periodicals exist. There isn't enough room in any library to house all of these books. They may all be in the same library, but we still won't be able to read them since they're written in different languages.

There are abstracting and indexing services available. Some will be accessible online for a price, and searching for them will involve a charge. In addition, the information we

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acquire from these sites will be many weeks to months out of date. The problem is shared by researchers in all areas. The question now is, "What is the way out?" Historically, scientists have faced this problem. As a result of the exponential growth of literature beginning in the 1960s, the difficulty became acute. A new service known as the current awareness service emerged to combat the issue.

# **1.3 CURRENT AWARENESS SERVICE (CAS)**

Library or documentation/information centre Clients' requirements are not identical. Their requirements vary widely. While some are content with a few pieces of information, others seek lengthy resources on their areas of interest; some come to update their knowledge or abilities, and still others seek books to remain informed of the most recent advancements in their fields of interest or job. Consequently, their information processing methods differ. As stated earlier, there are four reader approaches: the current approach, the easy method, the comprehensive approach, and the catching up or brushing up approach. These factors have a substantial impact on the organisations that provide information services, since they must develop methods to accommodate them.

## **Definition and Scope**

Prior to the concept of the current awareness service (CAS), the Internet, the World Wide Web, and electronic mail did not exist. The primary medium was print. It used to take months to include current literature on indexing and abstracting services and their delivery internationally, generally through sea mail. A monthly indexing service headquartered in the United States formerly required one month for processing the literature, another month for printing, binding, and shipping, and a fourth month for the document to reach India, China, or Japan through ocean mail. After a minimum three-month wait, users in these areas had access to the material in the fourth month. At the time, it was necessary for a service to notify users about the most recent literature more quickly than standard abstracting or indexing services. Consider a weekly service that might educate customers of the most current literary works within a month. such a service would be appreciated. The situation created a demand for such a service, which resulted in the emergence of services of various sizes, shapes, and forms.

CAS was defined as an information service that alerted users to recently published literature before it was indexed or abstracted by conventional services. Now, the circumstances have changed. Every day, a considerable amount of contemporary literature is added to the internet, and people from all around the world can access it virtually instantaneously. The thought may immediately occur in our minds: Has CAS become obsolete today? The answer is no, as the vast majority of current literature, particularly literature from developing and non-anglophone nations, is unavailable on the Internet. Current awareness services that originated before the Internet continue to operate.

#### **Need for CAS**

- Keeping experts and professionals informed in their particular fields of interest.
- Promoting and supporting research, study, education, and business

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- Assisting specialists and professionals in quickly identifying and accessing relevant data, so saving them time, effort, and money.
- Offering data in a format that allows its reuse.

## **Characteristics of CAS**

CAS possesses several properties. The following attributes are outlined:

1. It is primarily a written announcement service. Numerous libraries provide the service under a variety of names, including accession list, documentation list, current awareness list, current awareness service, etc. They are now capable of being transformed to digital format and delivered over the Internet, intranet, extranet, and email.

2. Speed and intensity is essential to CAS. Therefore, the normal servicing frequency rangesfrom weekly to monthly. Due to the short frequency, the service's literature seems to be more timely than those of conventional abstracting and indexing services.

3.It aims to provide or develop a contemporary informational viewpoint among scholars. The term "current approach" requires definition. According to study, researchers employ four main techniques in their quest of knowledge. They are listed below: i) Comprehensive strategy, ii) Everyday strategy, iii) Current strategy, and iv) Catching up or Refreshing strategy. To keep ahead of changes in their respective domains, researchers employ the current approach. The technique comprises mostly of a researcher-performed scanning process.

4.It presents a summary of current events without answering any particular queries. Suppose a researcher is interested in current user studies-related publications. She/he examines a current awareness service on a larger subject and saves the bibliographical information of user studies publications. In the next phase, he/she will gather these materials from libraries, information centres, etc. and use them for her study.

5.The service is a formal channel that enhances data collected through informal channels. Researchers frequently receive preprints and other resources from their colleagues. Even via chat, email, and correspondence, they are aware of the most recent advancements in their profession. These are all informal channels. Insufficient information gathered through informal routes necessitates CAS.

6.Scanning is the purpose of the service. Typically, researchers read the pages of a CAS and make note of any articles that capture their attention.

7.The service is designed for temporary usage only. What is included in CAS is then included in indexing and abstracting services. In essence, it tells the researcher in advance. It is comparable to a newspaper in certain ways. It gives the most latest news each morning. Likewise, each issue of a CAS provides information on the most recent advances.

## **Prerequisites of CAS**

There are four major requirements for a successful CAS.

- Understanding which topics to cover
- Understanding who desires what

- Knowing where to obtain the most recent information
- Providing the information consistently and dependably.

Not everyone has access to all informal channels, so most people must rely more on traditional media.

## **Categories of CAS**

With the rapid increase in the number of documents, it became increasingly difficult to regularly scan the vast body of literature in a single field of knowledge and to monitor its development. This increase also resulted in a decrease in the speed of the existing media. In order to bridge the time gap between the generation of information and its dissemination through formal channels such as indexing and abstracting journals, new media had to be developed.

The following CAS is widely used around the world:

- Current awareness list
- Current contents
- Routing of periodicals
- Selective dissemination of information
- Research-in-progress
- Forthcoming meetings
- Newspaper clippings.

#### **Current Awareness List**

Current Awareness List (CAL), also referred to as "Title Announcement Service," is a type of documentation list that typically contains information about articles in current issues of periodicals, recently published research and technical reports, and other macro documents on a broad subject field arranged in a way that facilitates quick and easy scanning. A Current Awareness List illustrates the most current advancements in a field of study "through judicious selection and presentation of the field's current literature." Such lists are not, however, entirely novel. Before this distinct medium emerged in the 1950s, some libraries had published periodic bulletins to inform their patrons of newly acquired materials.

#### **Current Contents**

This is the simplest and easiest way to provide CAS, often known as "contents-byjournal." All current journal issues received by the library are duplicated, stitched together, and delivered to the users on a regular basis. Because it involves little mental effort, the task may be completed nearly automatically. The pages of the table of contents may be photocopied and organised in any convenient manner. Current contents have the particular benefit of being readily scanned, but it may psychologically encourage readers to just visit the contents pages of journals they are already familiar with reading.

## **Circulating Periodicals**

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Forwarding of publications, or the circulation of journal issues among users, is a further way of CAS that is not novel nor uncommon. It is vital to specify which titles are to be transmitted, among whom, and in what order, for effective routing. The major restriction of this strategy is that consumers cannot get the issue concurrently. Therefore, routing lists should be designed such that a user's pertinent problem receives precedence. However, no user should be authorised to keep an issue for longer than the allotted time; otherwise, the entire process would be held down. Each user on the routing list is responsible for forwarding an issue to the next person in line, with the last recipient returning it to the library. When a magazine issue is made available for borrowing, any reader may borrow it for additional research. While sending an issue to a user, if his relevant items are marked, the process will be more efficient and save him time.

#### **IN-TEXT QUESTIONS**

1 Information has become a .....now a days.

2 The full form of CAS is .....

3 Current contents are one of the examples for.....

4 Matching of users profile of to that of ..... Profile is called SDI.

5 ..... Developed the concept called SDI.

6 DDS, refers to the process of making original documents or copies of

documents available to users on.....

#### **Selective Dissemination of Information**

As previously stated, SDI is structured to disseminate the most up-to-date information to each reader in the quickest time possible, taking into account his specific area of interest.

#### **Announcement of Research In Progress**

Research-in-progress documents the many research initiatives carried out by a single research organisation or a collection of such organisations. A particular field of expertise might occasionally constrain its coverage. Such a publication's entries might each include the information below: the name(s) of the research worker(s), the name(s) of the supporting body, the target completion date, the source where the early results have been released or are anticipated to be reported, and the (a) title of the research project. Research-in-progress publications, such as directories or periodicals, can be used to (b) plan new research programmes, (c) prevent research-in-parallel, and (d) foresees the emergence of new information. As a result, information consumers may stay informed and quickly access new information.

#### **Forthcoming Meetings**

In seminars, conferences, meetings, etc., a significant amount of new and practical information is produced. Before some publications or proceedings cover this material, the information consumers may directly gather by attending these events. For interested parties to attend such meetings, information about the meetings should be made available in advance. Recent years have seen the emergence of online directories that list upcoming

conferences, such as Conal: Conference Alert (<u>http://www.conferencealerts.com/</u>), All-ConferenceAlert.Com (http://www.allconferencealert.com/india.php), etc.

## **News Paper Clipping Service**

The most recent sources of information on any incident are clippings. There is no alternative to these until the news pieces are restructured and added to digestible publications and yearbooks. Making arrangements at a library for regular clipping and their upkeep in a suitable sequence is required to deliver current materials swiftly. Paper clippings are typically kept in vertical file cabinets with folder tabs labelled with subject titles. These days, many businesses offer this service, particularly online. These are a few instances of such newspaper clipping services:

- **NewspaperClips.com** (http://www.newspaperclips.com/) this US news clipping service monitors social media and traditional news sources, integrates this information with extensive measurement and analysis techniques, and then provides it to clients online.
- The Government of India organisation **Vigyan Prasar** Information System (VIPRIS) has released the VIPRIS Clip set, which offers selected news articles and feature articles on science, technology, and the environment that have been compiled from more than 100 newspapers and news magazines and categorised under seventeen subject areas.

# 1.4 SELECTIVE DISSEMINATION OF INFORMATION (SDI)

The Roman Stoic philosopher Seneca, Almost two millennia ago, said the following: "What is the point of having many books and libraries if their owners cannot read all of the titles in their lifetimes? It is preferable to devote yourself to a small number of authors than to wander aimlessly through a large number." The situation is even more accurate now: We are overwhelmed with information in this age. The volume of literature published and disseminated annually is growing significantly. It is quite difficult for the scientist to remain current in his current field of interest if he reads everything published. He must be quite selective about what he reads. Before that, he must be aware of what is being publicised so he can choose. Selective Dissemination of Information, or SDI for short, is one of the library's services that address this demand.

In libraries, SDI is a manual information service in which librarians scan new issues of journals and new books and notify users of items with potential relevance to their work. Only in the late 1950s and 1960s did the term "Selective Dissemination of Information" (SDI) gain attention in the literature of scientific communication. A Business Intelligence System by Hans Peter Luhn was likely the first to describe a computer-based SDI system. Luhn incorporated SDI into his wider "Business Intelligence System" design, including information retrieval and a communication facility. Luhn's original system proposal was never implemented, but it was the foundation for designing several computerised SDI systems. In 1959, the IBM Corporation's Advanced Systems Development Division in New York was the first to implement an automated SDI system based on Luhn's design; this system was dubbed SDI-1. Additionally, SDI-2, SDI-3, SDI-4, and SDI-5 have been produced and evaluated. SDI is currently an essential service in most specialised libraries and information centres.

#### **Definitions of SDI**

H Peter Luhn defined SDI for the first time in 1961: "The Selective Dissemination of Information is the service within an organisation concerned with the machine-assisted channelling of new edges of information, from whatever source, to those points within the organisation where the likelihood of usefulness in relation to current work or interests is high." Here, "machine assisted" refers to the use of computers, and "IT to whatever source" refers to information from both within and outside the organisation. "new things" refers to current information. "high utility" refers to the fact that the user or user group should find it valuable. "inside the organisation" indicates that SDI is typically made about a particular business or academic institution.

Edmund Weaving defined SDI as "the activity of providing clients with desired, specified sorts of information on a regular basis - with an emphasis on the specific." Over time, the definition of SDI has evolved; it is not always a service provided by an organisation for internal use. Many publishers and information centres have begun to offer SDI to external clients. The notions of cash, specificity, computer use, etc., continue to exist.

#### Need and Objectives of SDI

The information needs of two consumers are rarely identical. Occasionally, they may be similar, but almost never identical. According to Luhn, their interests "do not conform to conventional concepts of disciplines." Consequently, if a user desires to keep abreast of the most recent developments in his/her field of interest, he/she will have to sift through a tremendous quantity of content that may be accessible not only in the "umbral" zone but also in the "penumbral" region. It is a monumental task that may be physically impossible. The indexing and abstracting services and other CAS media may be of some use, but he/she will still need to wade through the entire list to locate the needed contents. Moreover, by the time indexing and abstracting journals cover the same material, their use may have reduced or gone. As a result of these causes, a rising number of institutions are now adopting SDI.

Therefore, the main objectives of an SDI service are to:

- To keep a specialist personally informed of all documents pertinent to his or her area of expertise;
- Eliminating unnecessary data saves time and makes the "information explosion" manageable.
- Consequently, SDI assists users in overcoming the problem of information overload by filtering information according to their needs.

#### **Characteristics of SDI**

As evident from the preceding discussions, SDI possesses the following important characteristics. They are

- It is a customised service designed for an individual user or group of users with similar areas of interest;
- It is a user-focused service offered with a good awareness of the users' particular interests;

- It is a quick gadget that delivers information well before it is included in the indexing and abstracting magazines;
- It does not offer to scan because the service is targeted.

#### Workflow of SDI

An SDI system is primarily built on two types of profiles — user-profiles and document profiles — which are analysed to determine the relevancy of any new documents for a particular user.

#### **Users 'Profiles**

While initiating an SDI service, the first decision addresses the intended audience. The needs and interests of each user or group with similar interests are ascertained and carefully analyzed. These are then expressed in terms of some keywords or code numbers. The standard procedure is to incorporate keywords from an established thesaurus. The resulting individual profiles are then filed together. It is known as the user's profile file. It should be noted that the creation and maintenance of user profile files are essential components of the system, without which SDI would be meaningless. The user may perform the job with the assistance of a manual provided to them or by collaborating with SDI staff.

#### **Documents Profiles**

As documents are added to the library, their contents are explicitly examined, and unit concepts or facets are described using the same keywords, symbols, or code numbers included in user profiles, allowing for matching. Individual profiles of prepared documents are filed together. This file is known as the document's profile. SDI workers perform this task.

#### **Profile Matching**

The user profiles and document profiles are compared at regular intervals. When satisfactory findings are obtained, that is, when a close likeness is discovered between two profiles, the essential information from both pro- files is recorded. For effective matching operations, it is necessary to determine the match level for each user in advance. For this reason, it must be determined what minimum number of concepts (keywords) and what combination of them are required for a document to be suitable for each user and marked on their separate profiles. Instructions provided by users and analysis of their responses may aid in determining the optimal level of match.

#### Notification

A notification is given to a specific user whose profile closely matches a document's. Thus, he or she is alerted to the existence of a potentially relevant document in the library. The notification may include only the minimal information required for the identification of the document or an abstract/keywords of the document's content, coupled with bibliographical information. Occasionally, the document itself or a document duplicate is also sent.

#### Feedback

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In the SDI system, there needs to be a mechanism for user feedback. Along with the message, a printed card or page may be given to each user, on which he or she indicates the extent to which the offered reference was helpful. A user's reaction can also be evaluated based on whether bibliographical information was sufficient or whether he or she requested an abstract or a copy of the document. Occasionally, the response may also take the form of a referral response, in which a user advises the SDI unit that the material referred to him may interest another user. Although feedback is a vital component that can increase the effectiveness of an SDI system, it is sometimes ignored. This method enables the detection of even the smallest change in user interests.

#### Readjustment

For the purpose of enhancing the service of an SDI system, it is required to examine and, if necessary, adjust the user profiles obtained through the aforementioned techniques. Such alterations are known as readjustment, rejuvenation, or updating. Continuous readjustment of the profiles contributes unquestionably to the enhancement of the system's effectiveness.

#### **Operation of SDI**

In his initial description of SDI, Luhn predicted the use of computers in SDI service. Nevertheless, SDI systems may also be manually operated. If the number of users is restricted and the coverage area is not broad, a manually controlled SDI system can offer essentially adequate service. When several computerised information systems and large indexing and abstracting services, such as the Institute of Scientific Information, Philadelphia, Chemical Abstracts Service, and MEDLARS, began producing and making available files of large volumes of documents in machine-readable forms, particularly on magnetic tapes, the concept of a mechanised SDI system gained attention. These tapes, which were less costly and had a greater scope than a single SDI system, could be utilised easily as document profiles. By separately creating a user profile file, every institution might operate its own SDI service with relative ease.

#### **Advantages of SDI**

The SDI service has several notable advantages over other library services. These are

- Individual users can receive customised services;
- The documents received by the library are distributed to those who will find them most beneficial.
- The SDI system alerts users automatically when new literature is published in their domains; thus, users do not need to be vigilant manually.
- The transmission of any information via an SDI system is far faster than any indexing or abstracting service.
- Due to the individualised nature of the service, SDI provides the highest level of user satisfaction.

#### **Disadvantages of SDI**

There are also a few disadvantages connected with the system, which are as follows

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- It might be challenging to discover the precise interests and demands of the users, since they are usually unable to express themselves in the proper manner.
- It is difficult to satisfy a large number of clients with a manual approach, and if a mechanical method is used, it may lose the personal approach, which is an essential aspect;
- A large number of users are not vigilant enough to respond to all notifications, which reduces the effectiveness of the feedback mechanism and the system.
- SDI service requires well-qualified personnel in significant numbers, which is typically unavailable in a small library.

#### **Comparison of CAS and SDI**

It is frequently questioned whether SDI qualifies as a current awareness service. By its very nature, CAS is not supplied in response to a particular need and spans a broad subject matter. However, SDI is not of this sort. Nonetheless, it assists users in keeping aware of current advancements in their respective professions, which is also the primary objective of CAS.Therefore, SDI is essentially a tailored service that provides current awareness.

## **1.5 DOCUMENT DELIVERY SERVICE (DDS)**

The basic purpose of any library is to serve the information requirements of its users as effectively as feasible. To do this, the library develops its collection systematically and offers a variety of information services to keep customers abreast of the most recent publications in their respective fields of interest. The current awareness services (CAS) and indexing and abstracting services (I/A) frequently bring to the attention of users the newly published literature in their subject field, which is dispersed across a wide variety of primary sources, including journal articles, research reports, conference proceedings, dissertations, monographs, etc. These services examine freshly released material in original sources, identify significant pieces, organise them with extensive bibliographical information, index them, and bring them to the attention of users. Requests for the original copies of the content presented in these publications are made by users of these services. It might be a book, a journal article, a report, or anything similar. Before sending the desired material to the user, libraries and information centres collect it from their own collections or obtain it from additional sources. Document Supply Service (DSS) or Document Delivery Service (DDS) is the service that provides the needed document to the customer upon request.

Online vendors offer document delivery services, i.e., they send copies of the identified information resources from their bibliographic databases. Where a library does not anticipate heavy use of a particular set of source materials (such as a journal title), it is generally preferable for users to be able to request documents on an as-needed basis. For instance, the ordering service has a network of locations from which copies of articles can be obtained. In-house collections, large academic and government libraries, and specialised document suppliers are examples of sources.

Frequently, commercial document delivery services offer the advantage of swiftness. There is a perception that they are more expensive than inter-library loan cooperation, but

library directors must be cautious with their cost estimates, as there may be no cost advantage to using inter-library loans over commercial document delivery once staff time is factored in.

#### DEFINITION

Document delivery service, often known as DDS, refers to the process of making original documents or copies of documents available to users on demand. DDS is "the delivery of published or unpublished documents in hardcopy, microform, or digital format upon request, often for a set rate," as stated in the Online Dictionary of Library and Information Science (http://www.lu.com/odlis/), which may be accessed through this website.

Due to the fact that its effectiveness influences the value and implications of all other access services, DDS is an indispensable service. For instance, if a user who has been alerted by a current awareness service insists on receiving an original document that was mentioned in the service but no attempts are made to send the original document to the user in a timely manner, then the CAS is of no use to the user and is of no benefit to the user. Other information services are therefore enhanced as a result of DDS.

#### **Historical background of DDS**

Historically, the primary focus of DDS was on the lending of necessary materials to the user for a specified amount of time by the library or information centre from its own resources, and if those materials were not available, on the inter-library loan (ILL) borrowing of the document from other libraries and the subsequent lending of it to the user. If neither of these options were possible, DDS was primarily concerned with the availability of the document. It wasn't until the middle of the 1950s that photocopying was invented, and it wasn't until the 1970s that photocopiers became commonplace in libraries that anyone realised that document delivery service (DDS) wasn't just limited to lending out publications; it could also reproduce and permanently distribute documents to customers. The libraries started making use of photocopiers so that they could provide copies of publications, most commonly journal articles and book chapters and sections.

#### **Document Delivery Facilities**

Several international hubs offering DDS services have sprung up in response to the growing need for centralised document distribution facilities. Some examples of document supply centres around the world include the British Library Document Supply Centre (BLDSC) in the United Kingdom, the National Library of Medicine in the United States, the National Research Council-Canada Institute of Scientific and Technical Information (NRC-CISTI) in Canada, the Indian National Scientific Documentation Centre (INSDOC now NISCAIR) in India, and the Institute de I' Information Scientifique et Technique (INIST) in France. The document distribution hubs furnish the service with resources, some of which are gathered centrally while others are gathered at random.

#### **Electronic Document Delivery Systems**

As previously noted, the proliferation of electronic databases and the development of communications networks have revolutionised the landscape of document distribution. Emerging technologies have also impacted the transmission of requests and the delivery of

documents. Previously utilised postal systems to communicate requests are being replaced by telephone, fax, email, and web-based ordering. Similarly, the method of document distribution from the provider to the requester is experiencing transformations. The conventional document storage, retrieval, and duplicating operations are being replaced by imaging technology. This technique utilises a number of equipment to scan and digitise paper documents. The digital copy of the document is sent to the requester through email, fax, or document delivery software such as Ariel. Electronic Document Delivery Systems (EDDS) are developing systems that use electronic technology to receive and disseminate documents in response to requests. A EDDS can provide instant access to the necessary data.

#### **Effectiveness of DDS**

Three elements influence the efficacy of DDS: speed, cost, and customer happiness. DDS should ideally be cost-effective, supplied promptly, and accommodate all needs.

#### 1. Speed

How requests are received and how documents are delivered have a direct influence on the speed of service. You may submit requests by letter, phone, fax, email, or online. In addition, papers can be transmitted by any of the aforementioned methods. Receiving the request online and providing the document using an electronic document delivery system is the quickest approach. In the traditional DDS, the speed of the service is determined by factors such as the location of the document within the library, the time required to locate it if it is unavailable, the transmission of the request, the processing of the request by the supplying library, the receipt of the document by the requesting library, and, finally, delivery to the user. These variables affect the document's delivery time. It might range from one week to one month. Standard service for EDDS takes one day, whereas urgent service can be completed in as short as two hours.

#### 2. Cost

Document Delivery Service should be economical. When developing cost-effective services, direct and indirect costs are considered. Direct costs are those associated with the operation of the service, such as processing the request, duplicating the document, and postage. Indirect costs include collection, building, staff salaries, equipment, etc. It is cost-effective if the service is offered from a centralised collection and the number of requests is high. In contrast, the service is less cost-effective when using the decentralised collection. Increasingly, it is understood that the service can be more cost-effective if it is operated by constructing a core collection to meet the users' primary needs and gaining rapid electronic access to the remaining requests from external sources.

#### 3. Satisfaction Level

Satisfaction in DDS is determined by the ratio of requests fulfilled to the total requests received by a library or document delivery centre. Idealistically, a DDS should fulfil all requests, but even the most comprehensive centralised collection cannot achieve this. Generally, a 90 and 95 per cent satisfaction rate is considered satisfactory.

#### **Document Supply Centres: Some Examples**

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Some of the document supply centres which offer DDS at the national as well as international levels are:

- British Library Document Supply Centre (BLDSC), Boston Spa
- National Research Council Canada Institute for Scientific and Technical Information (NRC-CISTI), Canada
  - (http://cisti-icist.nrc-cnrc.gc.ca/eng/ibp/cisti/about/index.html) Institute for Scientific and Technical Information (INIST), France
    - (<u>http://www.inist.fr/</u>)

•

- Document Delivery Service of INIST:
- Document Delivery Service of NISCAIR (Formerly INSDOC), Delhi
- Document Delivery Service of INFLIBNET Centre, Ahmedabad

## **IN-TEXT QUESTIONS**

7A well-designed ......can contribute significantly to the library's reputation. 8 Google image is an example for .....

9 RSS means.....

10 A weblog is a frequently updated website produced by an individual in a

.....diary format using specialised software.

11The full form of WWW is .....

12..... centre provides DDS in India.

# **1.6 Internet Based Library Services**

Internet is currently becoming a vital component of library services. It has revolutionized how libraries serve people with information sources and services. It serves as a platform for providing access to licensed and unlicensed information beyond the four walls of libraries. In addition, it supports the delivery of just-in-time services via virtual referencing mode. The Internet has enabled libraries to create and distribute innovative services and resources worldwide. Internet-based library services may be delivered as follows:

- Access to library materials via web-OPACS and circulation services via the library's website.
- Access to licensed online databases, full-text journals, and electronic books.
- Gateways and portals that provide access to non-library content for libraries
- Virtual reference and information services

## **Library Websites**

Establishing the library's website is the beginning point for the Internet-based library service. The Internet has created vast opportunities to develop and deliver library services. A well-designed website can greatly assist library customers in gaining access to library

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materials and services at their convenience. Internet usage is now so widespread that the majority of libraries strive to employ it to improve communication. Today, librarians provide information to remote and local consumers via the Internet. Historically, library websites were static, providing just factual information and links to external resources. Web portals have grown increasingly dynamic, interactive, and service-oriented throughout time. Understanding the user's needs and creating the site accordingly is the most crucial component of establishing a library's website. With the transition of library OPACS to web OPACs, service-oriented websites were first created. It was enhanced with the addition of internet databases and licenced, internally-generated digital full-text material. Modern library websites are extremely interactive and dynamic, with features like virtual citations and online debates.

For the design of a library website, one must consider the following factors:

- The information submitted must be current and regularly updated.
- A user-friendly interface with sufficient navigational capabilities is required.
- If licensed content is made accessible, suitable security and authentication must be implemented.
- The design must be appealing, and excessive information clutter must be avoided.
- The websites' links must be routinely examined to ensure they function properly.
- Important messages, information, and services must be highlighted to avoid the users' notice.

There is no firm and fast rule on what a library website has to provide. Nevertheless, the following aspects should be considered when building the website:

- Detailed information regarding the library's collection, services, regulations, policies, etc.
- Web OPACs will be integrated into the website with library holdings and user information.
- Contact details
- The library's floor layouts and virtual tours.
- There must be links to all online resources and services on the homepage.
- Interactivity can be provided through e-mail, feedback forms, and a chat function.
- The website may be made dynamic by incorporating news updates, information about special events, a list of recent library purchases, and announcements.
- The FAQs are required.
- Web forms may be used to provide online services such interlibrary loan, book and journal requisition and reservation, etc.
- Provide connections to external websites that are pertinent.

A well-designed website can contribute significantly to the library's reputation. To attract and retain user attention, the design must be aesthetically appealing. However, excessive graphics should be avoided because they may impede the loading speed of the homepage. The website must be centred on the user, and its components must appeal to their needs.

## LIBRARY PORTALS

A portal is a Web-based programme that offers an adaptable interface for getting information from numerous sources. Portals provide access to many network services that enable searching, harvesting, alerting, or a combination of these functions. They are application-level interfaces that enable uniform access to information resources and associated services and are based on software suites.

"Library portals often feature an online catalogue of materials and access to digital resource collections. Library patrons can simultaneously search all of these sources using broadcast search technologies with a single query. Portals may offer electronic reference services ("ask a librarian"), personalization features ("my bookshelf," custom intelligent searches), and additional research tools. The online catalogue can be supplemented with enriched material, including author profiles and book critiques, table of contents, and photos of book jackets. Some libraries have included interactive aspects in their portals, enabling the formation regarding virtual communities. (Pasquinelli, 2002).

Library portals are highly specialized and offer a limited set of capabilities, such as searching for and retrieving information and documents relevant to a certain topic from different information resources both inside and outside of an institution. It's a web service that helps people find relevant library-related information resources, conduct searches across many resources using a unified interface, and gain instantaneous access to the results. Either a standalone server or a shared Web server can host your portal's installation. The software may be categorised as a portal server application in general.According to Ron Davies, a library portal system must have the following features:

#### **Resource discovery**

Citation databases, abstracting and indexing services, electronic journal databases, library catalogues, and digital collections are only some of the local and remote information resources that users can traverse through in order to meet their information needs. Metadata descriptions of information resources can be browsed in accordance with their respective subjects or categories.

#### **Common interface for search**

It is necessary for a library portal to play the role of an intermediary by providing users with the ability to search numerous resources (that have distinct search protocols and metadata presented in a variety of formats) through a single search interface. This will allow users to avoid having to commit to memory the specific search criteria of each resource.

#### **Federated search**

Additionally, it must enable users to select a variety of information sources and conduct simultaneous searches across them. An integrated collection of search results that may be combined, sorted, and perhaps exported as a single list of pertinent references will be displayed to the user.

#### **Direct access to content**

It must feature an integrated context-sensitive dynamic linking service for a library portal, allowing users to navigate from a document citation to the full text of the document in electronic format with a single mouse click.

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#### Authentication

A library portal must allow access to licensed or commercial resources without requiring users to log in separately for each resource.

A growing number of libraries are seeking automated library systems that incorporate a portal that provides access to various electronic resources both within and outside the library through a single user interface. According to Boss, a standard gateway must possess the following characteristics:

#### Library Gateways

Subject Directories of approved websites are integrated into Library Gateways. They are subject-organized collections of databases and webpages that have been examined and recommended by specialists. They usually include high-quality, accurate content that has been reviewed by subject-matter experts. Library Gateways are typically used for research and reference materials. They provide access to subject-specific databases and high-quality websites. Access anything from specialist collections and databases to quick-reference items like handbooks, directories, and indexes via library gateways.

While gateways are collections of relevant links to information resources that appeal to a certain user group, portals strive to offer this information inside a single environment that the user may personalise and manage to some extent. This data might be compiled via a cross-search of information databases, an alerting service that alerts users of new resources on a certain topic, or a multi-channel newsfeed. Users in a portal may customise the appearance and feel of the portal environment, pick the information resources they want to explore and search for, and choose the topics for which they want to get alerts.

Notable Library Gateways are:

- Internet Public Library (http://www.ipl.org)
- New Canaan Library (http://www.newcanaanlibrary.org)
- Living Web Library (http://www.livingweb.com/library/search.htm)
- Digital Librarian (http://www.servtech.com/~mvail)

The Internet Public Library (IPL), which originated in 1995 as a graduate seminar at the School of Information and Library Studies at the University of Michigan, is the first library of and for the Internet community. It has corporate backing, grant funding, and a salaried workforce. The IPL organises subjects by subject type, provides keyword searching, and stems words automatically. It is also possible to conduct searches using the title, publisher, description, and subject headers. The results are arranged alphabetically. In addition to links to resources, the New Canaan Library offers a Ask a Librarian and Virtual Reference Desk are available. Internet tutorials are also accessible.

#### **Internet Based Document Transmission**

The phrase "electronic document delivery systems" implies the distribution of an electronic version of a document, which may need the duplication of an electronic copy if the

document is not already accessible in an electronic format. The libraries have been distributing copies of materials using fax machines and telephone lines. The original electronic document delivery deployment employed scanning technology. As scanning technology and equipment evolved, document supply companies began to scan documents as bitmap page images. The application is programmed to automatically create a hard copy along with a header page providing the applicant's address, which may be sent or faxed. Several libraries in wealthier nations disseminate scanned publications through the Internet using the "Ariel" software suite. A computer with Internet access and the Ariel application installed may receive and transfer electronic information to and from other libraries having the Ariel software installed. Developed in the late 1980s, the ADONIS system is an image-based document delivery system.

An economically feasible electronic document delivery system has been established as a result of the availability of the vast majority of peer-reviewed research journals in electronic format, inexpensive article-scanning technology, and enhanced electronic distribution methods. The bulk of secondary services that were formerly accessible via CD-ROM or online search services may now be accessed via the Internet, where the publisher's website is linked to the journals. Numerous Internet-based document delivery systems already enable users to download full-text publications from their websites or get them as email attachments. The majority of electronic publishers and aggregators, such as OCLC, Blackwell, OVID, etc., offer full-text articles on their websites. Some suppliers charge per journal access, while others demand an annual price for unlimited access. A user desiring to send an item can input a credit card number, select a delivery mode (postal, UPS, fax, email, etc.), and indicate whether the item is urgent (with a rush order fee attached.).

Some of the significant Web-based document delivery services are:

Uncover	http://uncweb.carl.org/uncover/subtitle.html
Articles in Physics	http://ojps.aip.org/
<b>Bioline Publications</b>	http://bioline.bdt.org.br/journals
BioMedNet	http://biomednet.com/library/
Chemporthttp://www	/.chemport.org/
ScienceDirect	http://www.scienceDirect.com/
OCLC	http://www.oclc.org/
Northern Light	http://www.northernlight.com/

#### WEBLOGS AND RSS

A weblog is a frequently updated website produced by an individual in a chronological diary format using specialised software (Winship). A blog can be a highly personal or collaborative endeavour. Blogs are simple to develop and maintain, even for those with minimal technological knowledge. The technique is as straightforward as writing an email and requires no HTML code or file transfer. One need not even host the file on a server. Logging on to the site, filling out a web form, and clicking a button are all required for blog publication. The software for this purpose typically provides templates with various designs from which to choose and allows users to create blogs in only minutes. Modern

weblogs are not restricted to text alone. One can submit photographs, audio, video, PowerPoint presentations, and Excel spreadsheets, among other file types. In general, librarians utilise weblogs for three reasons: to keep themselves current, to inform users about library resources and services, and to guide users to relevant resources. Numerous libraries in the U.S. and the U.K. use blogs extensively on their websites. Weblogs can fulfil the following objectives for libraries:

- Connect users with pertinent resources
- Inform them of local and national happenings.
- Provide information on the most recent library resources and services
- Utilize as a venue for collecting user feedback

To maintain the attention of the users, the blogs must be regularly updated. Utilizing one of the free web-based platforms, such as Blogger at http://www.blogger.com, is the simplest method to create a blog.

The majority of blogging software has RSS, often known as Real Simple Syndication or Rich Site Summary. It enables the automatic collection and transmission of blog posts or news website headlines to other websites. Weblogs automatically generate XML code (Extensible Markup Language). The reader can subscribe to the blog's material using the XML components referred to as feeds, which enables the delivery of the content to the subscriber without the reader having to go to the blog's website. The user is required to select the blogs or sources from which the newsfeed will be gathered and broadcast. When a user logs in, the most recent headlines are shown. This newsfeed gathering and transmission is carried out by a piece of equipment called an aggregator or newsfeed collector. The aggregator examines the subscribing sites on a regular basis and saves all new content in a folder for the user's review. An aggregator can be a PC programme installed programme like Feed Reader (http://www.feedreader.com) or a web-based service accessible from anywhere like Bloglines (http://www.bloglines.com). New technology called RSS will revolutionise how all content on the Internet is received and digested. RSS feeds are frequently utilised privately rather than for library reasons. Libraries may look into the possibilities of integrating RSS feeds into their websites to keep users informed on topics of general interest.

## 1.6 SUMMARY

Libraries have been able to handle crucial challenges with the assistance of emerging technology, such as increasing ease and speed, providing a variety of information formats that overlap with one another, extending working hours, and reaching a bigger audience. In the context of developing Internet technology, we talked about library services that are accessible over the internet. We looked at how a well-designed website for a library may aid in the institution's ability to communicate with folks regardless of their location. Users are able to access information resources and services whenever they want and from wherever they are located in the world thanks to this feature. In addition to that, we investigated the doorways and entrances of the library. It is not beyond the realm of possibility for library portals to perform the role of principal hub for all accessible databases, which would lead to an increase in database utilisation.

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Additionally, librarians utilise weblogs as a means of disseminating information to patrons on the resources and services offered by the library. In addition, visitors can find relevant websites using the links provided by these blogs. RSS is another tool that may be utilised by libraries to keep their customers updated about topics that are of general interest. Technology has also made it possible for libraries to provide patrons "virtual" services, one of which is virtual reference. Virtual reference is one of these services. Libraries may be able to provide services that are more user-centric by providing a range of Internet-based services, and they may also reach a far larger audience.

7.

# **1.7 ANSWERS TO IN-TEXT QUESTIONS**

- 1 Commodity
- 2 Current Awareness Services
- 3 CAS
- 4 Document
- 5 H P Luhn
- 6 Demand

# **1.8 SELF-ASSESSMENT QUESTIONS**

- Write a detailed note on the Alert Services.
- Explain the different types of Internet Services.
- Discuss the different types of Current Awareness Services (CAS).

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- Website
- 8. Subject specific search engine
- 9. Really Simple Syndication
- 10. Chronological
- 11. World Wide Web
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# Lesson -5.5 INFORMATION PRODUCTS: NEWS LETTER, IN-HOUSE JOURNAL, STATE OF THE ART REPORT, TREND REPORTS ETC.

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# **STRUCTURE**

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Newsletters
- 1.4 House Journals
- 1.5 Trade and Product
- 1.6 Reviews And Related Publications
- 1.7 State-Of-The-Art Reports
- 1.8 Statistical Reviews
- 1.9 Trend Reports
- 1.10 Technical Digests
- 1.11 Summary
- 1.12 Answers to In-Text Questions
- 1.13 Self-Assessment Questions
- 1.14 Reference

# 1.1 LEARNING OBJECTIVES

The main objectives of this lesson are to:

- Recognize the types and qualities of various information products;
- Recognize the significance of information products such as newsletters, house journals, and trade and product bulletins;
- Describe the function of house journals and newsletters in enhancing an organization's reputation;
- Determine the issues with these information products' bibliographical control; and
- Understand how technology has affected commercial organisations including manufacturers, distributors, and others who produce, use, or provide various industrial processes, materials, or services.

# **1.2 INTRODUCTION**

For a person to succeed and for a country to thrive and develop, access to scientific, technical, commercial, and health-related information is essential. This promotes sustainable development, the reduction of poverty, and environmental protection. However, the majority of the literature that is now available in the disciplines of science, technology, health, business, education, and others is created by experts for experts and cannot be used directly by non-experts or potential consumers in its original form. In other words, information is not

presented in a way that potential users who would profit from it can understand, read, and accept. Overabundance of knowledge on a subject is another issue with effective information use. The sheer volume of information on any given topic makes it impossible for a busy user to choose the information they need without spending too much time and effort. As a result, information consumers of all levels need relevant information that they can quickly understand, digest, and apply in the context of their working environment with a certain level of confidence and dependability. Users need information presented in a way that they can utilise right now. In other words, information that has been condensed is needed by users at many levels.

"Consolidated information is 'public knowledge' that has been carefully chosen, analysed, evaluated, and possibly restructured and repackaged to serve some of the immediate decisions, problems, and immediate needs of a defined clientele or social group, who otherwise may not be able to effectively and efficiently access and use this knowledge as available in a great deal of documents or in its original form. The criteria for choosing, assessing, reorganising, and repackaging this knowledge are drawn from the target market. the year 1981 (Saracevic and Wood). The goal of consolidated information is to be more relevant to users, their demands and levels, the capacities and time allotted for information absorption, and other user-related activities. In other words, information consolidation and repackaging refers to giving the appropriate information to the appropriate person in the appropriate format at the appropriate time.

Organizations in the business, government, and other sectors produce information products as marketing collateral for their target markets. These goods include trade and product bulletins, house journals, and newsletters. These publications provide the general public with information on an organization's performance, most recent activities, and available goods and services. These informational products' primary objective is to improve the organization's reputation and promote its goods and services. Newsletters quickly and effectively inform the intended audience of the organization's most recent activity. Employees and clients are informed by house diaries about the effectiveness and management style of the company. Trade and product bulletins, which are typically published by manufacturers, distributors, and business publications, have two purposes. These publications advertise the sale of the products while also providing information on numerous characteristics of the method, material, or service. The communication patterns of industrial, commercial, and public service organisations are significantly impacted by developments in computer and telecommunication technologies. Through electronic information products like e-newsletters, company websites on the Internet, and e-commerce, they are promoting themselves.

# **1.3 NEWSLETTERS**

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A newsletter is a periodic publication that is one or more pages long, issued in print, electronic, or any other media, that contains recent news or information of interest to a specific or niche audience. Organizations frequently send newsletters to their subscribers or members.

#### **History of Newsletters**

Newsletters, which circulated news for general consumption in the 1600s and early 1700s, are the ancestors of modern newspapers. The earliest printed newsletters or newssheets were distributed throughout the commercial hubs of Europe and were frequently referred to as corantos, courants, occurrents, or intelligencers. These newsletters covered business news as well as information on other public events that would be of interest to bankers and business owners. Then came newsletters, and finally news sheets. In the 1500s, official newssheets first appeared. Written notes, known as NotizieScritte, were displayed throughout Venice's public spaces. On payment of a gazetta coin, they might be read. This custom gave rise to the term "gazette," a traditional nickname for early newspapers. The Avisa Relation or Zeitung appears to have been the first news source to be regularly published. This news newspaper began appearing every week in Strasbourg in 1609 and then moved to Germany. The Boston News-Letter, which later evolved into a newspaper, was the first newsletter to publish in the United States in 1704. The majority of newsletters actually died out in the 1800s, after having prospered in the 1700s along with newspapers.

In the early 1900s, newsletters allegedly made a resurgence because enterprises and industries desperately needed a specialised information medium, which newsletters provided. The first one was "Babson's Reports," an investing advice newsletter, which debuted in 1904. The Kiplinger Letter came next in 1923. The most frequently read business forecasting publication worldwide is still this newsletter. Corporate newsletters exploded into popularity in the 1930s. In 1934, Telecommunications Reports (a newsletter for the telecommunications sector) grabbed the lead, and a number of others soon followed. Newsletters of all kinds, from farming to fashion, have become commonplace. The first newsletter devoted to other newsletters, Newsletter on Newsletters, was published in 1964.

#### Various Newsletters

- R&D Organisations (National and International);
- Associations (National and International);
- Government Organisations;
- Public Sector Undertakings;
- Private Institutions; and
- Academic Institutions, etc.

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#### a)Functions / Purpose

Newsletters are periodicals with a straightforward layout that deliver quick information to a specific target. The newsletters may be produced quickly, easily, and affordably. The majority of organisations publish newsletters to quickly and effectively inform their target audience of news about their activities.

The Newsletter serves as a medium to:

- Publicise or promote products and services of the institutions;
- Announce current and forthcoming events like conferences, seminars or workshops; and
- Communicate information about social and cultural activities, personne information,
- appointments, promotions, transfers, retirements, obituaries, etc. of the concerned institution(s).

#### b) Contents

The purpose of a newsletter determines its purpose-based content. Different newsletter formats contain a range of information. One such example is the International Sorghum and Millet Newsletter by ICRISAT, which provides information about the organization's programmes, grants and fellowships, awards and rewards, upcoming conferences, seminars, and workshops, as well as news from research institutions, reports on seminars, conferences, and other events, as well as technical and scientific articles (International Crops Research Institute for Semi-Arid Tropics). Associations publish newsletters that include the president's reports and remarks, association announcements, job and personnel news, and other news of interest to the membership, such as the IASLIC Newsletter from the Association of Special Libraries and Information Centers. Industrial businesses can publish two different sorts of newsletters, one for internal distribution and the other for external distribution. The newsletter intended for external distribution includes information on new goods and services, celebrates organisational successes, and announces consumer discounts and perks, among other things. While the one intended for internal distribution includes news about the staff, such as promotions, transfers, weddings, etc., announcements of welfare measures for the staff, social and cultural activities of the staff, including sports, etc., and occasionally wellliked articles, short stories, jokes, etc. by the staff.

#### c) Electronic Newsletters

Electronic newsletters are those that are published and distributed electronically using computer networks. E-newsletters first appeared in the 1990s and have since become widely

available. People who willingly subscribe to them online receive these through email. Initially, web page links were included in e-newsletters as a way for website owners to entice readers to visit their pages. However, a number of studies on the use of e-newsletters revealed that readers preferred to access material through their email accounts rather than websites. Thus, e-newsletters developed into whole magazines with a wealth of content. Businesses and professionals are increasingly using e-newsletters to market their goods because they think these advertisements are more effective and more precisely targeted than banner ads. The Association of Research Libraries (ARL), through its yearly "Directory of Electronic Journals. Newsletters. and Academic Discussion Lists" (http://www.arl.org/scomm/edir/archive.html), tracked the expansion of electronic publications from 1991 to 2001. This directory projected the continuous dominance of Internet publishing for scholarly as well as business communication and demonstrated the incredible rise of e-serials over this ten-year period.

## d) Benefits of e-mail Newsletters:

- Email newsletters are practical and can be sent right to a user's information desk.
- Email newsletters provide timely information and real-time delivery as features.
- Email newsletters keep readers up to date and informed; and
- Email newsletters receive a lot of emotional reactions from users. As they arrive in their inboxes, users engage with them frequently. On occasion, if they find them worthwhile, they may send them to colleagues or co-workers.

# **1.4 HOUSE JOURNALS**

An industrial, commercial, public service, or other comparable organisation may publish a house newspaper on a regular basis to inform the public about its operations and management style. It also acts as a tool for gauging audience opinion and response to performances. The people who have social control over an organisation are its members of staff, clients, distributors, retailers of its goods, shareholders, and the government. The house journal is a type of promotional literature since it aims to advertise and promote the organization's goods and services or to project and improve the parent company's image to its clients or staff. The home journal serves the following purposes:

- Enhance business and labour relations
- Keep consumers and staff in mind
- Act as a helpful forum for expressing management's viewpoints
- Promote and improve the organization's and the management's reputations among its clients and employees;
- Offer a news service that is impartial.

#### a) History of House Journals

Household notebooks date back to the Chinese Han Dynasty circa 200 B.C. These internal messages were sent out to update the court. The Tang Dynasty in the seventeenth century saw them develop into official gazettes, and they were the forerunners of modern home journals. The NCR Factory News, the first corporate-sponsored internal journal in the United States, was started in 1887 by National Cash Register Co. President John H Patterson. NCR World is the still the name under which it is printed. For his publication, Patterson was the first to adopt the term "house organ."

The Travelers Record, published on March 1, 1865, by Travelers Insurance Companies in Hartford, Connecticut, was the first recognised external house newspaper. Even though the name and substance of this publication have changed numerous times, it still exists today. In 1965, this external house journal—now known as "Protection"—celebrated its 100th birthday.

The Planters Chronicle, the first domestic periodical in India, was produced in 1905 by the United Planters Association of Southern India. The house journal industry has been growing in three ways at once: increasing readership, adding pages, and releasing new publications for the sponsoring organization's particular interest groups. The house journals currently represent various special interest organisations such as business, industry, labour unions, universities, colleges, or fraternities.

#### b) Categories of House Journals

House journals can be divided into three main groups: internal, external, and both. In contrast to the external house journal, which is distributed to current and future consumers of the organisation, the internal house journal is published for employees or members of the organisation. Combination periodicals try to accomplish both.

#### i) Internal House Journal

An internal house diary is published for the organization's staff and is only intended for internal usage. Its main objective is to tell the organization's employees about the welfare policies and the care that the company has for them. Additionally, it strives to give employees a platform to voice their opinions and complaints. As a result, it provides a platform for two-way communication, supporting an organization's healthy growth. The company also emphasises in the internal house newspaper that the management genuinely cares about the welfare of its workers.

#### ii) External House Journal

The external house journals are created for current or potential clients of an organisation and are circulated outside the company. They can be further generally divided into three categories based on their contents:

• The first type is an academic journal, which is essentially identical to a typical technical journal in every way.

• The publication falls within the second category. This provides broad information that isn't technical as well as information about the company's products without going into technical details.

• The periodical catalogue, which resembles a commerce catalogue, is the third category. This differs significantly from a trade catalogue in that it is published on a regular basis under the same title, much like a periodical publication.

#### c) Characteristics of House Journals

The following are some frequent traits of home journals:

- They are created by the sponsoring organisation to improve its reputation and to market its goods and services;
- The majority of the time, potential clients and workers receive them for free;
- The sponsoring organisation budgets money to provide financial assistance;
- They are produced on fine art paper and are typically colourful and appealing; They contain no advertisements other than those for the sponsoring organisation.

# **IN-TEXT QUESTIONS**

- 1) How many categories of House Journals arethere?.....
- 2) Trend report provides the information on.....
- 3) Who gave the statement "Trend Report is an exposition of a subject"
- 4) Information products helps in.....

# 1.5 TRADE AND PRODUCT

Publishers, producers, and distributors of various materials, goods, or services produce trade and product bulletins as informational products. The trade and product bulletins essentially cover every type of material, product, or service, from books, medications, chemicals, household items, to incredibly complex technology and equipment used in research and industry. The main objective of this kind of trade literature is to describe

numerous characteristics of the good, material, or service and encourage potential buyers to buy it. Trade catalogues are another name for them.

#### a) History of Trade Catalogues

Booklists given out by booksellers were the first trade catalogues. It is thought that the first book catalogue was published in 1564 by George Willer, an Ausburg bookseller. There were 256 books in this topic list. After that, bookshops in England and other European nations began to publish book catalogues. The next step was the release of drug catalogues by chemists and druggists. John Tweedy of Newport published the first American drug catalogue in 1760, and John Day and Company followed suit in 1771. Metal producers in Birmingham and Sheffield created illustrated product catalogues in the 1780s and sent them to their representatives in France, Italy, America, and maybe in India and Russia. The manufacturer's name was not given in previous British trade catalogues, forcing clients to buy the goods through intermediaries. American trade catalogues, on the other hand, included the name of the producer to make it easier to order directly from the manufacturer. Trade catalogues have multiplied and expanded greatly along with industry growth. An annotated guide to early American trade catalogues is available in Lawrence B. Romaine's book A Guide to American Trade Catalogs, ISBN 17441900.

#### b) Characteristics of Trade and Product Bulletins

Trade and product bulletins come in a wide range of formats, sizes, types, and informational content. It can be as simple as a brief advertisement in a magazine or booklet introducing a single product or as complex as a multivolume work outlining thousands of products from a single manufacturer or a large number of manufacturers. Editors frequently mark product advertisements as "Advertisement" to distinguish them from the feature pieces because some of them seem exactly like magazine articles. As an illustration, consider some of the adverts in Reader's Digest.

#### Trade and product bulletins typically have the following general traits:

- With the exception of trade literature detailing medications and sophisticated scientific equipment, they typically offer application-oriented descriptive material and do not provide theoretical specifics of the study leading to the development of the product. In trade and product bulletins for pharmaceuticals or scientific equipment, a concise summary of the pertinent underlying research is frequently presented, often accompanied by charts, graphs, equations, and literature references.
- Trade bulletins are primary sources where details about a method or product are revealed before they are revealed in any other form of literature. In fact, a large portion of the

information presented regarding a particular commercial product is unlikely to be published in any other form of literature.

- Because new goods and processes are continually being produced and existing ones improved, a lot of the information contained in these newsletters soon becomes outdated.
- These publications are typically given away without charge. Manufacturers' trade catalogues are not dated.
- The amount of information offered for products or processes varies significantly, from simple announcements to in-depth descriptions of the respective items.

# c) The type of information usually covered is as follows:

- Background information on the business;
- Background investigation leading to product creation;
- Product details, usage, functional specifications, etc;
- Information on setup, use, and maintenance;
- Illustrations, such as pictures, plans, circuit diagrams, etc.;
- The names and addresses of the distributors and agents;
- Recommendation letters or testimonials from pleased clients; and
- The item's price is often excluded.

# d) Functions of Trade and Product Bulletins

Trade and product bulletins are generally released to encourage sales, but they are also a vital source of information for specialised users including scientists, engineers, technologists, chemists, and healthcare professionals.

# **Bulletins on Trade and Products:**

- Give technologists the most recent information about industrial items and assist them in determining whether or not a particular piece of equipment, machine component, or product is on the market.
- Assist the technologists in comparing comparable items made by different manufacturers and choose the best option.
- Make it simple to find the names and addresses of industrial product manufacturers and distributors.
- Act as a vital conduit for communication among manufacturers, dealers, and customers.
- The articles in these bulletins have a wider audience since they include vibrant graphics, charts, and graphs.

• Back issues of these journals are a valuable resource for those researching industrial archaeology, corporate history, and technological history..

#### e) Trade Literature Resources

There are several places to find trade literature. the following are the primary sources:

- Ads and announcements in trade publications and technical journals.
- Journal special issues and supplements.
- Product catalogues, home magazines, and newsletters.
- Product information provided during trade shows.
- Business, product, and industry directories.
- Online business portals and company websites.

# **1.6 REVIEWS AND RELATED PUBLICATIONS**

Any discipline's primary literature is made up of an ever-growing number of journal articles, reports, dissertations, conference papers, and other primary literature pieces that have been dispersed around the globe in various languages and formats. By methodically indexing or summarising (in the case of abstracting services) items published in primary sources and arranging them in a helpful order for identification and location of individual items, abstracting and indexing services, catalogues, and bibliographies provide bibliographical control of the primary literature. It has been noted that as primary literature has expanded, so too has the volume of indexing and abstracting services. It's getting harder and harder to even use these gadgets to scan a subject's literature. Additionally, these services present each item with complete bibliographical information separately, disconnected from items, except it is placed along with other similar items, through subject grouping or system of classification

#### a) Characteristics

Most reviews share three crucial qualities, which are more or less universal. Integration, assessment, and compaction of primary literature are the first three. A review article, as opposed to an annotated bibliography or an abstracting journal, integrates each of the articles evaluated with the body of current knowledge in the topic. One crucial feature of a review is some level of appraisal. Some reviews—like critical reviews—are primarily and clearly evaluative in nature, whilst others—like a descriptive review—only hint at judgement in passing. A review should have compaction as a key component. The average number of references referenced per page of text in the review or the proportion of primary documents' pages to the review document's pages can both be used to estimate this. The degree of compaction varies between review articles and lengthy treatises, as well as from field to field within a single field. Only significant contributions with complete bibliographical details are

brought to the reader's notice after a review has sorted, evaluated, and placed each significant contribution into its right context. This eliminates a substantial volume of primary material. Reviews are shown to be more effective in transmitting ideas and knowledge than research papers because the information they convey is examined, assessed, and related to the broader body of knowledge by a third party. Reviews do not present any original research findings. Reviews are secondary sources of information because they draw their information from primary sources found in other publications. Reviews hold a key position among the numerous information items. They are frequently regarded as the highest level of information processing on an intellectual level. Reviews in this context are "critical," "evaluative," as opposed to simple summaries, annotated bibliographies, factual reports, or book reviews.

#### **IN-TEXT QUESTIONS**

#### **b)** Types and Functions

In general, two types of reviews can be distinguished:

i) Bibliographic; and

ii) Instructional.

The first type of reviews focuses on choosing and analysing primary material that has been written on a subject or topic within a certain time frame (e.g. annually, biannually or five yearly, etc.). The second category of evaluations focuses on a specific technical or scientific issue and offers a solution. Numerous reviews integrate the bibliographic and educational functions into one; the percentage varies depending on the review's goal and target audience.

#### **Reviews perform two major functions:**

- i) Historical or subject related functions; and
- ii) Contemporary or user related functions.

Historical functions relate to the development of a subject or a topic. These functions are as follows:

- A professional assessment of the material that has been published and the selection of the works that merit preservation.
- Gathering data from diverse sources and placing it in the correct context.
- Compaction of existing knowledge, or the removal of previously known information in favour of solely extracting new information from a variety of sources.
- The substitution of one document for numerous dispersed ones. sometimes serving as the written record in place of the original documents.
- Suggestions for additional investigation. Reviews identify topics for more research by critically analysing the state-of-the-art in a subject or topic.
- Determination of a new discipline. Reviews that include a variety of works may reveal the emergence of a new field.

Contemporary or user related functions of reviews, are functions which are beneficial to individual user. These functions are as follows:

- Current Awareness Function: Assists people in staying current on events in their own field of study or a related one without having to sift through a tonne of primary source literature.
- Informed Notification Function: In reviews, the most important contributions are highlighted along with complete bibliographical information.
- Support for additional literature searches: Reviews with rich bibliographies can be used as a jumping off point for more recent material that hasn't yet been addressed in reviews.
- Tutorial Function: Reviews help students learn new concepts and professionals and researchers continue their education and get a general understanding of a subject outside of their area of expertise.Inspiration: Reviews provide ideas and suggestions for further research work.
- Comments: Reviews give an indication of a researcher's own published work because each primary source is assessed and chosen for inclusion in the review by a subject matter expert.
- Encourage Cross-Fertilization of Ideas: Reviews in a specialist's related fields of study encourage the cross-fertilization of ideas and the development of new fields of study.

# **1.7 STATE-OF-THE ART REPORTS**

These are the reviews that lack the broad scope and historical perspective that are typical of regular "critical" reviews. Their primary goal is to represent the current and most recent state of a situation, which may involve a technology, its application or its effects, etc. These

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impartial reports serve primarily as a tool for current awareness and are more timely than traditional reviews. Modern reports are frequently produced as informal reports that are created on demand, targeted at a small audience, and sold for a premium price in order to acquire this currency. These reports quickly become outdated.

The majority of the cutting-edge reports are generated in the business and commerce domains and on technological subjects.

#### a) State-of-the-Art of a Technology

These reports summarise, contrast, and assess the developments, properties, and/or application of a certain technology, technological product, or technological process. Depending on the users and the intended purpose, the breadth and emphasis vary. These publications typically focus on a technology's advantages over others.

**Technical and Engineering aspects:** focused on technical professionals in general and engineers in particular. These reports outline the new technology's technical specifications. Such reports are helpful for a number of objectives, including technology design, providing purchase recommendations, comparing uses with those of alternative technologies, and staying current with technology.

**Use aspects:** geared toward a technology's users. These publications focus on the properties, prerequisites, and usage economics of a certain technology. It provides details about a certain technology's relative dependability, durability, operating circumstances, etc.

**Management aspects:** geared toward decision-makers at a higher level, such as government representatives, planners, members of special delegations, and those in charge of allocating funds for a particular technology. Such papers focus on the impact (social, environmental, economic, etc.), strategic requirements, political concerns, global issues, experiences of other nations in the application of technology in comparable circumstances, etc.

# **1.8 STATISTICAL REVIEWS**

In these reviews, statistical correlations are shown over a wide range of technological, financial, demographic, and other fields. Such evaluations are explicitly written and assessed to demonstrate the interdependence of trends, circumstances, and outcomes. These reviews may be published independently or in conjunction with any of the state-of-the-art reports described above. Decision-makers are typically briefed using these data reports.

#### a) Methods of Evaluation

Determining the intrinsic value, authenticity, and dependability of the information sources chosen for consolidation as well as the IAC product itself are all part of the review

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process. It is impossible to specify a single set of criteria for the selection of sources for information consolidation that covers all types of products for all types of users. Different IAC products with various purposes call for various requirements. On the other hand, the selection of information sources for information consolidation as well as the evaluation of IAC products can be done here using commonly accepted criteria that are used to assess the merits of a scientific publication. These criteria are:

- Selecting peer reviewed publications; and
- User evaluation of information services.

**Criteria in peer review** Scientific and technological publications have long been used to evaluate excellent work and reject work with little or no merit. The selection of S&T sources for information aggregation can be done using an adaptation of these criteria. User evaluations of information services are the other requirement. These standards can be used to identify and assess information consolidation products that are already on the market. There are five basic kinds of criteria that users use to assess information services, according to a number of user studies. These are as follows:

- i) Quality of Information, including Information precision and accuracy. Availability of reliable sources newness of the information.
- **ii)** Scope of the Service/Product, including accuracy of the information. covering of a subject or issue in its entirety.
- iii) Appropriateness of Information, including
  - satisfying the demand for information
  - addressing the issue of information overload.
  - Adapting to the language and intelligence levels that the consumers themselves can handle.
  - The service or product's level of opinions and unnecessary, irrelevant information.
- iv) Ease of Access of Service/Product, including
  - Receiving the service takes time.
  - Usability of the information received, or the service's or product's format.
  - It took work to receive a response.
  - Support is given for using and accessing the service or product.

#### v) Cost of the Service/Product, including

• The price paid directly for the service.

- Indirect costs associated with using and accessing the service as well as information post-processing.
- Due of reviews' dual, historical and educational responsibilities, particular evaluation criteria must be used in addition to the generic evaluation criteria indicated above. These criteria are as follows:
- **Completeness:** The extent to which the topic is addressed in both the subject's literature and other sources.
- **Perspective:** The degree of suitability for both a particular subject and a particular audience.
- Analysis: The analysis's thoroughness, depth, and scope; the extent to which information from various sources has been compiled, and the extent to which analysis has been evaluated.
- **Synthesis:** The extent of replacing earlier information and literature on the issue, the degree of evaluation used in synthesis, the degree of compaction and links drawn
- Value added: Identification of developing specialties, the presentation of fresh theories or hypotheses, and recommendations for future research, etc.
- **Utility:** The extent to which a review can fulfil the aforementioned various purposes.

# **1.9 TREND REPORTS**

Trend reports offer a methodical overview of recent advancements and ongoing research trends in a field of study. The goal of trend reports is to succinctly summarise the key trends in a certain field of study using an analysis of literature on the subject published during a specific time period, ranging from two to five years or more. IAC's trend reports are a very helpful tool for decision-makers and subject specialists. These papers also give students and researchers a place to start as they look for new areas of research to pursue. The definition of a trend report is given by Gopinath as follows: "A trend report is an exposition of a subject, giving an account of the general direction of research in the field, based on a review of the papers on current developments. The trend report service is intended to aid the specialised reader in making the most of his time and in maintaining the potential for future research. A documentalist's training prepares him to do this service successfully. However, it is essential that the experts work together.

# Need

- Trend reports give a broad overview of the most recent advancements and research trends in a specific field of study. Trend reports are useful:
- Researchers should stay current on new advancements in their field of study, identify new areas for research, and use their time and energy more effectively;
- Those who organise events, make decisions, and receive funds for study; and

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• Students should choose a topic for research.

The work involved in the preparation of trend report can be demarcated into three planes of work namely:

i) The Idea Planeii) The Verbal Planeiii) The Notational Plane

# 1) The work in Idea Plane involves:

- A detailed description of the topic, breadth, and duration of coverage, as well as the categories of documents to be covered;
- Gathering pertinent information from sources;
- Evaluation of the sources of information;
- Recognizing and extracting the key messages that information sources communicate;
- Organization of the information that was extracted into a useful order; and
- Incorporating the retrieved data into a text that is organised.

# 2) The work in the Verbal Plane involves:

• The use of vocabulary devoid of homonyms and synonyms; and

• Other elements that affect how thoughts are expressed in a language.

# 3) The work in the Notational Plane involves:

- Preserving the logical order in which ideas were reached in the Idea Plane, and for this reason;
- Creation and application of a notational system to organise the text.

The users for whom the product is intended will determine the optimal order, nevertheless. The text and language utilised should be tailored to the concerned users' intellectual capacity, comprehension, and needs.

# A trend report as a final product contains:

- Title page;
- Content page;
- concise informative abstract;
- chapter-by-chapter text body;
- Expressive index;

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- Bibliography of references; and
- An appendix, with a glossary of technical words are all included..

# **1.10 TECHNICAL DIGESTS**

Any industry's development depends on having access to the most recent marketing, commercial, and technological information. To stay current with new developments and to address technical issues related to the operation and management of an industrial organisation, industry personnel need information about new goods, machinery, production processes, management approaches, etc. However, technical workers and industry executives find it challenging to keep up with the most recent advancements in product designs, manufacturing processes, management techniques, etc. in their area of interest due to the exponential growth and proliferation of S&T literature in a variety of sources. Technical digest service is offered to satisfy their information needs. An information service called Technical Digest analyses, rates, compiles, and disseminates the most recent technical information to managerial, technical and operator level personnel in the industry.

## a) Definition and Meaning

A digest is defined as "to condense a work of literature or a body of information into a brief summary form, including the vital heart of the topic" in Webster's Dictionary."

A digest is a written work that has been carefully condensed, frequently by someone other than the original author. In general, it is longer than the synopsis and occasionally includes headers and subheadings for ease of rapid reference. Guha asserts that a digest is essentially a more thorough representation of a text, rewritten for a reason or to satisfy the needs of a new group of individuals, but intended to serve as a full replacement for the original material. Digests are typically periodicals that compile works from a variety of sources and arrange them in a logical sequence.

A digest can be created on demand and tailored to a specific topic, or it can be published often at regular intervals or in advance of demand.

The words "compendium" and/or "epitome" are interchangeable with the word "digest." The definition of the digest is thus "Body of knowledge or written material, incorporating information consolidation via condensation." It is a collection of data that was compiled from many sources, organised methodically and systematically, and categorised under headings and subheadings. It is prepared either on demand or in advance for easy access, with a subject range that includes anything from literature to science and technology."

The only difference between a technical digest and a digest is the topic matter. Technical digests typically cover topics related to science, technology, and management. Technical

digests are a result of the condensation process, claims Guha. It serves an accretion purpose. It may be addressed to different user groups, such as managers, technicians, operators, etc."

## b) Need and Functions

Technical digests are valuable informational resources for managerial and technical industry personnel. Managers and technical staff in industries can learn about technical expertise and other material that is useful for their work by reading technical digests.

Different forms of information are needed by various industrial worker classifications. Technical, commercial, and marketing knowledge that is focused on the product is needed by managerial staff. A good technical digest not only helps the management make decisions faster, but it also saves time.

Technical employees and operators need knowledge about new concepts and procedures that can aid them in their day-to-day work. Technical digests targeted at this user group to successfully fill their information needs.

## **Technical digests serve following functions:**

- Keep all employees, regardless of level, up to date with new advancements in their fields.
- To keep them informed of current advancements in their fields of expertise, provide timely, reliable information.
- The dissemination of cutting-edge technical knowledge; and
- Acting as a productive conduit between research and production facilities.

#### Categories

The following degrees of industry workers are taken into consideration when creating various sorts of digests:

- Top Management
- Middle/Supervisory Management
- Operator Level Personnel

The digest for top management should cover information on the following topics:

- Corporate Management/Planning
- Finance
- Production
- Research and Development
- Personnel
- Sales
- Public Relations
- External Regulations

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Digests for middle/supervisory management should contain information, which can help them in:

- Maximising the use of installed capacity;
- New production methods/techniques that may increase the usage of labourers and facilities for production in order to increase output;
- Decision-making and problem-solving.

Digests for workers/operators should contain information, which they can easily understand and put to use. Digests for workers/operators should help them in:

- Solving routine technological issues;
- A simulation of the modernization of current industrial processes and methods;
- Little adjustments to production/processing methods that result in significant industry savings; and
- Automation of current work

## **IN-TEXT QUESTIONS**

9) First Trade Catalogues was published by.....10) The information product that provides an exposition of a subject, giving an account of the general direction of research in the subject, based on a review of the documents on current developments is

.....

11) Trend Report is useful for which category of the users......12) Which information product information on new products, machinery, manufacturing processes, management techniques,

etc.....

# 1.11 SUMMARY

This lesson describes information products for the target audience, such as newsletters, house journals, trade and product bulletins published by commercial, industrial, government, or similar organisations. Additionally, it provides a brief overview of the background, purposes, varieties, and traits of house journals, trade, and product bulletins, as well as newsletters. The communication patterns of industrial and commercial organisations have evolved as a result of developments in computer and telecommunication technologies, as this Unit demonstrates. It briefly outlines how these organisations are advertising themselves using digital information products including e-newsletters, company websites, and online shops.

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It has been noted that the non-use or relatively low use of existing literature in the fields of science and technology, health, business, education, and related fields is not only due to the excess of literature and dispersal of information across sources, but also because the information contained in them is not packaged in a way that is useful to the various groups of users. Users with varying skill levels need relevant information that they can quickly understand, process, and use with a certain level of assurance and dependability within the confines of their working environment. In other words, customers need compiled data that is packaged in a format they can utilise right away. IAC has released a variety of products in response to this requirement. Some of these IAC products are intended for specialists like scientists, engineers, government representatives, planners and policy makers, managers in business and industry, etc.; whilst others are intended for a wider population like farmers, labourers, technicians, etc. We covered four specialist-focused IAC products in this unit, including Reviews, State-of-the-Art Reports, Trend Reports, and Technical Digests. This unit explains the requirements, features, and purposes of these products; lists the fundamental procedures involved in their production; and covers how to assess and provide successful customer support for these products to the intended audience.

## **1.12 ANSWERS TO IN-TEXT QUESTIONS**

- 1 Three
- 2 Recent developments and current research trends in a subject field
- 3 Gopinath
- 4 Delivering the material for the target audience
- 5 Corantos
- 6 News Letter
- 7 1990
- 8 John H Patterson
- 9 George Willer
- 10 Trend Reports
- 11 Special group of readers
- 12 Technical Digests

# **1.13 SELF-ASSESSMENT QUESTIONS**

1. What exactly is an online newsletter? What makes it superior than a print newsletter?

2.Differentiate between the internal and external home journals and describe their respective purposes.

3. What are the functions of trade and product

4.Describe what you mean by consolidated information. Describe the values and advantages of information consolidation.

5. Recognize the differences between reviews, cutting-edge reports, and trend reports.

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# **UNITT-1 FUNDAMENTALS OF UDC**

**LESSON 1** 

# TITLE OF THE LESSON

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# STRUCTURE

1.1 Learning Objectives

## 1.2Introduction

- 1.3 Genesis and Development of UDC
- 1.3.1 Development of UDC(1919-1975)
- 1.3.2 Other Editions
- 1.3.3 Universal Decimal Classification Complete Edition
- 1.3.4 Main Features
- 1.4 Structure of UDC
- 1.4.1 Organization of Main Tables
- 1.4.2 Types of the Tables
- 1.4.3 Common Auxiliaries
- 1.4.4 Special Auxiliaries
- 1.4.5 Citation Order
- 1.4.6 FilingOrder
- 1.4.7 Notation and Layout
- 1.4.8 QualitiesofNotationusedinUDC
- 1.4.9 Alphabetical Index
- 1.4.10 Application in Automated System
- 1.5 Classification of Simple Documents
- 1.6 Classification of Compound Documents
- 1.6.1 Plus Sign (+)
- 1.6.2 Extension Sign (/)
- 1.7 Summary
- 1.8 Glossary
- 1.9 Answers to In-text Questions
- 1.10 Self-Assessment Questions / Titles

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1.11 References

1.12Suggested Readings

# **1.1 LEARNING OBJECTIVES**

This lesson introduces you to genesis and development of UDC and some examples of simple and compound documents with their appropriate class number.

After studying this lesson, you should be able to know about:

- Basic / fundamental knowledge about UDC
- Genesis and development of UDC
- Its structure, principles and organization; and
- How to prepare the class number for simple and compound documents.

# **1.2 INTRODUCTION**

Classification of knowledge is very important especially in the age ofknowledge explosion and electronic environment. Knowledge is growing at anexponential rate and without organizing the knowledge, it is very difficult to makeuse of that knowledge. Classification is the only technique to organize knowledgesystematically.Inotherwords, classificationisatechniqueforsystematicarrange mentofknowledge.Classificationisnecessarytounderstandvarioussubjectsintheirproperp erspectiveandtocorrelateonesubjectwiththeotherinso for as their proximity is concerned, library classification in as essence hasdrawn many of its principles from various philosophical schemes. However, thephysical nature of books, and the purpose the classification supposed is to serve inlibrariesnecessitatedcertainadjustment.AsSayersviews"thefoundationoflibraryisthebo ok, the foundation of librarian ship is classification. It is not possible torun a library without classification. Library classification is not an end. It is only a means to an end.

Theuniversaldecimalclassification(UDC)istheworld'sforemostmultilingualclass ificationschemeforallfieldsofknowledge, asophisticated indexing and retrieval tool. It was adapted by Paul Otletand Nobel prize winner Henri LaFontaine from the Decimal Classification of Melvil Dewey, and first published (inFrench) between 1905 and 1907. Since then, it has been extensively revised and developed, and has become a highly flexible and effective system for organizing bibliographic records for all kinds of finformation in any medium (it is wells uited to multi-media information collections). It is structured in such a way that new developed, and new fields of knowledge can be readily incorporated. The code itself is independent of any language or script (consisting of Arabic numerals and common

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punctuation marks), and the accompanying class descriptions haveappeared in many translated versions, UDC is in worldwide use, and has beenpublishedinwholeorinpartin40differentlanguages.

UDC is used in bibliographic services, documentation centers and librariesin around 130 countries world-wide. Library collections indexed by UDC can befoundinlibraryOPACs and databases. The international federation for information and documentation (FID) managed UDC from its creation around 1900 until the1980s when it became clear that а more broadly based and financially autonomousorganization was needed to administer and exploit UDC. FID, together with thepublishers of the Dutch, English, French, Japanese and Spanish editions, becamethefoundermembersofanewbody:theUDCconsortium(UDCC).Theconsortiumass umed ownership of UDC on January 1992. The UDCC appoints the UDCeditorialteamandanadvisoryboardwithinternationalmembership, to oversee the conte ntofUDCandcontributetoitsrevision.

# **1.3 GENESIS AND DEVELOPMENT OF UDC**

UDCclassificationsuseArabicnumeralsandarebasedonthedecimalsystem.Everynumbe risthoughtofasadecimalfractionwiththeinitialdecimalpointomitted,which determines filing order. For ease of reading, a UDC identifier is usuallypunctuated after every third digit. Thus, after 61 "medical sciences" come thesubdivisions611to619;under611"Anatomy"comeitssubdivisions611.1to611.9;under 611.1 come all of its subdivisions before 611.2 occurs, and so on; after 619Comes620.Anadvantageofthissystemisthatitisinfinitelyextensible,andwhennew subdivisions are introduced, they need not disturb the existing allocation ofnumbers.

AllbranchesofhumanknowledgehaveaplaceinUDC andaretreatedasapart of a balanced whole.Becauseofthenatureofthesubjects,thelistedsubdivisions science and technology outweigh those of the arts and social sciences, but thesesubjects demand different criteria, and are also properly provided for. UDC hasbeen modified and extended over many years to cope with the increasing output inall disciplines and is still under continuous review so as to take account of newdevelopments.

The bibliographic enterprise envisaged by Otlet and La-Fontaine, which esulted in the Universal Decimal Classification (UDC) being developed in 1895, and the subsequent history of the scheme is outlined. Relationship with DeweyDecimal Classification (DDC) from which it was derived deteriorated in the early20th enturyand changes infunding, location, and editorship of Duyvis from 1929-1959 had a profound effect on the scheme's development and management. Lloyd, Duyvis's successor, reformed there vision structure, and furthermanagement changes from 1975 to the present day, culminated in the formation of the

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UDCconsortiumin1992.

The Universal Decimal Classification is known by many names such asEuropean Dewey,Brussels Classification, andtheInternational DecimalClassification. Since it was based on the Dewey's System, it was called ExpandedDeweyinthebeginning.Nevertheless,itisthefirsttrulyinternationalclassification designedforbibliographicinformationanddocumentationwork-

allearliersystemswerepurelylibraryclassificationswiththepurposeofshelfarrangement.Th ougharetrievaltool,itisequallyefficientasalibraryclassification,andtoolfororganizingothe r entities and objects. It has become a highly flexible and effective system fororganizingbibliographicrecordsforallkindsofinformationinanymedium,especiallymulti mediapackages.

UDCisageneralclassificationschemeforallfieldsofknowledgeavailablein various languages. All branches of knowledge have a place in UDC, thoughtraditionallyitisconsideredstrongerinscienceandtechnologysubjects. Brief History of UDC

In 1895, some system of classification was required by the then newly established International Institute of Bibliography (IIB). It was rechristened as International Institute for Documentation in 1914; International Federation for Documentation in 1958; and International Federation for Information and Documentation (FID) in 1986. FID was closed in 2000 due to financial failures. Task of the IIB was to compile a universal bibliography, a Repertoire Bibliographique Universal.

It needed a system for arrangement of entries in this universal bibliography- a systematic list of technical literature published anywhere in any subject and language, and since antiquity. This bibliography could only be in a classified orderto transcend the language barrier. By 1921, the IIB had collected 12 million references on cards. Two Belgians, founders of the IIB, Paul Otlet (1868-1944) and Nobel laureate Hernri La Fontaine (1864-1943) sought permission from Melvil Dewey (1851-1931) to use and expand Dewey Decimal Classification (DDC) for arranging items in the bibliography. They then developed an expanded and powerful classification equipped with more details and added synthetic equipment for class- number synthesis for micro documents. They gave dimension, depth, and flexibility to the DDC. It was credited as the first faceted classification, a harbinger of the Colon Classification (CC) in 1933 (though S.R. Ranganathan claimed his classification independent of the UDC). It has proved an apt classification for information analysis and retrieval, especially for highly specific subjects in documentation work.

First edition, based on the 5th edition of DDC (1894), appeared in French

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between 1905-1907 under the title Manual de ReperoireUniversale. It comprised 33,000 classes. The 2nd edition, again in French, Classification Decimal Universale. The 3rd German and 4th English editions were published in 1933 and 1936, respectively. Development of the UDC has been divided into the following four historical periods by Reyward:

French period:foundation and grammar 1895-1933German period:Details and expansion 1933-1952

English period: Research and practice 1936-1975

International period: Technical and organizational 1990-

improvement

The completed English edition, published in numerous small fascicules, took half-a-century to publish because of alleged neglect.

#### 1.3.1Development of UDC (1919-1975):

Throughout the early part of the present century, the classification was closely linked wit htheDeweyDecimalClassification, andDeweyhimself, and subsequently hissonGodFrey, as wellashisassistantDorcasFellows,remainedinclosecontactwith Otlet. Godfrey Dewey and Miss Fellows attended a congress in Geneva in1924, when an attempt was made to reestablish direct concordance between а thenumbersusedinthetwoclassifications.BothDewey's,fatherandson,wereanxiousthat the two schemes should be harmonized but Miss Fellows took the oppositeview. Her influence gradually prevailed and by the 1930s the two schemes weredivergingonseparatepaths.

In the 1920s, the need was felt for additional assistance in the work on the2nd France edition of the classification. DonkerDuyvis of the Dutch Patent OfficebecameSecretaryoftheInternationalCommitteeoftheDecimalClassification,thegov erningbodyfortheschemesetupbyOtletin1921,andheinitiallywasresponsibleforassistingthe developmentofthenaturalsciences.In1929,theOfficeoftheIIBwasmovedfromBrusselstoth eHague;in1931,theInstitutebecametheInternationalInstitute for Documentation (IIB), and in 1937, the International Federation forDocumentation (FID). On relocation in the Netherlands, Duyvis was employed asfull-timeeditoroftheclassification,andremainedinthatofficefrom1929-1959.

ThesecondFrencheditionwaspublishedasClassificationDecimalUniversellein1927-

1933. Work one ditions in German and in English began in 1934, and the German edition was completed in 1953 (Dezimal classifikation 1934-

1953). That in English remains unfinished and now is unlikely to be completed in the light of recent policy discussed below.

The Central Classification Committee originally consisted of the editor of the UDC and the Secretary General of FID. In 1965, as the direct result of 5 | Page



Lloyd'stightening up of procedures, they were joined by representatives of the nationalcommitteesresponsibleforthevariouslanguageeditions, and in this way anetwork was built up through those concerned at national level with specific subjects to their

representatives on the Central committee (Strachan, 1990). Lloyd remained editoruntil his retirement in 1975, by which time the Central Classification Committeehad 25 members and parts of the classification had been published in editions ofvaryingfullnessin22languages.

## **1.3.2 Other Editions**

Throughoutitshistory, it has been made available ineditions of varied details. Till) 1990, there were full, medium, and abridged editions. Full edition comprisedover 2,00,000 terms terms. medium had 60.000 (about 30 per cent of the full) andabridgedhadupto20,000terms(about10percentofthefulledition).Inadditiontotheearlie ravailablefull, medium and abridged editions, abridged and pocketed itions in French, English, a ndSpanishwerepublishedin1998,1999, and 2004, respectively. This format was subsequently publishedinotherlanguages(likeRussianand

Croatian)also.Now,onlystandardprintedversionof67,000terms,thepocketversion(alsopubli shedas'abridged')of4100classesandtheSpanisheditionof20,000areofficiallyavailable.Ane wEnglishpocketeditionisunderwaybytheBritishStandards Institution (BSI), while a multilingual pocket edition to published by the UDCConsortiumis also being.

AstandardversionoftheUDC,containing67,000classes,ismaintainedbythe UDC Consortium and is available in a database format. It is called the UDCMasterReferenceFile(UDC-MRF).Currently,themainlanguageofUDC-

MRFisEnglish,though31,000recordsarealsoavailableinGerman.TheUDCConsortiumhas plans to introduce a German. The UDC Consortium has plan to introduce aGerman translation by 2010, and translation in other languages such as Spanish,French, or Russian also. UDC MRF database was created in 1993 inCDS/ISISsoftware. Since then, UDC database exports (in ISO 2709), and simple text exportshave been distributed to the users in a file format. The UDC Consortium does notpublishordistributetheUDC-MRFinprintedFormat.TheprintedformataswellasCD-ROMorwebeditionscomeonlyasproductsfromdifferentpublisherswhoareeithermembers oftheUDCconsortiumorpay-publishinglicense.

Since1993,therewereanumberofeditionsinvariouslanguagesbothprintedandelectro nic(desktopandonline)

# 1.3.3 UniversalDecimalClassificationCompleteEdition

This is first complete update of UDC in hard copysince 1993. Derived from the Master R efference File (MRF) from the UDC Consortium, this is the newly revised Complete Edition, cont aining all available references and classifications.



UDC complete edition contains over 65,000 entries and comes in twovolumes: Volume1-SystematicTables

- \* Alltentables
- \* Completeauxiliarytables
- \* Summaryoftheclassification

Volume2-AlphabeticalIndex

- \* ProvidesaccesstoUDCtables
- \* EnablesfastaccesstoUDCtablesthroughspeciallyconstructedindexterms
- \* Must be used in conjunction with volume 1

# AbridgedEdition

Formerly known as the Pocket Edition, UDC Abridged Edition contains c.4,100classesandincorporatesmajorchangestotheschemesince1999.Itincludesthenewpr opertiestable(1k-

02)andnewandrevisedclassesformanagement,religion,population,tourism,socialwelfare,e nvironmentstudies,biotechnologyandcinema.

# UDCOnline

TheonlineversionisthecompleteeditionofUDCavailableelectronically, and with ad ditional functionality.

# **1.3.4 Main Features**

UDC is owned, managed, maintained, and distributed by an international consortium of publishers with its headquarters in the Hague. Its editorial team comprises six Associate Editors lead by an Editor-in-Chief and supported by the UDC's Advisory Board of over 20 members. Salient features of UDC are:

- \* UDC is a practical bibliographic classification, truly international in efforts and exposition of contents. It is considered as the first faceted classification and a synthetic classification which is able to specify minute subjects, aspects, formats and their varied viewpoints.
- Ult is the first officially internationally used classification system being published in French, German and English.
- \* Its notation is independent of any language or script, and its translations have appeared in about 39 languages.
- \* It lays more emphasis on subject analysis and document specification.

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- \* Its auxiliary apparatus of relations and synthesis is quite powerful. This makes the UDC a truly multidimensional scheme.
- \* It is more suitable for micro documents, electronic information and information retrieval in online and networked databases, and websites.
- \* Its structure is flexible to accommodate new subjects and change citation order for flexibility of shelf arrangement and searching.

## **1.3.5 Structure of UDC**

UDCisstructuredaccordingtotraditionaldisciplinesofstudy butishighlyflexible to all revision with development one for constant to keep pace ofknowledge.TheUDCMasterReferenceFile(MRF)isupdatedyearly.UDCmostininnovat iveandinfluentialfeatureisitsabilitytoexpressnotjustsimplesubjectsbutrelations between subjects. This facility in added to a hierarchic structure, in whichknowledge is divided into ten classes. then each class subdivided into its in logicalparts, each subdivision is further subdivided and soon.

The original framework setup by Dewey had, for copy right reasons, to apart from the empty bemaintained and even today, class 4. the firstthousandsubdivisionsofthetwoclassificationschemesremaincomparable.But the scheme as expanded and given added facility to combine any two numbersby using the colon. This was the great step Forword. For the first time it becamepossible to express facets of a subject other than those that recur commonly across the whole of without enumerating the compound concept within the structure of the classification. In other words, simple concepts could be identified intellectually, verball rotationally, permitting the combination of compounds v, and as required and without the need for their beings et out with the table of the classification.

#### **1.3.6 Organization of Main Tables**

In this scheme of classification universe of knowledge is taken as a subdivided into 10 divisions. These divisions in similar to the Dewey's scheme. Each of the 10 divisions are further subdivided. The 10 divisions are numbered 0-9 except 4, which class is presently vacant. Originally class 4 was allotted for linguistics and now linguistics is grouped under class 8 by leaving 4 blanks. The main tables in the UDC are as:

#### **0**GeneralitiesMetaphysics

- .2 Religion.Theology
- .3 SocialScience.Law.Governmentetc
- .4 Philology.Linguistics.Languages(Vacant)

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- .5 MathematicsandNaturalSciences
- .6 AppliedSciences.Medicine.Technology
- .7 TheArts.Reaerations.Entertainment.Sports
- .8 Literature.Bells-Letters
- .9 Geography.Biography.History

Eachmainclassisdividedintoagain10divisionsas:

00

Prolegomena.Fundamentalsofknowledgeandculture001The scienceandknowledgeingeneral

- 02 Documentation
- 03 Semiotics,Syntactic,Semantics,Writing,Scripts,Notations, Sprandsymbols.
- 004 -----

005 Organization Study. Methodology, Analysis and systematization Generally

006

- 07 ActivityandOrganizing
- 08 Civilization, Culture,

Progress009TheHumanities.

Again, divided into 10 subdivisions as:

- 01 Prolegomena. Fundamentals of Knowledge andculture
- 01Bibliography.Catalogue
- 02 Libraries.Librarianship
- 03 Encyclopaedias.Dictionaries.ReferenceBooks
- 04 CollectionsofEssays.Offprints.Reprints.Pamphlets,Brochure
- 05 Periodicals, Reviews
- 06 Organizations Associations. Congress. Museums
- 07 Newspapers.Journalism
- 08 Polygraphies.Collectiveworks.Varia
- 09 Manuscripts.RareandRemarkableworks

A dot has been put after the third digit. In fact, a dot in put after everythirddigitofthesamefacte.g.

022librarysiteandpremises.

- .1 Site
- .2 Buildingmaterials, protections

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f Delhi



- .3 Planningingeneral
- .4 Storagespace, shelving stacks
- .5 Readingroom.Roomsforstudy
- .6 Spaceforadministrativeandaccessoryservices
- .7 Lighting
- .8 Heatingandventilation
- .9 Variousfixturesandfittings

#### OtherExamples

This is an other example of putting the dot after three digits in each step under same facet.

- 159.9 Psychology
- 159.95 HigherMentalProcesses
- 159.952 Attentionandinattention, concentration
  - .1 Conditioningfactors
  - .2 Varietiesofattention
  - .3 Physicalreactions
  - .4 Clearnessandstrengthofattention
  - .5 Scopeandduration
  - .6 Acquiredinattention,Failureofconcentrate

# 1.3.7 Types of the Tables

TherearetwokindsoftablesinUDC:

(i) The main tables, these contain the outline of the various disciplines ofknowledge, arranged in 10 classes and hierarchically divided. They arenumberedfrom0to9.Thistableiscalledschedules.

 (ii) Auxiliarytablesincludingcertainauxiliarysigns.Thesignsareusedtolinktwoormore numbers.Theenumerativetabledenoterecurrentcharacteristics,applicableoveraran geofsubjectstheauxiliaryissimplyaddedattheendofthe number for the subject. These tables are also called common auxiliariestables.

#### **OGeneralities**

- 000 Computerscience, knowledge&systems
- 001 Scienceandknowledgeingeneral
- 002 Documentation. Books. Writings. Authorship

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- 003 Semiotics, SyntacticsSemantics.Writing
- 004 Computerscienceandtechnology.Computing
- 005 Organization Study.MethodologyManagement(Revisionfrom2001)
- 006 Standardizationofproducts, operations, weights, measures and time
- 007 Activityandorganizing.Information. arsity of Delhi Communicationandcontroltheorygenerally(cybernetics)
- 008 Civilization.Culture.Progress
- 009 Humanities.Artssubjectsingeneral
- 010 **Bibliographies**
- 020 Libraryandinformationsciences
- 030 Encyclopedias&booksoffacts
- 040 [Unassigned]
- Magazines, journals, periodicals&serials 050
- 060 Associationsandorganizations&museums
- 070 Newsmedia, journalism, Massmedia&publishing
- 080 **O**uotations
- 090 Manuscripts&rarebooks

## **Philosophy**

100 Philosophy

- 110 Metaphysics
- 120 Epistemology
- 130 Parapsychology
- Philosophicalschoolsofthought 140
- 159.9 Psychology

# **1** Religion. Theology

- 21 NaturalTheology
- 22 HolyScripture.TheBible
- 23 DogmaticTheology
- 24 TheReligiousLife.PracticalTheology
- 25 PastoralTheology
- 26 TheChristianChurchingeneral
- 27 GeneralhistoryofChristianChurch
- 28 ChristianChurchesorworshipingbodies

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## **2** Social Sciences

- 300 Socialsciences, sociology&anthropology
- 310 **Statistics**
- 320 Politicalscience
- 330 **Economics**
- 340 Law
- 350 Publicadministration&militaryscience
- 360 Socialproblems&socialservices
- 370 Education
- orsity 380 Commerce, communications & transportation
- 390 Customs, etiquette & folklore

## **MathematicsandNaturalSciences**

- 500 Science
- 510 Mathematics
  - Fundamentalandgeneralconsiderationofmathematics 510
  - 511 Numbertheory
  - 512 Algebra
  - 514 Geometry
  - 515.1 Topology
  - 517 Analysis
  - 519.1 Combinatorialanalysis.Graphtheory
- 520 Astronomy
- 530 Physics
  - 531 Generalmechanics. Mechanicsofsolidrigidbodies
  - 532 Fluidmechanicsingeneral.Mechanicsofliquids(hydro mechanics)
  - 533 Mechanicsofgases.Aeromechanics.Plasmaphysics
  - 534 Vibrations.Acoustics
  - 535 Optics
  - 536 Heat.Thermodynamics
  - 537 Electricity.Magnetism.Electromagnetism
  - 539 Physicalnatureofmatter

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- 540 Chemistry
  - 542 Practicallaboratorychemistry
  - 543 Analyticalchemistry
  - 544 Physicalchemistry
  - 546 Inorganicchemistry
  - 547 Organicchemistry
  - 548 Crystallography
- 550 Earthsciences&geology
- 560 Fossils&prehistoriclife
- 570 Lifesciences; biology
- 580 Botany
- 590 Zoology

## AppliedSciences.Medicine.Technology

- 600 Technology
- 610 Medicine&health
- 620 Engineering. Technologying eneral
- 630 Agriculture
- 640 DomesticScience
- 650 Management, organization of Industry and commerce
- 660 ChemicalIndustry.ChemicalTechnology
- 670 Manufacturers
- 680 SpecializedTrades
- 690 BuildingIndustry.Materials.Trades.construction

#### **1.3.8 CommonAuxiliaries**

The commonauxiliaries are applicable throughout the various main schedules or tables. The various tables of common auxiliaries and their connecting symbols are given below-

S.N.	AuxiliaryTables	Symbol	Denoteas
(a)	Additionandextensionsign	Plusandstroke	+and/
(b)	Relationsign	Colon	:
(c)	CommonauxiliariesofLanguage	EqualSign	=
(d)	Commonauxiliariesoffrom	Zeroinsquarebracket	(0)
(e)	CommonauxiliariesofPlace	Indo-Arabicnumeralsin	(1to9)
		squarebracket	

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(f)	Commonauxiliariesof	Withequalsignunder	(=)
	RaceandNationality	squarebracket	
(g)	CommonauxiliariesofTime	Invertedcoma	""
(h)	Alphabeticalandnon-U.D.C.	AtoZ,I,II,III.etc.	A/ZI,II,III
	Numericalspecification		
(i)	CommonauxiliaryofPointofview	Pointdoublenaught	.00
(k)	Special(auxiliary) subdivisions	Dash zero to dash	-0/-9,.0
		nine,pointzeroandApostro	and'
		phe	

# **1.3.9 SpecialAuxiliaries**

The special auxiliaries are those," which express aspects are recurrent, butin more limited subject range. They are therefore, listed only in particular sections of the maintable

SpecialAux.	Indicatordigit	Rangeofdigits
Hyphen	—	-00/-009,-0/-09,-1/-9
Pointnaught		.0.01/.09
Apostrophe	, 🔨 ) 🤊	,
(i) UseofHyphen(-)		
Thefollowingexampless	nowtheuseofhyphen(-):	
Example-	× >?	
Metalboardsandstrip	O <sup>v</sup>	669-41
Timberboards, planks	s,etc.	674-41
Coppersheets		669.3-41
Preventionofeyedisea	ases	617.7-084
(ii)USEofPointNaught(	(.0)	
Example-		
Philosophyofmusic		78.01
Measurement		53.08
Structureoforganicco	ompounds	547.022
(i) Use ofApostrophe (	(,)	
Example-		
Preparationofacidalc	coholesters	

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547.29'26.07Frenchl

anguageusagespoken811.133.1'271.1andwrittenformandHeat treatmentofquenchedmetalalloysofcobalt,iron669.14'25=156.04.

# 1.3.10 CitationOrder

Two or moreauxiliariescanbeaddedtoagivenclassnumber. The UDC follows the principle of inversion that is the order of facets in the classnumber is reverse of their arrangement the shelves. А broader order is: on classNumber+specialauxiliaries+commonauxiliaries.Thecommonauxiliariesaretobeadd edintheorderoftheirdecreasingspecificity, i.e. more important auxiliaries are to be added first and the least specific be added last. Common to auxiliariesshouldbearrangedasfollowingorder-1

Viewpoint	Place	Time	Form	language
.00	(1/a)	""	(0)	=

The mechanical formula for citation or derist hat the auxiliary tables hould be added in the order 1 k to 1 c

# Example-

Unemployed medical librarianship graduates in Brazil in 2010: A motion picture in German language- 026:61-577.19(81)"2010"(084.122)=30

# 1.3.11 Filling Order

Theordinal value of used various connecting symbols needs to be specified so that filing of compounds of UDC numbers is easily possible. The general intension of the filing order in to achieve general before special sequence. This requires the principles of inversion. The symbols in table 1a, the + and / (Plus and stroke) extend rather than restrict the meaning of a number and compound number with these symbols' files before the simple number itself. Filing order is given schematicas:

677+687TextilesandclothingIndustries

676/679Paperandpulp,Rubberandplastic,processablematerialindustry

# SimpleNumber

676	PaperandpulpIndustries
: 676:382.6	PaperandpulpExports
[] 676[37]	PaperandpulpIndustry, InstructionandTruancy
=676=914	PaperandpulpIndustry,(DocumentsinHindi)
(0)676(05)	Journal of Paper and Pulp

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Industry(1/9)676(540) PaperandPulpIndustryinIndia(=..)676(=96 Paper and Pulp Industry of ) Africans"..."676"199" Paper and Pulp Industries in 1990'sA/Z676 NPPC Nationalpaperandpulpcorporation PaperandpulpIndustry:Manpower .00676.007 - 676-78 PaperandpulpIndustry:ProtectionandSafety PaperandpulpIndustry:ProcessingandSafety .0 676 .1/.8676.5 **WallPapers** Paperandboardwares 676.7

## **IN-TEXT QUESTIONS**

(1) Equal sign = is used for common auxiliary of ------

(2) If 540 is written under parenthesis, it indicates forcommon auxiliary of place or common auxiliary of forms

(3) Notation for time is written in bracket or double inverted coma or with equal sign in parenthesis.

(4) Point double zero .00 is used for -----

#### 1.3.12 Notation andLayout

Thenotationalsysteminanyschemeofclassificationisofgreatsignificance. A bad notational system decreases the value of the scheme of classification. TheUDC notation is a mix of decimal number, punctuation signs and symbols withpermissibleuseofalphabets, or other non-UDC symbols. The use of decimal notation has

made it a truly international classification with many technical advantages. Insome classification schemes, the notation consists of all letters, such a notation istermedaspurenotation. Thenotationconsistingofbothlettersandnumbersistermedas mixed notation. A pure notation cannot accommodate compound and complexsubject, Hospitalityinfacet,

arrayandchaincannotbemaintainedinapurenotation. To overcome these problems, mixed notation has been employed by many aclassificationscheme. Thus the UDC uses the mixed base consisting of the following five categories-

1. Romanalphabets-26(capitalandsmallletters)

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- 2. Indo-Arabicnumerals-10
- 3. Punctuationmarks;and04;and
- 4. Mathematicalsymbols-07

## 1.3.12.1 QualitiesofNotationusedinUDC

MainqualitiesofnotationinUDC are as follows:

## **1.**Simplicity

UDCmainschedulesaredividedbased onIndo-ArabicNumeralsalone.This scheme has mixed notation because for common auxiliaries and specialauxiliaries several indicators and symbols were used which make the notationmixed.So,thenotationundoubtedlybecomecomplicatedinnature.

# 2. Brevity

This quality has not in UDC due to small base of ten Indo-Arabic numeralsasdecimalsandpoorallocationofnumbersofclasses.Manyclassnumbersexceedsi x digits in length. The aim of several synthetic devices in to achieve co-extensiveclassnumberandconsequentlytheclassnumberstendtobeverylengthy.

## **3.** Hospitality

A notation of the any scheme should be hospitable to emerging new subjects and concepts. These are two types of hospitality i.e. hospitality in array and chain.

Hospitalityinarraymakesubordinatedclasses.HospitalityinarrayisachievedinUD Cbyusingcentesimaldevice-alphabeticaldeviceisalsousedi.e.namesofplaces,persons, plants and industrial products etc to extend any array. Sometimes zero isalsousedtorepresentarrayofclasses.Infinitehospitalityinchainisachievedduetodecimalfr actionnotation.

## 4. Flexibility

Flexibilityqualitymeansthatthosequalitieswhoallowsandsupportsalternativearrange mentofsubjects.Thisqualityisachieved:

- (i) Usingdistinctsignsasfacetindicators.
- (ii) Theuseofcolon(:)asagenerallinkingsign
  - (iii) Theuseofintercalatingdevicesforgeneralintercalation,()and"..."forintercalatingspaceandtime.
  - (iv) Thepointofviewnumbers.

## 5. SubordinationtoOrder

The notation reflects the process of division from general to specific

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and subordination to order. The above examples demonstrate this order. But because of enumerative nature and limited base, the class number for minute subjects islengthy.

## **1.3.13Alphabetical Index**

The entries in the index reflect the terminology used in the schedules. Some terms occur more than once in the schedules indifferent context.

Current terminology uses British spellings and idiom. In the index of theabridged edition there are 9500 main and 3500 subentries a total of 13,000 entriescontained in 107 pages. It gives an average of three access points per entry in thetables. Index entries culled from the electronic files are arranged in word-bywordordertoconformtotheBSISO999Standard.SpecificnamesareenteredfollowingAAC R2specifications.Itincludesalltheprincipaldivisions,inclusionnotes,commonandspecialaux iliaries, and built-incompound numbers. Collocation of terms depicts relations and qualifiers are added to homonymous words to show the context. e.g.,axes(tools),672.7;axes(plants),581.4orline(art),7.013.Incaseofasynonymallitspopul artermsareindexedtoavoidsee-

references, e.g., both Aves and Birdshave indexed. Indexistidy and easy to use.

## Example

Books. Cf. Editions, printing publishing accountancy 657.3 binding seebookbinding form of documents (02), (03) reference 03 school instruction 371.32Booksellingtrade655.4/.5branchesandtypes655.42.

## 1.3.14 ApplicationinAutomatedSystems

Again, in the 1960s, the UDC was perceived, despite certain problems with some of the notational symbols, (problems, incidentally, which remain) ashaving great potential for use with automated systems which were at that timebeing developed. Work was undertaken to investigate the possibilities by PaulineAtherton (now Cochrane) and Freeman Robert R. at the American Institute ofPhysics(Freeman&Atherton, 1968; MelgaardHansen&Rigby, 1969), and several papers on the possibilities of UDC in an automated world were presented at theFIDConferenceheldatWashingtonin1665.ThisprojectwasnamedAUDACIOUS automatic Direct Access to information with the online UDC system. Many of the conclusions reached by Freeman and Atherton in this work, such as the value thata notated system provides for international exchange networks where the problemof language might otherwise prove a serious barrier, and the possibility of usingUDCinconjunctionwithathesaurus, aretopics that are being very actively pursued, and are central to several projects that the UDC is engaged upon at the presenttime. This provides a salutary warning, for the rearemany enterprises being under taken in the information world today that have already been tackled, albeitnot in an automated

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environment, and the results of earlier research often suggestsolutionstoproblemsinanonlinecontext.LackofStandardRulesforApplication

Unfortunately, as far as rapid development is concerned, UDC is a classification that hundreds of libraries is used in in a whole range of different versions, and therefore, although frequently published by Standards Organizations, i t can in no way be described as a standard. Although there are rules for filingorder, norules are prescribed for the combination of facets, as ituation which leaves the in dividualfreetoadoptthepracticebestsuitedtoaparticularneed. Thismeansthat it is possible to construct a variety of different combinations to express acompound concept, each of which may be correct according to the rules of UDC, but none of which corresponds precisely with another. There is, therefore, nostandard for application, only a standard for the symbol representing a simpleconcept. There are also a great many places in the scheme where the facetedapproachbreaksdownandenumeratedcompoundsremain.Consequently, it is quitep ossibletocreatetwo"correct"yetquitedifferentclassmarksforthesameconcept, even if the construction of the class mark is based on the same analysis of the subject and even, in places, the same application of citation order. Traditionally, this has been perceived to advantage, permits be an since it the individual to adapttheclassificationtothearrangementthatbestsuitsanindividualcollection.Nowadays, standardization correspondence ) in and records is seen as much moredesirable, and in an automated environment, there is fargreater pressure for conformity. Unless a strict order for the combination of concepts is rigidly applied and universally adhered to, it is difficult to claim the title of "standard" for thescheme. It means that a standard order citation must be imposed, suggestion а thatisunpopular with users. This is a major problem that those responsible formaintaining and developing the classification are attempting to tackle in as nondisruptiveamanneraspossible. Torid thescheme of all these enumerated compounds cannot be accomplishedinahurry, since it will affect the classification practices of those hundreds of who are locked into users its structure in their shelfandindexingarrangements.Untilitaccomplished,therewillremainthepossibilityof constructing class marks for compound concepts that are enumerated in thetables either using the enumerated notation or by combining by ) the same conceptsingly, through the use of auxiliary tables. Addition intwo different ways is possible, e.g.

597.553.2-113.2 Salmon-digestion
591.132-755.32 Digestion-salmon
34(410.5)3.21 Law-Scotland-criminallaw
343.21(410.5) CriminallawScotland

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This facility makes machine retrieval of single concept simpossible. It is not clear to am achine, or indeed to the average user, that these two sets of class marks each consist of the same no tation scombined in deferent order.

## 1.3.15 Limitations

Although this is good scheme of classification despite its constant and enduring success, it has been criticized on certain points:

- (i) Lackofstandardrulesforitsapplication
- (ii) Mainclass4hasstillnotbeenfilledup.
- (iii) ItsDDCbasehasalwaysbeencriticized.
- (iv) Itsauxiliariesarestilldevelopingwithchangesinsomenotationalsymbols.
- (v) Somenotationaldevices, although apparently logical and satisfactory,
- (vi) causeproblemsinsearchingandbrowsing.e.g.,symbolslikeand0overlapinfunctionandmayleadtoconfusion.
- (vii) Therearecertaincitationorderproblems, as no definites tandard has been prescribed.

# **IN-TEXT QUESTIONS**

- (5) How many mathematical symbols are used in UDC?
- (6) Henri La Fontaine was a .....
- (7) Notation 383/388 means.....
- (8) Dash zero -0 indicates to.....

# **1.4 CLASSIFICATION OF SIMPLE DOCUMENTS**

Simple document means only one subject, but common isolate may be come with the subject who justify the nature of that publication / document.

		<b>20  </b> Page
5. Civilization	008	
4. Information theory	007.001.1	
3. Origin of transliteration	003.034	
2. Compiling, sorting and methodical arrangement	002	
1. Fundamentals of knowledge and culture	00	
Some worked out examples have listed here—		



6. Universal bibliography	011
7. Bibliography of anonymous and pseudonymous works	014.1
8. National bibliography	015
9. Bibliography of specific subject	016
10. Dictionary catalogue of public libraries	019.1
1I. Library co-operation 021.6	
12.Inter-library loans	024.68
13. Book selection 025	.21
14. Colon classification scheme025.49	4
15. Yearbooks and directories	058.7
16. Annual reports of an organization	06.055.5
17. Association of International level	061 (100)
18. Furniture and equipment 'of museum	069.3
19. Manuscript in English	091=20
20. Technical libraries	027.021
21. General management in libraries	025.1
22. Collection of popular literature	087.6
23. Relation between Individual sciences	001.2
24. Extension work and services in libraries	021.422
25. Sense Perceptional theory	159.930
26. Magically Occultism	133.4
27. Ethical stand points and trends in ethics	17.03
28. Tobacco use ethics	178.7
29. Ethics in relation between employer and employee.	174.8
30. History of knowledge: from mythology to science	165.9
31. Plant and animal behavior- a biopsychology	159.929

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32. Ethics and recreation in India	175(540) 1.
33. Origin and development and history of language	401
34. Phonetics	414
35. Sources of Philology	418
36. Spelling reforms	411.4
37. Etymology	415.4
38 Nomography	518.3
39. Geometric topology	513.83
40. Seasons of Earth	525.5
41. Telescopes of practical astronomy	522.2
42. The calculation of time in general	529.2
43. Aerodynamics	533.6
44. Principles of constancy and variability	530.13
45. Mathematical theory of mechanics	531.01
46. Electromagnetic theory of light	535.13
47. Theory of vibrations in sound	534.01
48. Hydrogen compounds - a chemical compounds	541.44
49. Chemistry of qualitative analysis	543.061
50. Petroleum deposits in Saudi Arabia.	553.98 (532)
51. Wildflowers of Great Britain and Southern Europe 581.46 (410+4-	-13)
52. Smallpox	616.9
53. Gynecology	618
54. Electronics transistor	621.382.3-21
55. Powder Metallurgy	621.762-39

# **1.5 CLASSIFICATION OF COMPOUND DOCUMENTS**

**1.5.1 Plus Sign** (+)

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The symbol plus (+) and stroke (/) extend the meaning of number by denoting the sum of meaning of several UDC numbers. The coordination sign + connects two or more non-consecutive UDC numbers to denote commonly associated concepts in the same compound subject for which no single number exists, e.g.

1.Plant biology and field crops	581+633
2.India and Spain	(540) +633
3.Zoology and animal breeding	59+636
4. Chemistry and chemical technology	54+66
5. Mining and metallurgy	622+699
6. India and Pakistan	(54+549)
7. France and Spain	(44+46)
8.Spain, China and Mexico	(46 + 510 + 72)
9. East and North area	(-11) +(-17)
10. Past and future	"311+313"
11. Economics and management	33+65

## 1.5.2 Extension Sign (/)

This symbol is used for two or more than two numbers in continue. This sign means from- to- . It is used to connect/denote the first and last number of a series of consecutive U.D.C numbers. In other words, this symbol is used to denote a broad subject or range of concepts by connecting first and last od a series of consecutive numbers.

## For instance:

	23   Page
5 AC and DC electric machines	621 313 2/ 3
4. From 1984 to 1996	"1984/1986"
3. Science and Technology	5/6
2. Communication and Transport	383/388
1. Christian religion	22/28



6. Heat, light and sound	534/536
7. Electricity and Electromagnetism	537/538
8. Logical standpoints and Trends	165.6/.8
9. Carbohydrates, Fates and Proteins for health	12.396/.398
10. Maths, Astronomy and Physics	51/53
11. Arithmatic, Algebra and Geometry	511/513
12. Systematic Paleozoology	562/569
13. Mineralogical Sciences, Crystallography, Mineralogy	548/549
16 SUMMADV	

In this lesson you have studies the fundamentals of Universal Decimal Classification. Although this scheme of classification is based on Dewey Decimal Classification but also differ from DDC too. This is almost faceted scheme. Main divisions and common auxiliaries are given in this lesson. Many examples of simple documents and compound documents have given with their appropriate class numbers. Though we are familiar with genesis and development of UDC, editions in various languages and different versions like full, abridged etc. Now you can classify the simple and compound documents.

# 1.7 GLOSSARY

**Common auxiliaries**: Common auxiliaries are applicable throughout the main tables, and represent notations such as language, place of the text and physical form of the document, which may occur in almost any subject

**Compound subject:** A subject with a basic subject and one or more an isolate ideas as components.

**Special Auxiliary:** The special auxiliaries are those, which express aspects are recurrent, but in more limited subject range.

# 1.8 ANSWERS TO IN-TEXT QUESTIONS

(1)Common auxiliary of Languages	.(5) Seven (07)
(2) Common auxiliary of Place	(6) A Belgium International Lawyer
(3) Double Inverted Coma	(7) 383/388 means all concepts are
(4) Common Auxiliary of Point of View	covered which have given between 383-388.

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(8) Special Auxiliary

#### SELF-ASSESSMENT QUESTIONS 1.9

- 1. Classify these titles-
  - Shiversity of Delhi (a) Dewey Decimal Classification, 22<sup>nd</sup> Edition
  - (b) English grammar
  - (c) Applied biology
  - (d) British Air transport System
  - (e) German Literature
  - (f) National Libraries
  - (g) Higher Education
  - (h) British National Bibliography
  - (i) Hindu Religion
  - (i) Financial Economics
  - (k) Exchange rate of money
  - (l) Architecture
  - (m) Systematic zoology
  - (n) Mathematics, astronomy and physics
  - (o) Secondary and higher education
  - (p) Mathematical and civil engineering
  - (q) French drama of  $17^{\text{th}}$  and  $19^{\text{th}}$  century
  - (r) Lung disease

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# UNIT- II: Advance Applications of Universal Decimal Classification (UDC)

# CHAPTER –1: INTRODUCTION TO COMMON AUXILIARIES AND SPECIAL AUXILIARIES

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# **STRUCTURE**

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Overview of Universal Decimal Classification
  - 1.3.1 Concept of Classification
  - 1.3.2 System of Classification
  - 1.3.3 UDC Notation
- 1.4 Structure of UDC
  - 1.4.1 Main Tables
  - 1.4.2 Auxiliary Tables
  - 1.4.2.1 Common Auxiliary
  - 1.4.2.2 Special Auxiliary
- 1.5 Summary
- 1.6 Glossary
- 1.7 Answers to In-text Questions
- 1.8 Self-Assessment Questions
- 1.9 References
- 1.10 Suggested Readings

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# **1.1 LEARNING OBJECTIVES**

After reading this Unit, you will learn:

- An overview of the common auxiliaries usage and other complexities associated with universal decimal classification method
- Introduction to the universal decimal classification method
- Explanation, usage and process to be followed while using UDC notations
- Insights into the characteristics of UDC classification system
- Introduction to UDC main and auxiliary tables
- Concepts of common and special auxiliaries

## **1.2 INTRODUCTION**

In this chapter you will learn in detail the basic tenets of Universal Decimal Classification system. The chapter will provide insights to the very concept of classification, various schemes of classification along with a detail overview of UDC system including its notation, structure, and auxiliaries.

Classification is the process wherby similar things are grouped together and dissimilar things are separated. UDC is one of the most widely used knowledge organization systems in libraries. It is used both for content indexing of documents in libraries and also for shelf arrangement of documents highly popular in special libraries with specialized collection.

UDC is a hybrid of two kinds of documentary classification namely enumerative and analytico-synthetic. The UDC system arestrutured using two kinds of tables or classes, Main Tables and Auxiliary tables or classes. The auxiliary tables as the name suggest complements to provide concepts that are generalized and common to several subjects in the main table. These concepts may be related to the language of the text, the place or physical form of the document or any other facet that is common to a large number of subjects in the main classes.

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# **1.3 OVERVIEW OF UDC**

The Universal Decimal Classification (UDC) is an indexing and retrieval language in the form of a classification for the whole of recorded knowledge, in which subjects are symbolized by a code based on Arabic numerals. This system of knowledge organizationwas developed by Paul Otlet and Henry LaFontaine, they began working on UDC in 1889. UDC was built upon the foundation of the DDC while Dewey conceived his scheme to be applied to the arrangement of books on shelves, Otlet and LaFontaine, expand the scheme usage and its application to varied document types like journal articles, news items, etc, and how to access them. Thus, it developed into a detailed system with wider scope and perspective. Otlet and LaFontaine augmented Dewey's system with numerous devices that they later described as synthetic. UDC thus allows systematic arrangement of all branches of human knowledge. It is based on a coherent system of knowledge wherein the knowledge fields are related and interlinked. UDC also includes syntax that allows detailed content indexing and also information retrieval from large collections of documents.

UDC was managed by the organization known as the International Federation of Information and Documentation (FID). It was first published, in French, from 1904 to 1907. The publication included many features that changed the way document classification wad done and viewed. One of the distinct feature was the inclusion of the common auxiliary tables, which were tables that described generally used concepts. Another feature was the special auxiliary tables. These tables described reusable attributes in a particular field of knowledge. UDC also included an expressive notational system with connecting symbols and syntax rules.

UDC is one of the most widely used knowledge organization systems in libraries. It is used both for content indexing of documents in libraries and also for shelf

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arrangement of documents highly popular in special libraries with specialized collection. Please note this study unit discusses the UDC system based on the third edition by British Standard Institution published in 2005.

#### Typographic presentation layout

It is fundamental to understand that a UDC entry consists of three main elements: The class number (notation), which appears in the number column at the left The class description (caption), which appears in the text column at the right Various amplifications, which appear indented within the text column. The latter includes notes, cross-references, and instructions for synthesizing and examples of compound notation obtained. Class description can be extended with other concepts that are included in the class.

Sample entry layout





Special auxiliary tables, usually placed at the beginning of the main class in which they are valid, are marked with a vertical line to the left of the class number.

#### Summary of symbols used

sign		meaning
$\Rightarrow$	(double arrow)	See also
$\diamond$	(diamond)	Example(s) of combination
	(square)	Including
≅	(approximately equal to)	Subdivision as
	(side lining)	Special auxiliaries
*	(asterisk)	Non-UDC notation

## **1.3.1** Characteristics of UDC:

By now you are well acquainted with the concept thatClassification is a means of bringing order to a multiplicity of concepts or items of information, by arranging them into classes. A class is a group of concepts that have at least one thing in common. This shared property gives the class its identity. A class my further be divided into smaller classes or subclasses, and so on, until no further subdivision is feasible. So classification is likely to be hierarchic, with each level of division except the lowest divided into its logical subsets.

Classes may consist of various kinds of concept, such as physical things (objects, person, places etc.) and their parts expressed as activities, processes, abstract ideas; for example:

- Things- buildings (schools, churches, houses, etc.)
- Parts- parts of buildings (doors, walls, stairways, etc.)
- Activities- buildings services (joinery, glazing, plumbing, etc.)
- Abstract ideas-architectural styles (classical, Georgian, etc.)

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## **1.3.2** System of classification:

Classifications may be designed for various purposes in other words concepts are classified based on various events. They can be Special, Scientific, General, and Documentary Classifications.

- Special classification: It is applied to cover a certain subject used for laying emphasis on it.
- Scientific classification As the term denotes it concerns with the phenomena of the natural world as an aid to systematic study. They include the arrangements in systematic botany and zoology, and the table of chemical elements, and they often form the basis of field guides.
- Documentary classification: Pertains to information organization and retrieval, in other words, for locating knowledge recorded in various information resources (objects, images, sounds, printed or digital documents).

The Documentary classification is further divided into two main categories Library Classification and Bibliographic Classification:

- Library Classification the physical arrangement of library holdings and guidance to their contents.
- Bibliographic Classification- the description and indexing of the holdings or the documents in general.

These categories of classification scheme are not mutually exclusive but complementary to each other. Scientific classification may be incorporated into documentary ones, for example at 549 and though not explicitly parts of 58 and 59. Bibliographic and library classifications may each incorporate some of the other's features, and in practice are not limited to a single application.

• General classification- This encompasses all recorded knowledge or the universe of information.

It may be of the following three types:

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- Enumerative Classification- universe of information where categories are divided and exhaustively listed.
- Faceted or analytico-synthetic classification- This type of classification involves identification of common categories which are then listed. Each list represents a facet. Subjects are thus analyzed into their elements enabling the user to recombine or synthesized it.
- Aspect Classification- Phenomena of the natural world are classified in the context or the discipline in which it appears.

The Universal Decimal Classification tends to align with an aspect classification where a phenomenon is classed according to the context or discipline in which it is considered (so that its various aspects occur at many different places). For example, 'coal' has no single place in UDC. Aspects of Coal covered in UDC:

Petrological aspect - 552.574,

Economic geology aspect - 553.94,

Mining aspect - 622.33, or as dust at 622.411.52

Soil mechanics aspect - 624.131.27,

Agricultural aspect (fertilizers) - 631.878,

Fuels aspect - 662.66 and 662.75, or as briquettes at 662.814,

Pig iron production - 669.162.16

More peripheral aspects are at still other numbers. Theoretically, general documents covering all of those aspects should be classed at all of those numbers; but in a given collection, with a particular bias, it is often possible to select on number as the main place for a subject.

Further the documentary classifications tend to be either for library use- for the physical arrangement of an actual collection and as a guide to its coverage; or bibliographic- for the detailed indexing and description of documents, not confined to any one collection. They will often be enumerative-exhaustively



listing the categories into which the universe of knowledge has been divide; or faceted- identifying characteristic common to many categories and arranging them in lists or tables each representing a facet (that is, the total concepts obtained by applying a particular characteristic of division). Thus, the compiler has analyzed subjects into their elements for the user to recombine or synthesize, and faceted classification is also called analytico-synthetic. UDC has evolved from a project to develop an enumerative into a faceted classification.

Classification thus may be special- concentrating on, or biased towards, a particular subject; or general – covering the universe of knowledge. UDC is a general classification scheme that is particularly detailed and sophisticated. It can therefore be used both for information organization in covering all subjects, or most of them, and in document collections which are more specialized but still cover a range of other subjects in less detail. UDC was designed for bibliographic use, but has proved eminently suitable for library use.

#### **1.3.3 UDC Notations:**

Notation is a code that symbolizes the subject of each class and its place in the sequence. It has an inherent order, such as numerals, alphabetic notation or a mixture (alpha-numeric). When such a code is assigned to each class, it expresses and fixes the order of classes (that is the filing order), and enables automatic sorting of entries. Notation with variable length can also express the position in the hierarchy, with each extra character representing a lower level; this is called expressive notation. Arabic numerals, arranged as decimal fractions, are ideal for this purpose and are the basis of the notation in UDC.

Notation is an artificial language from which many of the ambiguities of natural language have been eliminated. For example, the term 'paraffin' has both a technical sense (a series of saturated aliphatic hydrocarbons of the general formula  $C_nH_{2n+2}$ ) and a popular one (=kerosene, a petroleum fraction with a particular boiling range), while 'kerosine' has at times been known as 'petroleum', a term now used as the general name for mineral oils.

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The use of notation frees UDC from such ambiguity; in the context of mineral oil technology, 'mineral oil' generally (petroleum) is at 665.6, 'production of paraffin's' is at 665.637.2, and 'production of kerosine' is at 665.634. Similarly, 'power' in mechanical engineering (the output of an engine) is 621.1.018.7, and 'power' in electrically engineering is at 621.311. Other aspects of these subjects may occur elsewhere, but in each case the class number represents a clearly defined concept, not a word or phrase whose meaning may vary according to context.

UDC notation is based on Arabic numerals including few other common symbols. The numbers are arranged as decimal fractions, and this determines their filing order. One can think of them as following an imaginary nought and point, which for convenience are omitted (for example, 5 stands for 0.5). So they do not have the same order as integers, in which 6 would precede 59 by a long way; 5 is followed not immediately by 6, but by 50 to 59. Similarly, 59 is followed by all its subdivisions from 591 to 599 before you reach 6; and between 591 and 592 come all the subdivisions of 591 up to 591.9. After the third digit, there is a point, but it is not a decimal point- merely punctuation for ease of reading. A long code is easier to read if it is broken into small groups, so a point is added after every third digit; for example, in the UDC database the eleven-digit number 6213823332 becomes 621.382.333.32, which is far more manageable. As the whole class number is a decimal fraction, including the part before the first point, it is preferable to pronounce it not as an integer but as a series of digits ('six-two-one point three...' rather than 'six hundred and twenty-one point three...').

As an example, the following numbers would be in this order if they were integers (or integers plus decimals): 1, 02, 3, 6, 22, 37, 66, 82, 94, 210, 543, 655, 681.81, 728.1, 811, 929; but if they are UDC class numbers, they file as if they were all decimal fractions, thus:

class number	as if	
02	0.02	
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* All yia Ran		
1	0.1	
210	0.210	
22	0.22	
3	0.3	
37	0.37	
543	0.543	
6	0.6	
655	0.655	
66	0.66	A
681.81	0.68181	
728.1	0.7281	7
811	0.811	
82	0.82	
929	0.929	
94	0.94	

Because decimal fractions are infinitely extensible, it is always possible to introduce further subdivisions without altering the ordinal value of the rest of the sequence. New development, or increasingly detailed information, can therefore be accommodated in the scheme by the creation of new classes while preserving the stability of the rest. Such notation is said to be hospitable.

# **1.4 STRUCTURE OF UDC**

**UDC its Structure** 

UDC is a hybrid of two kinds of documentary classification scheme i.e., enumerative and analytico-synthetic. There are two kinds of table: the main and auxiliary tables also called the 'schedules' and 'tables' respectively, and though the distinction is not hard and fast, they exemplify to some extent the enumerative and analytico-synthetic elements in UDC, and their associated notation.



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Symbols outside UDC



Figure 1: UDC macrostructure

## 1.4.1 Main tables

The main tables or the primary notation, in UDC are the ones most closely related to DDC. In Dewey's scheme, the universe was divided into ten classes, each of which was then further divided. In UDC, one class is now vacant, since class 4 was cancelled in 1963 to make room for future developments, and its subject, linguistics, was merged into class 8 with literature. UDC therefore comprises the following top classes:

0	Generalities, Science and Knowledge. Organization.
	Information. Documentation. Librarianship. Institutions.
	Publications.
1	Philosophy. Psychology.
2	Religion. Theology.
3	Social Sciences. Statistics. Politics. Economics. Trade. Law.
	Government. Military affairs. Welfare. Insurance. Education.
	<b>11</b>   P a g e

#### MASTER OF LIBRARY AND INFORMATION SCIENCE

Folklore

- 4 [Vacant]
- 5 Mathematics and natural sciences.
- 6 Applied sciences. Medicine. Technology.
- 7 The arts. Recreation. Entertainment. Sport.
- 8 Language. Linguistics. Literature.
- 9 Geography. Biography. History.

Thus, each of these broadest classes is denoted by a single-digit Arabic number. Each of the ten theoretical classes, or nine occupied classes, may in turn be divided to form ten narrower classes or subclasses. The subclasses accommodate more restricted concepts, as represented by longer numbers. For example, class 5 is divided into the following subclasses:

- 50 Generalities about the pure sciences
- 51 Mathematics
- 52 Astronomy, Astrophysics, Space research, Geodesy
- 53 Physics
- 54 Chemistry. Crystallography. Mineralogy
- 55 Earth Sciences. Geology, meteorology etc.
- 56 Palaeontology
- 57 Biological sciences in general
- 58 Botany
- 59 Zoology

The next level of division gives three digits; for example, 57 is divided into:

572	Anthropology
	1 05

- 573 General and theoretical biology
- 574 General ecology and biodiversity ...
- 575 General genetics. General cytogenetics... Evolution etc.

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- 576 Cellular and subcellular biology. Cytology
- 577 Material bases of life. Biochemistry... Biophysics
- 578 Virology
- 579 Microbiology

Other details one should know while practicing UDC

- a) Each of these is a logical subdivision of the content of class 5 and 57 respectively, and each is denoted by a number beginning with 5; but each is also a more restrictive class than 5, and has a class number one digit longer. The main tables, in other words are divided hierarchically, with the numeric hierarchy reflecting the conceptual hierarchy; the broadest classes are at the highest level, and the narrowest or most restrictive classes are at the lowest level, of the hierarchy.
- b) The length of the class number is indicative of the degree of detail. Class numbers of the same length, denoting a similar level of generality (or extension) are coordinates.
- c) Classes with shorter numbers, denoting greater extension, are superordinate. Classes with longer numbers, denoting greater specificity (or intension) are subordinate. 58 and 59 are coordinate. 5 is superordinate to 58 and 59. 591 is subordinate to 59. An exhaustive set of coordinate classes (containing the full logical subdivisions of the superordinate class) is an array.

The parsing of an example will show the structure of a long class number from the main tables:

621.397.132.125 Phase Alternating Line (PAL) system

This string of twelve digits represents a chain in a hierarchy of concepts, in which each successive place implies a choice from the possible subclasses:

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	MASTER OF LIBRARY AND INFORMATION SCIENCE
Haryin Terl	
6	Applied sciences. Medicine. Technology
62	Engineering. Technology in general
621	Mechanical engineering Electrical engineering.
	Machinery
621.3	Electrical engineering
621.39	Telecommunication Telecontrol
621.397	Video technology. Television engineering
621.397.13	Television
621.397.132	Colour television
621.397.132.1	Simultaneous colour systems
621.397.132.12	With common transmission channel for the prima
	colour signals
621.397.132.125	Phase Alternating Line (PAL) system

The first digit, 6, denotes 'Applied sciences. Medicine.Technology'. A start has been made along a path down the hierarchy, which branches at each successive level: out of the universe of information, a class of concepts has been selected that belong to the applied sciences. The second digit, 2, shows that, of the ten possible subclasses 60 to 69, the one selected is 62, restricting to engineering. Each succeeding digit futher specifies the preceding concept, and symbolizes a more restrictive class, until the lowest level is reached. The meaning of each digit is determined by its place in the chain. The full number exhibits increasing specificity going towards the right.

# 1.4.2 Auxiliary Tables

UDC's most innovative and influential feature was its auxiliary notation, the signs and subdivisions provided to allow for the construction of compound numbers, or synthesis. A simple number constitutes a number taken from a single place in the tables and cited on its own; it can be either a main number or an independent auxiliary. A compound number is always constructed by synthesizing elements from more than one place in the tables.

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There are two kinds of auxiliary notation: Common and Special.

The Common auxiliaries provides a means of expressing interrelation between subjects, it denotes generally recurrent characteristics applicable in the main tables. The Special auxiliaries denote locally recurrent characteristic i.e. those that are applicable in a limited range of the main table.

**1.4.2.1 Common Auxiliary**: Common auxiliaries establish interrelations between subjects. These consist of two kinds of symbols, i.e., signs and sub-divisions.

The common auxiliary signs are a number of symbols which relate UDC numbers by linking them through coordination and aggregation to denote compound numbers.

As regards common auxiliary sub-divisions, they differ from auxiliary signs in two respects: firstly, these comprise numeric tables, and similar to the main tables, concepts in it are enumerated and the arrangement is hierarchical. Secondly, these concepts are followed, preceded by or prefixed to common auxiliary signs.

These common subdivisions can theoretically be attached to every class number in the main table for denoting any concept in the scheme more specifically. When these sub- divisions are isolated and cited independently, the characteristics of division can be identified by the addition of an extra symbol. This symbol is known as the facet indicator.

For example, the digit 20 has several shades of meaning in the tables. But, the addition of an extra symbol (or facet indicator) determines the facet. The digit 20 when enclosed

within parentheses indicates place facet, i.e., (20) means ecosphere; with quotation marks "20", means twenty-first century AD: with equal sign=20 signifies English language, and so on.

These common auxiliary subdivisions are divided into two groups; independent auxiliary tables, and dependent auxiliary tables. Functions of these two kinds of

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table can be enumerated as follows:

- Independent auxiliary tables-These are affixed to UDC numbers when needed, and also used in isolation to form class numbers for documents. These are the auxiliaries of language, form, place, race and time. These tables have biterminal signs, i.e, signs that enclose the number and demarcate it from adjacent ones. These biterminal signs enable the auxiliaries to be affixed anywhere within a UDC number with a few exceptions.
- Dependent auxiliary tables- These are not used in isolation, but always affixed to UDC numbers.

#### 1.4.2.2 Special auxiliaries

Special auxiliaries denote those characteristics which are recurrent locally, and such being the case, these can be applied in a limited range of main tables. Differing from common auxiliaries which are listed at one place, these auxiliaries are dispersed throughout the table, and have limited applicability. Wherever valid for application, they are discernible by their appearance under main tables. These auxiliaries are enumerative, denoted by notations, and the same notations can be applicable in other parts of tables with different shades of meaning. As regards the principle of their use, these sub-divisions are affixed as suffixes to class numbers, and also to their direct subdivisions even in the absence of instructions.

The structure of the UDC, in the form of an up-turned tree, is given below:



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# 1.5 SUMMARY

The UDC was developed as a bibliographic classification system based on DDC. It was therefore found to be eminently suitable for use in libraries. The UDC although belonging to general classification schemes, can be used for formulating special subject classifications, and many specialized editions have been derived from it. The UDC can be termed as a blend of two categories of classification, i.e., enumerative and analytico-synthetic. It contains two types of table's i.e. main tables and auxiliary tables. The former may be said to be enumerative, while the latter is a combination of analytico-synthetic elements and the UDC aligns with aspect classification system.

# 1.6 GLOSSARY

**Class Identifier:** It is a unique identifier assigned to each class. It identifies the meaning of the relationship between the representation of the class and its notational number or UDC number.

**Broader Class:** It represents a class, which is super-ordinate class, i.e., the class above the given class in the hierarchy.

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**Sub-division:**These are three-digit numbers derived from two-digit subclasses. e.g., (504) Environment.

**Simple Number:** A number taken from a single place in the table and cited on its own whether a main number or an independent auxiliary.

**Compound Subject:** In a compound subject, more than one element within a conventional class gets reflected within it. A compound subject can accordingly be represented by a number.

**Analytico-Synthetic**: A freely faceted classification based on postulates and classification principles for analysis and synthesis of the subjects.

**Common Auxiliaries**:Schedules of supplementary facets to be used with main schedules for construction of class numbers. A faceted classification has many such schedules. Examples of auxiliaries are separate tables for form divisions, geographical divisions, chronological divisions, languages, materials, etc.

# 1.7 ANSWERS TO IN-TEXT QUESTIONS

1. Enumerate the principles on which UDC system operates.

Some of the main principles of UDC are as follows:

- UDCapplication is not limited to classifying recorded documents and knowledge or for arranging documents. Its application is based on analysis of data,content and relationships that exist between the concepts and its existing facets.
- UDC is a universal classification system that falls under the general classification system. It encompasses the universe of knowledge and forms

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intelligent linking of concepts by identifying similar concepts on the basis of integrated patterns

and correlated subjects.

- Like every classification scheme UDC proceeds from general to specific, broader, related to narrower concepts of knowledge domains.
- UDC accounts for detailed specifications of a main subject rather than on the order of the subjects or the documents it classifies.
- UDC also takes into account the principles of mutually exclusive classes, collection of related subjects and consistency of approach.

• Use of notation which consists of Indo-Arabic numerals used decimally frees it from ambiguity while enabling infinite hospitality by linking main class to the auxiliaries in an easy manner.

## 2. What are Special Features of UDC?

UDC is a practical bibliographic classification international in scope often considered as the first faceted and synthetic classification. It is flexible and canclassify universe of knowledge, every subject from broader to narrower categoryin appropriate context or aspects, which can be in various formats and point of views. It is officially the first internationally adopted classification system published in French, German and English., (Satija, 2008)

- UDC lays more emphasis on subject analysis broader to narrower and document specification.
- UDC common and special auxiliary offers multidimensional approach to classification.
- Its usage is wider in scope and application, various formats of recorded knowledge both online and offline can be classified systematically with enabling retrieval.
- o UDC structure is flexible to accommodate emerging subjects.

#### 3. Do you find any merits of UDC in complex classifications of

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#### resources?

As UDC is a common scheme of classification, it covers the whole field of humanknowledge. The procedure of dividing a class into ten subclasses is accepted to the

required degree of specificity. The required degree of detail is achieved with the help of general and special auxiliaries. The resultant subject account is of utmost precision.

• UDC notation which consists of alpha numeric signs and symbols frees it of ambiguity that may arise in language usage. Its decimal notation enables accommodation of new/ hybrid subject areas.

• UDC can be customized as per the specific requirement of the knowledge center.

• It is amenable to computerization.

## 4. What are demerits of UDC in classifications?

- UDC notation often tends to be extensive and seems clumsy.
- Handling complex classifications in UDC notations often found to be difficult for novices

• User participation in revision has created unevenness in the scheme at spaces.

#### 5. What are UDC Numbers or Notations?

UDC notation is a combination of symbols,numerals, signs and letters that represent a class, the position of the class in the hierarchy and also the relation of the class to other classes.Notation is a language-independent indexing term that enables mechanical sorting and filing of subjects.

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# 1.9 SELF-ASSESSMENT QUESTIONS

- 1. Write a short note on the universal decimal classification.
- 2. Write a short note on UDC notation.
- 3. What are the distinguishing features between main table and auxiliary table of the UDC?
- 4. Define Common Auxiliaries.
- 5. Which class in UDC is left blank and why?

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### **UNIT- II: Advance Applications of Universal Decimal Classification (UDC)**

Application of common auxiliaries, special auxiliaries, parallel devices, filing order, citation order, intercalation

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#### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Common Auxiliaries
  - 1.3.1 Kinds of Common Auxiliaries
  - 1.3.2 Group of Common Auxialiaries
- 1.4 Special Auxiliaries
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- 1.11 Answers to In-text Questions
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#### **1.1 LEARNING OBJECTIVES**

After reading this Unit, you will learn:

• How you can use common auxiliaries along with their different divisions and subdivisions and special auxiliaries usage and their complexities associated

• Introduction to the parallel devices, filing order, citation order, intercalation in UDC method

• Examples of use of auxiliaries and other associated parameters

#### **1.2 INTRODUCTION**

As mentioned in the previous unit, the first edition of UDC was launched in 1905 which included several features that greatly enhanced the scope of classification. One of this distinct feature marked the introduction of Common and Special Auxiliaries. Common Auxiliary tables are used to described generally used concepts and Special Auxiliary enabling description of reusable attributes in a particular field of knowledge. The common auxiliaries comprise two kinds of symbol: the signs and sub-divisions. It is further divided into two groups Independent and the dependent auxiliary tables. The special auxiliaries occur at various places in the tables, and express concepts that are recurrent, but in a more subject range.

Other features discussed in this unit include the Parallel device which are not an auxiliary table at all yet it is similar to special auxiliaries. It results in the same notation being used to denote a given concept in more than one place. The filing order of UDC symbols is based on a progression from the general to the particular, a common auxiliary used as an independent number is filed before a main number. Intercalation is the use of the auxiliary as an infix. Genenally, an auxiliary is prefixedor suffixed to a main number. In UDC, it can also be infixed to interrupt a mainnumber.

# O DDCtr.

#### **1.3 COMMON AUXILIARIES**

common auxiliaries comprise two kinds of symbol: the signs and sub-divisions.

1.3.1 Common auxiliary signs: The common auxiliary signs are the plus, the stroke, the colon, the square brackets and the double colon, which serve as relators, linking UDC

The



numbers either main or auxiliary), but are not themselves numbers, they do not represent classes, and cannot be subdivided.

Not many kinds of relation are distinguished: the plus (+) and the stroke (/) represents kinds of aggregation which is the sum of meanings of several UDC numbers. The colon (:) serves for most other relations, it merely shows that subjects denoted by numbers are related to each other in some way without specifying or showing the influence exerted.

This lack of specificity in the common auxiliary notably the colon implies a correspondingly extensive usefulness: this device enables any concept in the whole classification to be related to any other, and so in a sense to qualify it.

Signs	Example	of Y
(+) Plus	622+ 669 Mining and metallurgy	
(/) Stroke	fromto (7/8) North and Central Ame America	erica and South
(:) Colon	reversible relation - 17:7 Ethics 'in relation in relation to ethics	on to art or 7:17 Art
(::) Double Colon	Irreversible relation 77.044:: 355 War ph irreversible, it cannot be 355::77.044	otography. Since it is
[] Square brackets	Subgrouping as understood in Algebra [6 Mining and metallurgy in Sweden	522+669].(485)

**2.1.2. Common Auxiliary sub-divisions:** The common auxiliary subdivisions consists of numeric tables, in which concepts are enumerated and arranged hierarchically; to this extent, they resemble the main tables, but they are distinguished by their own symbols either prefixed to, or enclosing, the number. Common auxiliary tables are as follows:

Concept	symbol
the linking signs- Table 1a and 1b	+, /, :
language of the document-Table 1c	=
form of the document- Table 1d	(0/09)
place- Table 1e	(1/9)
race, nationality etc Table 1f	(=)

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time-Table 1g	·· · · ·
non-UDC codes etc Table 1h	#, A/Z
general characteristics-Table 1k, includes	-0
properties	-02
materials	-03
processes	-04
persons	-05

It may be noted language table 1c denotes the characteristic of the document, the language in which it is written or spoken. Form table 1d denotes the material or person involved.

Some features, such as time and space, are relevant to practically all phenomena, while others, such as language and documentary form, become relevant as soon as a phenomenon becomes the subject of a document. When a given characteristics of division recurs throughout a classification, it is convenient and mnemonic if the resultant facet is expressed in the same notation wherever it occurs; but this also makes it possible for the digits expressing it to be detached and separately listed hence they can be affixed, theoretically to every class number. If a class number is removed from their context, they require an extra symbol to identify the characteristic of division.

#### 1.3.2 Independent and dependent auxiliary tables

The common auxiliary is further divided into two groups: Independent and the dependent auxiliary tables.

*Independent auxiliary tables*, though they may be affixed to any UDC numbers where appropriate, may also be used on their own, to form the whole class number of a document. These are Tables 1c to 1g, the auxiliaries of language, form, place, race and time. These tables have biterminal signs (see 2.1.4) that enclose the number and demarcate it from adjacent ones. For example, if it were decided that the place facet was the only one that needed to be expressed (e.g. in classifying maps), a way of doing this would be to cite the place auxiliary alone, from Table 1e..



*Dependent auxiliary*tables as the name denotes must always be affixed to a UDC number; these are officially, Table 1k common auxiliaries of general characteristics: properties, processes, materials, persons. Additionally, Table 1h, which specifies means of adding non-UDC notation, is in practice dependent though not described as such), since the asterisk and alphabetic extensions must be added to a UDC number.

Biterminal Signs: Most of the independent auxiliary tables have symbols that enclose the number, thus demarcating it from adjacent numbers. These are biterminal signs- signs with both an opening and closing element. Table 1d, 1e and 1f have parentheses, while Table 1g has quotation marks. The exception is Table 1c, which has only an equal sign; this is compensated for by adding a colon at the end of the language notation in some positions e.g. =133.1:641.5(083.1) given in the preamble to Table 1c. Because of their demarcation, auxiliaries with biterminal signs can be affixed to any part of a UDC number, at the beginning, middle or end (prefixed, infixed or suffixed, as well as being usable independently, e.g. of

(410)	Great Britain. United Kingdom of Great Britain and Northern Ireland
(410)622.33	Britain- Coal mining
622(410).33	Mining-Britain-coal
622.33(410)	Coal mining-Britain

Dependent auxiliaries can only be used as suffixes, e.g.

622.33-022.316	Coal mining- sustainable
622.33-022.316(410)	Coal mining-sustainable-Britain

The asterisk, the point and the hyphen, therefore, can never occur at the beginning of a number.

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#### 1.4 SPECIAL AUXILIARIES:

The special auxiliaries, unlike the common auxiliaries, are not listed in one place, and by definition do not have such extensive applicability. They occur at various places in the tables, and express concepts that are recurrent, but in a more subject range.

Special auxiliaries use three main kinds of notation: the hyphen series -1/-9, the point-nought series .01/.09 and the apostrophe series'1/"9. (.0 is almost always used to introduce special auxiliary subdivisions, but there are a few exceptions, such as 626.0 and 669.05.). The special auxiliary numbers are recognizable by side-lining, for example under UDC53:

53	Physics
53.02	General laws of phenomena
53.05	Observation and recording of phenomena. Visual
	indication of phenomena,

The number before the side-lining is main number, 53 'Physics'. The auxiliary notation.0... may be used either in the form, i.e.

53.05 Observation and recording of phenomena etc. (in general)

or detached and added to any direct decimal subdivision of the main number, e.g.

531	Mechanics
531.05	Observation and recording of mechanical phenomena
531.5	Gravity
531.5.05	Observation and recording of gravitational phenomena

Special auxiliaries denote those characteristics which are recurrent locally hence can be applied in a limited range of main table. It differs from common auxiliaries which are listed at one place as they are dispersed throughout the table. Special auxiliaries possess enumerative quality, except for the apostrophe which is a synthesizing sign. They are always listed as suffixes to other numbers and cannot be used independently. A common form of presentation is a list immediately under the main number where they are valid. If no other indication is given, they are applicable also to all the direct division of that number. For



example, at 621.3.01 to .095.4, the .0 element is applicable anywhere from 621.31 to 621.398, as well as 621.3 itself.

Special auxiliaries are applicable only when indicated, and the same notation may be used elsewhere with the different meaning. In a few cases, they have either an extended or a reduced range of applicability. This is always indicated by a note, e.g. at 52-1/-8 or 616. For instance, hyphen auxiliaries under 62 are applicable throughout the range 62 to 69, and the point-nought auxiliaries listed at 7, applicable throughout the class except under 77.

Special auxiliaries may also occur within other series of auxiliaries, as they do, for example, at the beginning of Table 1d: Common auxiliaries of form. The principle is the same: they may be used in the form in which they appear e.g.

(0.035.22) Transparent, strip-form [documents]. Microfilm

or the special auxiliary element (beginning with .0) may be detached and affixed to any of the direct divisions of (0), e.g. (05) Serial publications. Periodicals (05.035.22) Periodicals on microfilm.

The compound thus formed is still a common auxiliary, which may qualify a main number, e.g.

5(05.035.22)

Science periodicals on microfilm

The -6 auxiliaries at 66.041 are an example of special auxiliaries within other special auxiliaries.

#### **1.5 PARALLEL DEVICES**

Parallel device are not an auxiliary table at all it is similar to special auxiliaries in that it results in the same notation being used to denote a given concept in more than one place. It is signalled in the tables by the subdivided-as sign $\cong$ . This sign has wide ramifications and use. Parallel divisions are possible with auxiliary numbers drawn from main numbers, also main numbers derived from auxiliary numbers; a number may also serve as the source number for the parallel division of its own subdivision. This simply means that the number preceding  $\cong$ 



may be subdivided in a manner analogous to the number following it; this will result in an exactly analogous array, with the same concepts expressed by the same sequences of digits.

A simple example is in 611'Anatomy', parts of which are parallel to 616'Pathology', where both are subdivided into particular organs. They are parallel, and to enumerate organs fully in both places would be a waste of space and effort. Instead there are instructions such as that under 611.2 'Respiratory system':611.21/.26, or under 611.3 'Digestive system': 611.3  $\cong$ 616.3. In these cases, the 616 subdivisions are the source numbers, from which digits may be detached and added to the target number under 611; thus 616.21 gives the analogous 611.21, while 616.31 gives 611.31, and so on. The parallel arrays may be represented symmetrically:

611.21	Nose. Sinuses	616.21
.22	Larynx (voice-box)	.22
.23	Trachea (windpipe)	.23
.24	Lungs	.24
.25	Pleurae	.25
.26	Diaphragm	.26

The number is the left-hand column represents these items in the context of anatomy, while those in the right-hand column represent them in the context pathology.

#### 1.6 FILING ORDER

The filing order of UDC symbols is based on a progression from the general to the particular. Thus, the common auxiliaries come first, and an independent auxiliary used alone or cited first files before a main number. Next, an aggregation of several numbers has a broader meaning than a simple number, so compounds with the plus and the stroke- Table 1a – file before a single component number (622+669) comes before 622). Finally a shorter number files before a longer number, because a number followed by an auxiliary is more specific than the simple number, while in simple hierarchic division each successive digit further specifies the concept, increasing the particularity. Table 1 shows the filing order of both simple and compound numbers.

Table 1 . Filing order

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symbol	example	
=	=112.2	German language
(0)	(0.035.2)	Microform documents
(1/9)	(430)	Germany
(=)	(=1.410)	British nationals
··· ??	"18"	Nineteenth century
+	622+669	Mining and metallurgy
/	622/623	Mining and military engineering
Simple number	622	Mining
:	622:338.3	Productivity in mining
=	622=122.2	Documents in German about mining
(0)	622(0.035.2)	Microform documents about mining
(1/9)	622(430)	Mining in Germany
(=)	622(=1.366)	Mining among the ancient British
··· ··	622"18"	Mining in the nineteenth century
*	622*Fe <sub>2</sub> O <sub>3</sub>	Mining of red haematite ( $Fe_2O_3$ )
A/Z	622GOE	Mining of named ores: goethite
-0	622-057.2	Manual workers in mining
-1/-9	622-78	Protective devices and measures in mining
.0	622.03	Geological character of ore deposits
4	622'17	Tailings, waste, residues from mining
Next simple number	622.3	Mining (extraction) of specific minerals

The algebraic subgrouping sign (square brackets) does not affect the filing order, and may be ignored for this purpose, except where class numbers would be identical but for the square brackets. Then one may apply rule of nothing-before-something, so that the one without brackets files first:

658.512.2:004-051

Industrial design in relation to: practitioners of data processing (e.g. designing for convenience of computer operators)

[658.512.2:004]-051 Practitioners of: industrial design in relation to data processing (e.g. practitioners of computer-aided design)

In general, the filing order of UDC symbols is that in which they are displayed in the tables. The exceptions are (i) that the simple number comes between compounds with the colon, and (ii) that square brackets have no inherent filing order.

#### **1.7 CITATION ORDER**

Facet Formula: When an element of notation is selected as representing an aspect of a document's subject, and is incorporated into a class number for the subject, it is said to be

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cited. The order in which the elements are combines to make a compound number is the citation order (as an element symbolizes a facet of the subject, the citation order is also known as the facet formula).

Principle of Inversion: In order to ensure a sequence from general to special, it is necessary that the filing order should be the reverse of the citation order; it is called the principle of inversion. In theory, either might be taken as the starting point, but a specified filing order with both tables as a whole, and examples of synthesis given within the tables displayed in this order is available. The simplest rule for citing elements in a compound is:

The citation order is the reverse of the filing order. For example:

=122.2 and (430) and "18" and '17, all qualifying 622.341.1, the standard order would be: '17; "18"; (430); =112.2, thus:

622.341.1'17."18"(430)=112.2

Iron-ore mining-waste-nineteenth century-Germanyin German

The standard citation order may not be satisfactory for all purposes. The reason would be the need, in particular collections, to bring together (or collocate) all references to a particular aspect of a subject, which would be separated if the standard order were followed. For example, in the standard citation order, time "…" would precede place (1/9) (the reverse of the filing order), and so, following the main number, a sequence of entries would be arranged primarily according to time, with any given time aspect divided secondarily according to place:

622""	Mining at various times BC
622""(1/9)	Mining, BC, in various places
622""(410.197)	Mining, BC, in Cornwall
622"+"	Mining at various times AD
622" +"(1/9)	Mining, AD, in various places
622"+"(410.197)	Mining, AD, in Cornwall
622"17"	Mining in the eighteenth century
622"17"(1/9)	Mining, eighteenth century, in various
	places

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622"17"(410.197)

Mining, eighteenth century, in Cornwall

In this example, reference to Cornwall are scattered through the sequence, separated by, first, the time element, and, second, most of the place sequence, since (1/9) represents many individual entries. If, for a particular purpose, it were necessary to collocate references to mining in Cornwall, it would be necessary to exchange the positions of the time and place auxiliaries in the citation order. Then the division would be primarily according to place and secondarily according to time:

622(1/9)	Mining at various places
622 (1/9)""	Mining in various places, BC
622(1/9)"+"	Mining in various places, AD
622(1/9)"17"	Mining at various places, eighteenth century
622(410.197)	Mining in Cornwall
622(410.197)""	Mining in Cornwall, BC
622(410.197)"+…"	Mining in Cornwall, AD
622(410.197)"17"	Mining in Cornwall, eighteenth century

In this example, references to Cornwall are brought together, but references to the eighteenth century are scattered.

If there is no other preference, follow the standard citation order as follows. If there is no other preference, follow the standard citation order (reverse of filing order). But to bring together aspects that would otherwise be scattered, vary the citation order so as to place the relevant notation nearer the beginning of the compound (so affecting the filing order of the class number). The filing order is prescribed, but the citation order is optional.

#### **1.8 INTERCALATION**

the use of an auxiliary as an infix rather than a prefix or suffix. In other words, certain auxiliaries may interrupt a main number, creating a compound such as 622(430).341.1. The reason for this would be to create a more helpful arrangement of documents, or references to

It is



them, when classed. It is merely and extreme case of varying the citation order to produce a different sequence. In the example given in 2.4.4.3, the place auxiliary (410.197) was brought forward to precede the time auxiliary "17", giving 622(410.197)"17". Theoretically, it might be brought still further forward, and intercalated into the main number, giving 62(410.197)2"17". This would be useful only if one wanted to group all information on the subject 62 'Engineering', then subdivision it according to place (1/9) before proceeding to ...2 'Mining'. In practice, this is not likely, but there might be a need to group information Active Active A about a more specific activity, such as mining, in a given area:

622(410)	Mining-Britain
622(410).333	Mining-Britain-coal
622(410).34	Mining-Britain-metal ores
622(430)	Mining-Germany
622(430).333	Mining-Germany-coal
622(430).34	Mining-Germany – metal ores

or about institutions, such as laws, that vary from country to country:

#### 1.9 **SUMMARY**

UDC has developed both common auxiliaries and special auxiliaries. Its adoption of several connective devices proves it to be highly synthetic in application and usage. These auxiliaries form the vital connecting link between different facets of compound and complex numbers.

UDC has identified several relations between subjects and has established mechanisms to vary the order of facets such as independent auxiliaries, reversible relation and intercalation. These notation allows it to be highly accommodative and hospitable to a great extent. Since the division of classes is based on hierarchic enumeration the notation is expressive. It is capable of displaying numeric hierarchy. The notation contains a number of synthetic devices and is capable of allowing alternative approaches.

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#### 1.10 GLOSSARY

Citation Order: The order in which facets are cited in a number.

**Dependent Auxiliary:** A common auxiliary in UDC so called because it can appear only in conjunction with a main number. (see also Independent Auxiliary).

**Generally Recurrent:**Featurescommontoallsubjects,e.g.,form,language,etc.Common auxiliaries listed only once (see also Locally Recurrent).

**Independent Auxiliary:** A common auxiliary in UDC that may be used as a class number also. For example, it is possible to build a collection of areastudies by starting the number with the relevant space number. Here, the space facet is an independent auxiliary (see also Dependent Auxiliary).

**Infix:** Anelementoranumberthatinterruptsanothernumber, e.g., 622 is miningand 333 is coal so that 622:333 is coalmining. This number can be interrupted by infixing (410). Thus, in 622(410):333, (410) is an infix.

Intercalation: The device that facilitates infixing explained under Infixabove.

IrreversibleRelation: Therelationthatcannotbereversed. Therelation that does not allow permutation of the concepts in a compound number (see also Reversible Relation).

**Locally Recurrent:** Featuresspecialtocertainsubjectsonlyandnotapplicableto all, e.g., personnel in industry and the like. They are listed where applicable in the scheme (see also Generally Recurrent).

**Parallel Division:** When the same set of concepts appears at two places, or under two classes, in a classification, these concepts are listed only onceandreferenceismadetothemfromtheotherplacewhere theyaretoberepresentedinasimilarfashion. These two divisions under two classes are parallel to each other.

**Reversible relation:** The relation that can be reversed. The-two elements in a classification can be permuted or rotated if the relation between them is reversible (see also Irreversible Relation).

**Specificity:**Akin to particularity: If particularity is achieved through enumeration,specificityisachievedthroughsynthesis.The capability of a classification to

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represent all elements in a subject (see also Particularity).

#### 1.8 ANSWERS TO IN-TEXT QUESTIONS

1. Define Faceted or Analytico-Synthetic Classification.

In a faceted or analytico-synthetic classification system characteristics common to many categories are identified. These are then arranged into lists each of which represents a facet. The given subject are identified, and thus analysed into their common elements which can further be arranged together, recombined or synthesized by the user.

2. Parallel Division

It consists in the use of the same notation denote a given concept in more than one placesignaled in the tables by the sub-divide sign as. This sign indicates that the numberpreceding it has to be divided as the number following it. This device produces ananalogous array with the same concepts expressed by the same sequence of digits.

3. Mnemonics

Mnemonics results from the use of the same notation presenting a given concept wherever that concept occurs in the scheme.

4. UDC Notation

As discussed the UDC notation are alpha numeric symbol following are the sets of symbols:

- i) The ten Indo-Arabic numerals: 0, 1.to 9.
- ii) The Roman alphabets both capital and lower case.
- iii) Punctuation marks like point, semi-colon, colon and inverted commas.
- iv) Mathematical signs: the plus and the equals.
- v)It also includes parentheses, square brackets, the stroke and the apostrophe.
- 5. What do you understand by dependent common auxiliaries tables?

The dependent common auxiliary tables have no independent status and are always suffixed to the main class numbers. They cannot be used at the beginning and in the middleof the class number. It is generally used when there is need to expand a base number forlocal



variation to represent a specific concept in the classification. In such an occasion theasterisk mark (\* ) is to be used as notation for such non-UDC number.

#### 1.9 SELF-ASSESSMENT QUESTIONS

- 1. Describe the kinds and groups of Common auxiliaries?
- 2. What is the usefulness of Special Auxiliary in classification?
- 3. Define process of classifying a document using common auxiliaries in the universal decimal classification?
- 4. Elucidate with an example the function of parallel division in UDC classification.
- 5. What is interlacation?

#### **1.10 REFERENCES**

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#### 1.11 SUGGESTED READINGS

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#### **UNIT- II: Advance Applications of Universal Decimal Classification (UDC)**

## CLASSIFICATION OF COMPLEX SUBJECT DOCUMENTS

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#### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Classification
  - 1.3.1 Practical Classification Methodology
  - 1.3.2 Principles of Classification
- 1.4 Classification Process
  - 1.4.1Steps to Classification
  - 1.4.2 The Layout
  - 1.4.3 The Procedure
- 1.5 Examples and Exercises
- 1.6 Summary
- 1.7 Answers to In-text Questions
- 1.8 Self-Assessment Questions
- 1.9 References
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#### 1.1 LEARNING OBJECTIVES

- Steps to Classifications, layout and standard procedures
- Practical examples and practical learning of UDC classifications using common and special auxiliaries, citation order and other associated parameters

#### **1.2 INTRODUCTION**

UDC is primarily an analytico-synthetic numerical classification system. It belongs to that category of scheme which gives the classifier the maximum autonomy in constructing numbers for new specific subjects not enumerated in the schedules.

The methodology of practical classification is largely dependent on the facets into which the subject of a document is analysed. These methods are governed by certain principles which are discussed in this chapter.

In actual practice the entire exercise of classification is done mentally first, while identifying the subject category before drawing the whole class number in written. This chapter discusses the steps, approaches, procedures involved in classification with work out examples.

#### **1.3 CLASSIFICATION**

Classification is the process whereby similar things are grouped together, while dissimilar ones are separated. This Principle can be extended to ideas contained in documents and when it is applied there emerges the field of library or document classification. Thereforthe term ideas denote a diversity of concepts, perceptions or items of information. This implies that when things (i.e. ideas) have some common or distinctive features, which differentiate them from others, the former can be grouped together into a class. Things which do not have the common feature are excluded. This class can, in turn, be divided into smaller classes on the basis of common distinctiveness. The process is continued until the entire gamut from the universe of knowledge toa class with only one number is, theoretically, covered. All useful classescontaining groups of related things lie between these two 'extreme ends.



For division of classes into mutually exclusive classes, the principles of division (characteristics) are brought into play. Classes are then divided into subclasses by the application of one characteristic of division at a time. A second characteristic is next applied to the subclasses to yield further subclasses. The process continues till the characteristics are exhausted and the subject has been classified to its minute details.

UDC is primarily an analytico-synthetic numerical classification system. This implies that the UDC belongs to that category of scheme which gives the classifier the maximum autonomy in constructing numbers for new specific subjects not enumerated in the schedules. In fact, all modern schemes of classification are faceted to a certain degree, i.e., they provide tables of constant numbers for divisions relating to time and to space. In other words, a classification scheme which allows the classifier to build up the notation for a particular document from various unit schedules is called an analytico-synthetic classification. The faceted classification is also called analytico-synthetic because the subjects are analysed into their elements which have to be recombined or re-synthesised. It may be repeated here that the UDC is analytico-synthetic because it is the result of an endeavour to develop an enumerative scheme, i.e., DDC, into a faceted classification making UDC an ideal tool for subject classification. Documents when classified by the UDC can be arranged in their respective subject areas so that the information contained in them can be retrieved quickly and easily. Further, the UDC is invaluable in classifying the subject areas of science and technology. Due to non-dependence on alphabet or language it has been accepted internationally. Its constant amplification and modification to meet the emerging needs spans the ever-increasing universe of knowledge.

#### **1.3.1 Practical Classification Methodology:**

The methodology of practical classification is largely dependent on the facets into which the subject of a document is analysed. The meaning of 'facet' needs to be made explicit. It may be recalled that the totality of divisions of a basic class according to a single train of characteristics is said to constitute one of its facets. The concept of facet may not be comprehensible to those who are not familiar with the theory of classification.



To them, the facet will appear as synonymous with the 'element' or 'aspect' of a subject. They are advised to consider the basic class as a cut gem; a cut gem has many faces each of which can be called as its facets. Similarly, the subject of a document has many faces; these faces may be considered as facets of the basic class of a subject. The problem of practical classification can be viewed as the process of analysis and synthesis of concepts underlying the subjects. So, the process of analysing subjects into their facets (or categories) and the subsequent operation of combining terms from different facets to constitute a subject, compound or complex, will now be described. Thus when these facets are represented by numbers and then combined, the number for the subject as a whole is obtained.

As discussed in 2.3.2. The subject of a document having more than one aspect or elements is considered as being made up of facets and a subject with more than one aspect (or facet) may be considered. In such case, when these different aspects so selected as to represent multiple facets of a subject are represented by numbers and these in turn are integrated to form the class number of the subject the facets are said to have been cited. In other words, each facet symbolises a particular aspect of the subject. Thereafter, these aspects (or facets) can be aligned in a certain prescribed sequence. This prescribed sequence (or order) of alignment of facets is known as the citation order; it is also known as the facet formula.

#### **1.3.2** Principlesof Classification

The British standard attempts to provide a theoretical base for the UDC classification. In doing so, it lays down a number of principles for deciding upon an acceptable citation order of facets. These principles, which are somewhat hypothetical, are outlined as follows:

(i) Subject factors will have precedence over others, e.g.

547 (031) Organic chemistry: encyclopaedia

Here, the subject factor 'organic chemistry' is cited first, followed by the 'encyclopaedia', which, being merely the form of presentation is the secondary aspect of the subject. But, if it



is desired to have all these forms (e.g. encyclopaedia at one place in the interest of users, then the document will have the following class number;

03:547 Encyclopaedias: organic chemistry (*ii*)Traditional way of looking at subjects, e.g.

#### 820—1 English poetry

As the users expect to find 'poetry' under literature which is the traditional way of looking at subjects, the number 820-1 will be appropriate.

The other alternative is to classify the subject under linguistics by allotting the number 802; 82-1 which represents English poetry from a linguistic viewpoint. The number is not suitable because poetry is related more to literature than linguistics.

#### (iii) Most concrete to least concrete

This principle of citing more concrete facets before less concrete ones had been formulated by Ranganathan in Colon classification and is expressed through his facet formula PMEST, i.e. Personality—Matter—Energy—Space—Time.

But, the conceptual preciseness of the term 'concrete' is elusive due to the following reasons. According to this principle of decreasing concreteness, the facet 'time' is the least concrete in the facet formula, PMEST. But the 'time' is an important factor in all the fine arts, i.e., paintings, architecture etc, It may, therefore, find precedence over other facets which are more concrete than the 'time' facet.

The citation order of the UDC scheme is flexible enough to accommodate such eventualities, as will be evident from the following example:

Twentieth century jazz music in the U.S.A,

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This subject can be represented by any of the following numbers:

"19" 785. 16 (73) 785 "19" 16 (73) 785. 16 "19" (73)

In the UDC scheme, the time auxiliary is usually cited after the main number. But, as the quotations are biterminal, they permit reversal of the order of intercalation.

#### (iv)Means to be subordinated to ends:

The principle of subordinating means to ends is based on the fact that to get an end-product, some kind of operation is necessary, e.g.

671.202	Fancy jewellery: Manufacturing process,
from 671.2	Fancy jewellery
and 67.02	Manufacturing process

In this number, the operation 'manufacturing process' has been subordinated to the endproduct 'fancy jewellery',

#### (v) Subordination or dependence one facet to the other

This principle which is a corollary of (iv), can be explained: as follows: when 'part' is dependent on 'kind', and 'kind' is, in turn, dependent on 'whole', then the citation order will be 'whole-kind-part' and not the other way around, e.g.

629.735.3.035.5

Propellers of landplanes

The subject can be analysed in terms of standard facet formula as follows:

Aircraft—Landplanes—propellers



The citation order, if based on the aforesaid principles is supposed to reflect users' interests, consistency of approach and ensure a helpful order of elements within a class number. Based on this hypothesis, the following standard facet formula for the citation of elements has been propounded in the BS, 1000C (1963):

Whole thing—Kinds—Parts—Materials—Properties— Processes—Operations—Agents.

All these elements are unlikely to get reflected at-a time in the subject matter of a single or all documents. But, the chances do exist that some of these elements will occur in nearly all documents. So, it is surmised that if classifiers follow this standard facet formula, they will arrive at correct conclusions regarding the citation order of facets and be able to formulate numbers consistent with the subject of documents.

This standard facet formula contains such terms denoting multiple aspects of a subject which may appear as overlapping to many. Nevertheless, the array of these aspects in the standard facet formula stresses the basic principle of alignment whereby the 'most concrete' is followed by the 'least concrete'. This idea is an offshoot of Ranganathan's chain indexing.

#### 1.4 CLASSIFICATION PROCESS

#### 1.4.1Steps to Classification:

In 'Prologomena to Library Classification', Ranganathan has proposed for the adoption of nine successive steps for the classification of documents. It was proposed in the context of colon classification but this may serve as a base for other classification scheme as well. Step 0 Raw title: Name of the subject as is found in the title page of a document Step 1 Expressive title (to be derived from the Raw title) Step 2 Title in Kernel terms (to be derived from the Expressive title) Step 3 Analysedtitle (to be derived from the Kernel title) Step 4 Transformed title (to be derived from the Analysed tithe) Step 5 Title in 'Standard terms (to be derived from the Analysed title)

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Step 6 Title in Facet terms (to be derived from the title in Standard terms)Step 7 Class number (to be derived from the title in Facet terms)Step 8 Verification (the synthesised class number has to be translated, analysed, interpreted and verified)

Conciliatory Approach: As discussed in 1.3.2. A class number is built up of elements starting from the "most concrete' to 'least concrete' aspect. In contrast to it, the primary index entry with full-length chain based on it, has the sequence of elements aligned from the 'least concrete' to "most concrete' aspect. If this order is reversed, then the elements will get aligned in the same order as that of those in the class number. This alignment of elements in the order of decreasing concreteness may be termed as the chain index in reverse. It, therefore, becomes logical that such an alignment of elements, which follows the "most concrete' to 'least concrete" sequence be chosen for practical classification. Thus, the reversed order of elements in a primary index entry with full-length chain is the base on which class numbers should be built. For example, the following subject may be considered:

Maintenance of diesel engines.

If the subject is chain indexed, then the primary index entry with full-length chain will assume the following form:

Maintenances: Internal combustion engines (diesel type): Mechanical engineering: Engineering.

When the chain is reversed, the following form emerges-Engineering: Mechanical engineering: Internal combustion engine (diesel type): Maintenance

After these elements are substituted by respective class numbers, the following sequence is derived:

62:621: 621:4:621.43: 621.436.1:62-7



In an evolutionary process, the lower species get extinct and complex ones survive. The analogy, though rather far-fetched, can be cited when one sees how classes, subclasses and subdivisions gradually fade away evolving into a number, which may be simple, compound or complex.

Thus, in the following example, these individual numbers ultimately merge into621.436.1 which, when joined with 62-7 by colon becomes a complex number, i.e. 621.436.1:62—7 Maintenance of diesel engines,

The facet indicator can be eliminated, and integrated class number expressed as follows: 621.436.1—7 Maintenance of diesel engines.

Thus it should be noted that the entire classification analysis has to be conducted through a mental exercise before actually the documents are classified. However, for the understanding of the users, the steps will be traced in the examples that will follow. While doing actual classification work, these intermediate steps need not be written down. With a little practice on these lines, the classifier will be ableto comprehend all the steps and arrive at the appropriate class number.

#### **1.4.2The layout:**

The principal divisions are preceded by special auxiliary subdivisions in all the classes. The implications of such a layout of special auxiliary subdivisions will be apparent from some examples which have been derived. We will dwell on exposition explaining the process of formulation of these numbers with the help of special auxiliary sub divisions. These auxiliaries are used for constructing numbers for subjects not enumerated in the schedule. Few examples are as follows:

and 621.922.025	Abrasive wheels
from 621.922.2	Abrasive tool with carborundum
621.922.2.025	Abrasive wheels with carborandum
Example- 1.	

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(special auxiliary)

The number 621.922.2 has, in turn, been, formulated with the help of parallel division  $621.922.1/.8 \approx 621.92.1/.8$  as shown below:

621.922.2

from 621.922 and 621.921.2

Example- 2:

621.924.924.37.046

from 621.924.37

Internal face-grinding machine

centerless grinding

Centreless grinding

Internal face-grinding machine for

Abrasive tool with carboarandum

Abrasive tools Carborundum

and 621.923.046

(Special auxiliary)

The number 621.924.37 has been formulated with the help of parallel division  $621.924.3 \cong 621.924.5$  through a process as shown below:

621.924.3	Internal face-grinding machine
from 621.924.3	Face-grinding machine
and 621.924.57	Internal grinding machine
Example- 3.	
621,927,4.084	Fine crushing plant with rollers
from 621.927.4	Crushing plant with rollers
and 621.927.0684	Fine crashing

(special auxiliary)

It is interesting to note that the special auxiliary subdivision 621.927.084 has been derived from the parallel division 621.927.082/. 086 \approx 621.926.082/.086 through the following process:

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621.927.084 from 621.927 and 671.926.084 Fine crushing Crushing Reduction to granular form.

#### **1.4.3The Procedure:**

The methodology presented in section 3.1.1 requires to be tested against problems which a classifier faces while classifying some compound subjects embodying scientific and technological advancements. The ease and clarity with which these problems can be solved is construed as the merit of the scheme. To that end subjects have been selected at random for classification from different sources and presented. Work out examples has been so chosen as to represent a cross-section of subjects and diverse techniques used in classifying them. These examples have been selected from various published sources. This entire exercise is designed to arouse interest in all categories of users of the UDC Scheme.

Again it is stressed that in actual practice the entire exercise is done mentally first while identifying the subject category before the end result in the form of whole class number is written down. This applies to professionals and classifiers as well. Students areadvised that subject analysis be done on a paper to avoid missing links in the class number before arriving at the class number. The overall result will be the elimination of possible errors and arrival at the appropriate class number.

#### 1.5 EXAMPLES AND EXERCISES

As stated in the preceding paragraphs, the following examples have been selected for illustrating the points discussed so far:

(1) The commonwealth conference on apartheid in South Africa, held in 1986 Subject analysis:

Commonwealth	Apartheid	South Africa
Conference		

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1986

		MASTER OF LIE	BRARY AND INFORMATION SCIENCE
All Line And			
061.3(41-44)	323.118	(680)	"1986"
Class number: 061.	.3(41 - 44):323.118(	580) "1980"	
(2) Effects of chem	nical fertiliser on the g	rowth and develor	oment of high vielding variety
(HYV) rice plants:	case studies inexperi	ments	
Subject analysis:	cuse statics mexperi	inclus.	
Rice plants	Variations	Fertilisers (a	rtificial)
Theo plants	mutations,	i ortiniseris (u	
633 18	581 5	631.82	S.Y
055.10	501.5	031.02	
Class number: — 6	33 18.581 15.631 82		
Class humber.	55.10.501.15.051.02		1Sr
(3) Technology of	large-scale vacuum di	rving of corn flake	
Subject analysis:			
Corn flakes	Vacuum		Mass production
664 784 - 8	66 047 2	nying	658 526
004.784 - 8	00.047.2	O'	030.320
Class number: 664 784 8:66 047 2:658 526			
	.704.0.00.047.2.030.3	20	
Noto: The term 'm	ass production' can be	o considered as equ	uivalant to flarge scale
note. The term into	ass production can be	e considered as equ	urvalent to large-scale
production .			
(4) Steel for earthq	uake resistant structur	res.	
Subject analysis:			
Steel		Foundations	resistant to earth tremors
691.714		624.159.1	
Class number:— 69	91.714:624.159.1		

(5) Energy spectra produced by the interaction of antiprotons with other particles.

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Subject analysis:

Antiprotons	Interaction wi	th other particles	Energy spectra
539. 125.4	539.1217		539.12164
Class number: — 53	39.125.417.164		
(6) Review of dry la	and agricultural re	search in India during 1	1971-81: Progress Reports
Subject analysis:			c
Dry farming	Research in India	during 1971-81	Progress reports
631.586	001.5(540)	"197 1/1981"	(047.1)
			ST
Class number— 631	1.586.001.5(540)	"1971/1981" (047.1)	2
		in	
(7) English language	e bibliography of	research in strategic gu	ided missile system of the
U.S.A.			
Subject analysis:		5	
Strategic guided	U.S.A	Bibliography	English language
missile system			
632.462.14	(73)	(01)	=20
Class number: $-63$	32.462.14(73)(01)	=20	
(8) Self-sealing tyre	s for use with pol	ice vehicles.	
$\bigcirc$			
Subject analysis:			
Police vehicles	Self-sea	ling tyres	
629.114.476	629.11.0	012.558.4	
Class number:— 62	9.114.476.012.55	8.4	

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Note:—The number 629.11.476 for police vehicles has been derived with the help of the parallel division 629.114≅629.1-4 as follows:

	629.11.476	Police vehicles	
from	629.11	Road vehicles	
and	629.1-476	Vehicles for polic	ce
(9) Incidence of end	ephalitis among infa	nts of low-lying areas of A	Assam: A bibliographical
study.			c
Subject analysis:			o l
Encephalitis:	Children:	Assam, below level	Bibliographic
		, c	description
616.831 - 002	- 053.6	(541.1—197.2)	(048.1)
Class number: - 616	5.831	(541.1—197.2)(048.1)	
Note: - The number	for the low-lying are	eas of Assam has been form	nulated as under:
	Ċ		
	(541.1—197.2)	Low-lying area	s of Assam.
from	(541.1)	Assam	
and	(I - 197.2)	Below level	
(10) Impact of infor	matics on vocational	and continuing education	in India.
Subject analysis:			
Information work	Vocationa	l education India	
techniques			
659.21	377.4	(540)	
Class number:- 659	9.21:377.4(540)		

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11) Papers and proceedings of the International Conference on the effects of environmental pollution on human life.

Subject analysis:Pollution depredations onon humanshumansConference502.57061.3(100)(061.3)

Class number: -502.57:061.3(100)(061.3)Note: It may be noted here that the number (061.3) has been derived with the help of the parallel division (061/069)≅061.1/9 as shown below:

(061.3)	Conference publications
From (061/069)	Publications of a particular kind of
	society or organisation
and (061.3)	Conferences etc,

12) Social welfare schemes for leather industry personnel of Tamil Nadu: A bibliography. Subject analysis:

Leather industry	Social welfare	Tamil Nadu	Bibliography
personnel	scheme		
675—051	36.07	(548.1)	(O48)

Class number: — 675—051:36.07(548.1) (048)

Note: The number 675—051 has been formulated through the following process:

675-051	Leather industry personnel
from 675	Leather industry
and - 051	Persons as practitioners



13) Measurement theory and its application in library research.

Subject analysis:

Measurement theoryLibrary functions etcResearchClass number:- 303.21:021.001.5

(18) Current research topics in clinical and community psychology (a bibliographical serial published in the U.S.A. since 1972).
Subject analysis:
Clinical and community psychology, research in U.S.A
159.91.922.27.07 (73)
Class number: -159.91.922.27.07(73) "1972/1986"

Note: The following points may be noted here:

(i) The number for 'research in clinical and community psychology, has been formulated through the following process:

	159.91.922.27.07	Research in clinical and community psychology
from	159.91	Clinical psychology
and	159.922.27	Community psychology
and	159.07	Research in psychology

(ii) The year 'since 1972" may be considered as the continuation of it, i.e, 1972-1986, So, the time can be written as "1972/1986."

(iii) The auxiliary (05:048.1) has been formulated through the synthesis of two different auxiliaries as shown below: —

(05:048.1)	Bibliographical serial.
from (05)	Serial publications
and (048.1)	Bibliographic descriptions.



(19) Fusion reactors using high-temperature rotating Plasma.

Subject analysis:

Fusion reactors:rotating plasma High temperature plasma. type

621.039.629 533.921.6

Class number:— 621.039.629:533.921.9 Note-— The number 533.921.6 has been formulated: through the following process:

	533.921.6	High temperature plasma
from	533.92	Plasma reactors
and	533.916	High-temperature plasma.
		1017

#### 1.6 SUMMARY

UDC is an analytico-synthetic- classification with the added advantage of flexibility in the citation order for facets. This flexibility, in citation order is due to the provision of devices of intercalation and reversible relation. The UDC-includes two kinds of tables: main and auxiliary. While the former represent its enumerative character, the latter lend it its analytico-synthetic character. As discussed above the auxiliary tables comprises Common and Special Auxiliaries. While the common auxiliaries are generally recurrent, the special auxiliaries are locally recurrent. The degree of detail achieved by UDC through hierarchical enumeration in the main tables and through facetisation with the help of auxiliaries makes it a truly bibliographic classification. It is extremely flexible where a library can adjust and develop special classification series with relative ease. This is because the citation order in any given class often allows several alternative treatments (intercalation and reversible relation). It is ideally suited to special libraries, as its full edition contains subject schedules of minute description. Special subject editions are also 'separately available. The standard edition can take care of almost all subjects. The UDC is an international effort and caters to universal needs. It is at once suitable '.for general and special collections. UDC is the



preferred scheme of classification especially with science libraries both nationally and internationally.

#### 1.7 GLOSSARY

**Class Identifier:** It is a unique identifier assigned to each class. It identifies the meaning of the relationship between the representation of the class and its notational number or UDC number.

**Broader Class:** It represents a class, which is super-ordinate class, i.e., the class above the given class in the hierarchy.

Sub-division: These are three-digit numbers derived from two-digit subclasses. e.g., (504) Environment.

**Simple Number:** A number taken from a single place in the table and cited on its own whether a main number or an independent auxiliary.

**Compound Subject:** In a compound subject, more than one element within a conventional class gets reflected within it. A compound subject can accordingly be represented by a number.

**Analytico-Synthetic**: A freely faceted classification based on postulates and classification principles for analysis and synthesis of the subjects.

#### 1.7 ANSWERS TO IN-TEXT QUESTIONS

1. Soviet economic aid to India, an analysis and evaluation

Law -34

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ofDelhi



International law -341 Economic aid - 341.232.3 Russia- (47) Economic development -330.34 India - (540) Evaluation- 001.818 Class number- 341.232.3(47):330.34(540):001.818

- Proceedings of wood heating seminar Fuel technology of wood -662.71 Class number - 662.71(08)
- Handbook of energy conservation for mechanical systems in building Economics of Energy -620.9
  Building -69
  Class number: 620.9:69(035)
- 4. Agricultural biotechnology in developing countries Biotechnology - 606 Agriculture - 63 Developing country- (1-773) Class number - 606:63(1-773)
- 5. The 'project tiger' campaign in India, and its aftermath Tigers- 599.742.7
  Wildlife Conservation-502.2
  India- (540)
  Class number- 599.742.7:502.2(540)

#### 1.9 SELF-ASSESSMENT QUESTIONS

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- 1. UDC is known for its flexibility and hospitality explain.
- 2. Discuss in brief the principles of classification.
- 3. List out the classification process.
- 4. Classify the title "Climate resilience in India in last decade using renewable technology application".
- 5. Classify the title "Wealth from Waste".

#### **1.10 REFERENCES**

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#### 1.11 SUGGESTED READINGS

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**2. McLLWAINE (I C).** The Universal Decimal Classification: a guide to its use. 2007. UDC Consortium, The Hague, Netherlands.

**3. UNIVERSAL DECIMAL CLASSIFICATION.**(Latest Edition).British standards institution, London.

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onoch, cou, sou, university of politi

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# LESSON 1 NON-BOOK MATERIALS

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Non Book Materials: Definiton& Types
  - 1.3.1 Uses of non book materials
  - 1.3.2 Chief sources of information
  - 1.3.3 Levels of description
- 1.4 Complexity of Periodicals
  - 1.4.1 Problems in cataloguing periodicals
  - 1.4.2 Rules and procedures for cataloguing periodicals
- 1.5 Manuscripts
- 1.6 Cartographic Materials
- 1.7 Microforms
- 1.8 Graphic Materials
- 1.9 Summary
- 1.10 References
- 1.11 Suggested Readings

# **1.1 LEARNING OBJECTIVES**

# After reading this Unit, you will be able to:

- describe non-print media;
- categorise different types of non print media;
- discuss the bibliographic description of non-print media, their structure and sources of information
- learn cataloguing of various non book materials



# **1.2 INTRODUCTION**

You have learned about various aspects of cataloguing in previous lessons. These are discussed in the context of print material cataloguing. Libraries are acquiring an increasing number of non-print materials these days. Though there are many similarities between these two media, there are many unique characteristics of non-print media in terms of cataloguing details. This lesson will cover the cataloguing of various non-book materials.

# 1.3 NON - BOOK MATERIALS: DEFINITION & TYPES

Non Book Materials (NBM) are materials that do not fit the definition of a book, periodical, or pamphlet and require special storage, such as audio-visual materials, microforms or computer files, or electronic resources. It is commonly understood to be any non-printed book resource material that contributes to the learning process. In order to exploit information from those formats, the NBM require special treatment in terms of bibliographic description. "Non-book" is defined as "something other than a book; being a manuscript, microfilm, map, or other library holding that is not a book" by Webster's Third New International Dictionary. According to Harrold's Librarian's Glossary, NBM is "those library materials that fall under the definition of special holding, such as audio-visual materials, vertical file materials, microforms, or computer files."

The cataloguer faces a challenge with non-print material due to its diverse nature and physical characteristics. Cataloguing aids in the acquisition of bibliographic control over non-print media. It also improves access to materials in the library and across networks.

Cataloguing non-print media necessitates familiarity with a wide range of information, including the General Material Designation (GMD), specific physical characteristics of individual formats, and the software and hardware associated with the item's uses. The library/information centre must make decisions on the following issues in order to establish cataloguing procedures for non-print media.

There are various types of non-book materials like:

# **Cartographic Materials**

- Ariel Chart
- Leaf
- Ariel Remote Sensing image
- Atlas
- Celestial Globe
- Chart
- Globes

- Map
- Plan
- Relief Model
- Remote Sensing Image
- Space Sensing Image
- Topographic Drawings



# Name of the Course

Shiversity of Delhi

#### **Sound Recordings**

- Sound Disc
- Sound Cartridge
- Sound Cassette
- Sound \_ Track Film

Reel(Cassette)

#### Music

- Score
- Condensed
- Minature Score
- Chorus Score

#### **Manuscripts**

- Item (for collection of manscripts.)
- Box

# **Motion Pictures and Video Recordings** ot.

- Film Catridge
- Cassette
- Video Cassette
- Video Disc
- Video Reel

#### **Graphic Materials**

- Art Original
- Art Print
- Art Reproduction
- Chart
- Film Strip
- Kit

#### **Computer Files**

- Data Files
- Program File

- Photograph
- Picture
- Post Card
- Slide.
- Technical Drawing
- Transparency

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- Object Program

#### Microform

- Aperture Card
- Microfiche
- Micro Film Cartridge Cassette Reel

#### **Three-Dimensional Artefacts and Realia**

- Art Original
- Realia
- Game
- Diorama
- Model

#### 1.3.1 Uses of Non- Book Materials:

Some of the uses of Non Book Materials are:

- minersity of Delhi NBM as a storage medium offers a potential alternative access to information because • of its enormous information storage capacity at a low cost.
- With NBM, data damage is greatly reduced, and information can be retrieved and transferred quickly and accurately.
- Their durability quality allows for repeated use of information without deterioration or loss.
- There is currently a trend toward compressing information carriers so that they take up less space and are easier to store and distribute.
- They provide security, accessibility, portability, dependability, economy, easy retrieval, and easy updating.
- Microform can be used to store rare books. A CD-ROM can hold the entire set of • Encyclopedia Britannica, Chemical Abstracts, and Biological Abstracts.

There are different types of non-book materials. They are found in various forms such as cartographic materials, motion pictures, sound recording, graphic and other computer files. AACR-2R provides specific rules for cataloguing such materials.AACR-2 specifies the sources of information to be used in describing a publication; for example, in the case of a printed monograph, such sources include the title page, the verso of the title page, and so on. The chief source of information is the source of bibliographic data to be given first preferences as the source from which a bibliographic description is prepared. For each type of material, the rules identify a primary source of information.



#### 1.3.2 Problems of Cataloguing Non-Book Material

- Information may be difficult to obtain from the documents to be catalogued than with
- conventional documents having title page.
- Information collected from one source in the NBM may differ with that obtained from another source of documents.
- It may be harder to reach the cataloguing decisions with reference to choice of access point i.e. determination of heading or in other words to decide the person who is chiefly responsible for the intellectual content of the document, which is less experienced in case of books and serials.
- Information about physical description of different types of NBM definitely creates problems for cataloguer rather than that for conventional documents,
- Not possible to obtain information through the naked eyes as it requires special equipments.
- John Horner at the same time in his book Special Cataloguing has discussed a number of possible problems along with the two above problems as stated by Hunter. The problems stated by Horner are:
  - ✓ The materials may be more fragile, rare and expensive than normal book-form materials.
  - ✓ Special subject knowledge and that of the relevant rules in catalogue code may be needed to catalogue the materials thoroughly and quickly.
  - ✓ Special knowledge and experience of the physical form may be needed.
  - ✓ Special cataloguing tools that is, codes and thesauri may be needed.
  - ✓ Hence, it may be necessary to compile one's own aids because of the variety of the type of material.
  - ✓ With the publication of AACR-2, Amendments and AACR-2002, the cataloguing of NBM has become easy, clear and standardised.

#### **1.3.3Chief sources of information:**

Type of materials	Sources
Cartographic materials	Cartographic item itself Container or case, the cradle
	and stand of globe, etc
Manuscripts	Title page and Colophon
Music	Title page
Sound recordings	
Disc	Label
Tapes	Reel and Label
Tape cassette	Cassette label
Tape cartridge	Cartridge and label
Sound recording on film	Container and label



Motion picture and video recordings	Film and its container
Graphic materials	Item itself including any labels and the container
Computer files	Internal user label Information issued by publisher, creator, etc.
Microforms	Title frame

# **1.3.4** Levels of Description

One of the significant features of the ISBD is a set of prescribed punctuation. The prescribed punctuation mark precedes each element in the description and signifies thenature of that element. The prescribed punctuation marks are used as a device of recognition for both machine and human manipulation of bibliographic records. Specific and detailed rules with regard to prescribed punctuation are given in eachchapter in AACR-2.

Besides some punctuation marks necessary for NBM have been given below:

#### Parentheses ()

Parentheses are used to:

- enclose physical details of accompanying material.
- enclose the number of logical records after the designation for a data file; the number of statements and the name of programming language the designation for a program file; the number of logical records, or statements in each file after the designation for a multipart file; or the name, number, etc. mentioned after the designation for an object program.
- enclose the number of frames of microforms a filmstrip and the speed of a film or recording.

#### Plus Sign +

- precedes a statement of accompanying material.
- is used to indicate the Northern Hemisphere when giving the declination of the center of a celestial chart.

# Square Brackets []

- enclose information taken from outside the prescribed source or sources.
- enclose the general material designation.

#### **Areas of Description**

AACR-2 prescribes detailed rules for each area of description.In presenting data in the bibliographic description, information taken from the chief source of information is



preferred. If the information required is not available or is insufficient from the chief source, other sources are used.

#### **1.3.5** Structure of Description

The bibliographic description of NBM follows the same norms as for books and othermaterials. The main structure of the bibliographic entry comprises the heading, the description and the subject description. The structure of the bibliographic descriptionaccording to AACR 2R is given below(*International Standard Bibliographic Description for Non-Book Materials*).

#### First Level

The level was designed for minor-item and for entries in catalogues with a policy of minimum description. The bibliographic elements to be included are set forth in the following schematic illustration.

Title proper/First statement of responsibility, if different from main entry heading in formof number or if there is no main entry heading. Edition statement. Material (or type of publication) specific details first publisher, etc., date of publication, etc. Extent of item –

#### Second Level

This level was designed for the standard range of item found in the library and for entries in catalogues with a policy of standard description. The following elements are included: Title proper [General material designation] = Parallel title: other title information/First statement of responsibility, Each subsequent statement of responsibility. –Edition statement/First statement of responsibility relating to the edition,- material (or type of publication) specific details,-first place of publication, etc.: First publisher, etc., Date of publication, etc.. – extent of item: other physical details; Dimensions. –(Title proper of series/Statement of responsibility relating to series, ISSN of series; Numbering within sub-series) – Note(s). –Standard number. This level might appropriately be used in medium sized library

# Third Level

It includes all the rules applicable to the item being catalogued. This level represents full description and is recommended for items which, in the context of the catalogue are considered to be important and rare. All elements set forth in the rules which are applicable to the item being described are included, it is appropriate to large libraries and research collections.

#### **Entry Structure**

7 | Page



Call No	
	Heading
	Title proper [GMD] = parallel title: other title information/ first statement of responsibility; each subsequent statement of responsibility Ed. statement / first statement of responsibility of the edition Material Specific Details first place of publication: first publisher, date of publication.
	Physical Description (Number of physical units, Dimensions, Accompanying Material etc. ) (series). Notes. Standard Number and terms of availability I. Subject headings. I. Added entries (series)

# 1.4 COMPLEXITY OF PERIODICALS

A publication with a distinctive title which appears at stated or regular intervals, without prior decision as to when the last issue shall appear. It contains articles, stories or other writings, by several contributors. Newspapers, whose chief function is to disseminate news, and the memoirs, proceedings, journals, etc. of societies are not considered periodicals under the cataloguing rule. At the General Conference of UNESCO, held in Paris on 19th November, 1964, it was agreed that a publication is a periodical, if it constitutes one issue in a continuous series under the same title, published at regular or irregular intervals, over an indefinite period, individual issues in the series being numbered consecutively or each issue being dated. In statistical records, a periodical publication with a single system of numeration whether or not the title has changed. Where a change of numeration occurs, a new sequence starting at one irrespective of any change of title, is considered to be a separate Unit.

The following are some of the features of Periodicals:

- Every periodical is identified by its Title. For example India Today, Business India, are titles of periodicals.
- Periodicity Periodicals are published at regular intervals, e.g.,

Daily - Newspapers are published after one day, i.e., daily.

Weekly- Published after a week.

Monthly- Published after a month.

Quarterly- Published after 3 months.

Six monthly- Published after 6 months.

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Annual- Published after one year.

- Issues we receive various issues of a periodical, e.g., we receive 12 issues of a monthly magazine in a year. Every issue has a volume number, issue number and date or month.
- Every issue contains articles, papers written by different authors. Besides articles and papers, the journal may include book reviews, news and events, announcements, letters to the editor, short'communications and advertisements of products', services or contents of other periodicals.
- It is expected that the periodical will continue for a long time. However, sometimes the periodicals are discontinued, e.g., the famous magazine Illustrated Weekly of India.
- At the end of the year, all the issues of a periodical are collected together, arranged sequentially by issue number and sent for binding. While binding, the title page, contents page and index. (generally published after the year separately) are collected and bound along with the volume.
- These bound volumes are accessioned in the accession register.
- Generally one volume is published in a year. This volume has a serial number, period covered and year. Sometimes two or more volumes may he published in a year
- Periodicals are to be classified and catalogued.
- In many libraries, periodicals catalogue is kept separately. Printed catalogue of holdings of periodical publications is also brought out by many institutions.
- National Documentation Centres compile Union Catalogue of Periodicals, and publish them for public use.
- Union list of periodicals currently received in a city/region/state are also published for input into city based library networks like DELNET, PUNENET, etc

# **1.4.1** Problems in cataloguing periodicals

Cataloguing of periodical publications poses several problems because of their complexity, CCC describes that "their vagaries may transcend all imagination and anticipation. It looks as if nothing relating to a periodical publication can escape the sport of caprice-sponsor, name, periodicity, format, pagination, excrescential attachments to all or stray volumes, and, as but not least, span of life and resurrection". Some of the common problems faced by the cataloguer are, change in the name of the publication, while volume numbers continue, irregularity in publication, irregularity in volume number, change of sponsor, amalgamation of two or more periodicals into one, splitting of a periodical into two or more periodicals, change in frequency of publications and so on.

# 1.4.2 Rules and procedures for cataloguing periodicals

Some of the common elements which are applicable to catalogue the periodical publications are discussed in this section. Like any other document the Main Entry and Added Entry (i.e., Class Index Entries) are to be prepared. for Periodicals.

Name of the Course



#### **Main Entry**

Main Entry will have the following sections:

- 1) Leading Section
- 2) Heading Section
- 3) Periodicity Section
- 4) Series Note Section
- 5) Holdings-in-Brief Section
- 6) Tracing Section
- 7) Holdings-in-Full Section
- 1) Leading Section: In the Main Entry the leading section will have only the Class Number. In case of books you write both Class Number and Book Number. But for a periodical publication Book Number is not written in the leading section for the reason that the entry stands not for one volume but for all the volumes that are added to the library from time to time. The Class Number to be written with pencil. No full stop is to written after it.
- 2) Heading Section: Title is to be written in the heading section. This means entry is to be prepared under title of the periodical and not under editor of the periodical or publisher of the periodical, e.g., READERS DIGEST, BUSINESS INDIA, NATURE, SPAN, NAVANEET, SAPTAHIK HINDUSTHAN. First two words in the title are to be 'written in capitals.

If the periodical is an organ of an institution or sponsored by an organization and if the name of the sponsoring body is not included in the title of the periodical.

- 1) Title of the periodical should be written first.
- 2) Followed by a comma, and
- 3) Name of the institution/sponsoring body to be written in circular brackets.
- 4) Full stop is to be written after circular bracket.

# **Entry Structure**

Call No		
	He	ading
		<i>Title proper [GMD] = parallel title: other title information/</i>

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first statement of responsibility; each subsequent statement of responsibility. - Ed. statement / first statement of responsibility of the edition. - Material Specific Details. - first place of publication: first publisher, date of publication.

Physical Description (Number of physical units, Dimensions Accompanying Material etc. ). - (series).

Notes. ISSN Tracing

S.R. Ranganathan has recognized as many as 20 types of complexities of periodicals under 7 main headings(*E-PGPathshala*): mivers

- 1. Irregularities in volume number
- 2. Irregularities in publication
- 3. Change of title and sponsor
- 4. Amalgamation
- 5. Splitting
- 6. Supplement
- 7. Difference of places of periodical conferences

#### **MANUSCRIPTS** 1.5

#### Scope :

The rules cover the description of manuscripts (including type-script)materials of all kinds, including manuscript books, dissertations, letters, speeches, etc., legal papers (including printed forms completed in manuscript), and collections of such manuscripts for reproductions of manuscripts published in multiple copies.

# **Chief Source of Information**

The chief source of information for manuscripts is the manuscript itself. Within manuscripts, use (in this order of preference) information from the : Title page, Colophon, Caption, heading etc. Content of the manuscript If information is not available from the chief source, take it from the following sources (in this order of preference) : Another manuscript copy of the item, A published edition of the item, Reference sources, Other sources.

#### **Determination of Heading**

FDelhi



The entry is prepared same as works of personal authorship,. Rule 21.1A 1 states that "A personal author is the person chiefly responsible for the creation of theintellectual or artistic content of a work". Also the main entry can be done under 'Title' according to Rules.

#### **Edition statement:**

Transcribe a statement relating to a version of a manuscript that is different from otherversions.

Rule 4.4B. Date of manuscript

Rule 4.5B1. Give the number of leaves or pages

e.g. VII, 18 leaves; leaves 43-43; [3], 122 p.

Rule 4.5C1. (Physical Details):

Name the material on which the item being described is written if it is other than paper mivers

e.g. [2] leaves : vellum; [1] leaf : parchment.

Rule 4.5 D for dimensions

Rule 4.6. Series area : This area is not used for manuscripts

Rule 4.7B Notes area

Edition, place of publication, name of publisher, series, ISBN and materials are notused as these are irrelevant to manuscript. If it is handwritten, the word is used asholograph (s). Ms will be used for manuscript and Mss for collections of manuscripts.

HamareDeshbashiyon. Manuscript. Hindi Poems.

8 leaves. 2 leaves stained by water. There is a signed holograph on the manuscript.

Author- Ganpati Roy

#### **Cataloguing entry**

VastuShastra (1940-1950)

By Ganpati Roy

**Other information:** Call no.: 494.5 ROY

12 | Page



Leaves: 25 in 5 lines Size:  $30 \times 5$  cm. Accession no. 7651 In Hindi Contains coloured illustrations

Note: this manuscript is available with Ramachandra Goyal

# Main entry:

	Main entry:
494.5 ROY	5
	Roy, Ganpati
	VastuShastra [manuscript]/by Ganpati Roy. – 1940-1950.
	25 leaves (5 lines): col. Ill.; 30 × 5 cm.
	Ms. in Hindi.
	Available with Ramachandra Goyal.
	sol
	1. Hindi - Manuscripts. I. Title.
7651	
	Added entry (Subject):

#### Added entry (Subject):

494.5 ROY	HINDI-MANUSCRIPTS
	Roy, Ganpati
	VastuShastra [manuscript]/by Ganpati Roy. – 1940-1950.
	25 leaves (5 lines): col. Ill.; $30 \times 5$ cm.
	Ms. in Hindi.
7651	

13 | Page



Ava	ailable with Ramachandra Goyal
	1. Hindi - Manuscripts, I. Title.

# Added entry (Title):

494.5 ROY	VastuShastra
	Roy, Ganpati
	VastuShastra [manuscript]/by Ganpati Roy. – 1940-1950.
	25 leaves (5 lines): col. Ill.; $30 \times 5$ cm.
	Ms. in Hindi.
	Available with Ramachandra Goyal
	Un.
	1. Hindi - Manuscripts. I. Title.
7651	

# **1.6 CARTOGRAPHIC MATERIALS**

Cartographic materials include two and three-dimensional maps and plans, aeronautical, navigational, and celestial charts, atlases, and globes, and all materials that represent the earth or any celestial body, in whole or in part. Block diagrams, sections, aerial photographs for cartographic purposes, and so on. The item itself or the container are the primary sources of information. The terms globe and maps. In the GMD section, are designated for all types of cartographic material. For cartographic materials, the 'Mathematical data area' is designated as the material or type of publication specific details area. This section contains statements about scales and projections. A cartographic item's scale is usually included in the item. If not, this can be established.The word'scale' should come before the word

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'the/information.' If the item is a multipart item with different scales, write'scales vary.' Similarly, information about 'Projections' is usually available in the item. The physical description area should include specific material designation and other physical details such as the number of maps in the atlas, colour, material, and mounting.

#### **Cataloguing structure:**

Call No	
	Heading
	<i>Title proper [GMD] = parallel title: other title information/</i>
	first statement of responsibility; each subsequent statement of
	responsibility Ed. statement /first statement of responsibility
	Statement of scale; Statement of projection first place of
	publication, distriutionetc: first publisher, distributor etc.; date of publication etc.
	Extent of item: other physical details; dimensions +
	accompanyingmaterial etc. ) (series).
	Notes.
	Standard Number and terms of availability
	Tracing

Fig: structure of the bibliographic description for cartographic materials

# Cataloguing entry: Maps: Map of India 4<sup>th</sup> edition Reprinted with minor corrections New Delhi Goyal Printing Press 1996 Other information: Call number: 917.54 GOY



Scale: 1 inch= 500 miles Accession number: 8550 Size:  $70 \times 30$  cm.

Note: 1 coloured plastic map.

# Main entry

	Main entry	N
917.54 GOY		
	Goval Printing Press (New Delhi)	
	Map of India [map]. – 4 <sup>th</sup> rev. ed. – scale 1 inch: 500 miles. –	
	New Delhi: Goyal, 1996.	
	1 map: col. plastic; $70 \times 30$ cm	
	Uni	
	1. India - Maps. I. Title.	
8550		
	COr	
<b>N</b>	Added entry-Subject	
917.54 GOY	INDIA- MAPS	
	Goyal Printing Press (New Delhi).	
	Map of India [map]. – 4 <sup>th</sup> rev. ed. – scale 1 inch: 500 miles. –	
	New Delhi: Goyal, 1996.	

1 map: col. plastic;  $70 \times 30$  cm

8550

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#### Added entry- Title

917.54	Map of India
GOY	
	Goyal Printing Press (New Delhi).
	Map of India [map]. – 4 <sup>th</sup> rev. ed. – scale 1 inch: 500 miles. –
	New Delhi: Goyal, 1996.
	1 map: col. plastic; $70 \times 30$ cm
	(nit
	1. India - Maps. I. Title.
8550	

#### Atlases:



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Scale of all Maps: 1:200,000. Accession number: 5884 Size:  $12 \times 8$  inches.

Note:60 textual pages, out of which 10 belongs to preliminary matters followed by 50 maps some of which are coloured.

# Main entry

940	
NAT	
	National Atlas Company (New Delhi). Atlas Sub-committee.
	Collins World Atlas [atlas] / prepared by Atlas Subcommittee
	of the National Atlas Company; –Scale 1: 200,000. – New
	Delhi: Goyal, c1956.
	1 atlas (x, 60 p.): 50 maps: some col.; 12 × 8 in.
	Hardcover Rs. 550
	SOL?
	1. World - Maps. I. Title.
5884	
	A so
	Added entry (Subject)

# Added entry (Subject)

940	WORLD- MAPS	
NAT		
<u> </u>		
	National Atlas Company (New Delhi). <i>Atlas Sub-committee</i> .	
	Collins World Atlas [atlas] / prepared by Atlas Subcommittee	
	of the National Atlas Company; – Scale 1: 200,000. – New	
	D 11 0 1 1050	
	Delhi: Goyal, c1956.	
	1 atlas (x, 60 p.): 50 maps: some col.; $12 \times 8$ in.	
5884		

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Hardcover Rs. 550	
1 India Mana I Tida	
1. muia - Maps. 1. 1 me.	

# Added entry (Title)

940	Collins World Atlas
NAT	$\mathbf{x}$
	National Atlas Company (New Delhi). Atlas Sub-committee.
	Collins World Atlas [atlas] / prepared by Atlas Subcommittee
	of the National Atlas Company; – Scale 1: 200,000. – New
	Delhi: Goyal, c1956.
	1 atlas (x, 60 p.): 50 maps: some col.; $12 \times 8$ in.
	Hardcover Rs. 550
	SOL.
	1. India - Maps. I. Title.
5884	

# 1.7 MICROFORMS

# Rule 11.0A Scope

It includes microfilms, microfiches, microopaques and aperture cards. Microformsmay be reproductions of existing textual or graphic material or they may be original publications.

# Rule 11.0B1 : Chief Source of Information

The title frame is the primary source of information for microfilms (i.e. a frame, usually at the beginning of the item, bearing the full title and, normally, publication details of the item.) In the case of a set of cards, the main source of information is the title card, or in the case of a set of cards, microfiche, and microopaques is the title frame. If such information is



unavailable or insufficient, consider the eye-readable data printed at the top of the fische or opaque as the primary source of information.

#### **Cataloguing entry**



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I. Tuli, Rohit II. Mathew, Ryan III. Title.

# **1.8 GRAPHIC MATERIALS**

#### Rule 8.0A. Scope

It covers the description of graphic materials of all kinds whether opaque (e.g. twodimensional art originals and reproductions, charts, photographs, technical drawings)or intended to be projected or viewed (e.g. filmstrips, radiographs, slides) and collections of such graphic materials.

#### Rule 8.0B1. Chief Source of Information:

It is the item itself including any labels, etc. that are permanently affixed to the item or acontainer that is an integral part of the item. If the item being described consists of twoor more separate physical parts (slide set, etc), treat a container that is the unifyingelement as the chief source of information if it furnishes a collective title and the itemsthemselves and their labels do not. If the information is not available form the chiefsource, take it form the following source (in order of preference):

Container (box, frame, etc.)

Accompanying textural materials (manuals, leaflets, etc.)

Other sources

Rule 8.4: Publication, Distribution etc. Area.

Rule 8.4 F2

Record the date of creation of an art original, unpublished photograph, or otherunpublishedgraphic item.

Portrait of Charles Dickens - 1964

Garden flowers [GMD]/Geoff Arnold. — [1898]

Fair Resemund. — [1910-1973]

(Unpublished photographs)

Rule 8.4. G : Place of manufacture, name of the manufactures, date of manufacture.

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sitt



Rule 8.4 G 1 : If the name of publisher is unknown, give the name of place and manufacturer as instructed in 1.4 G, if they are found in the item and have not beenrecorded in a statement of responsibility.

Fig. : (s.l. :s.n., 1966) (London: Allen press)

Rule 8.5 B 1 : Record the number of physical units of a graphic item.

4 wall charts 1 filmstrip catridge

200 slides 6 stereograph reels

ofDelhi Rule 8.5 B 2 : Add to the designation for a filmslip, filmstrip, etc. like

1 filmstrip (26 fr.)

1 flip chart (6 sheets)

Rule 8.5 C : Other physical details.

# **Cataloguing entry** Jack and Jill by Samuel Arnold New York Hamilton Films 1937 **Other information:** Call number: 640.1 A475 Accession number: 6021 No. of filmstrips- 2 (40 frames each), coloured and black & white + 4 sound cassettes (20 min. each). Size: 30 mm. Intended for audience grade 2-4

# Main entry

640.1		
		<b>22  </b> Page



A475	Arnold, Samuel
	Jack and Jill [filmstrip] / Samuel Taylor New York:
	Hamilton Films, 1937.
	2 filmstrips (40 fr. each): col. and b & w; 30 mm. + 4 sound cassettes (20 min. each).
	Intended audience:Grades 2-4.
	O
	1 Nursery rhymes I Title
6021	1. I valsely mynes. I. I ne.
	·JOT

# Added entry (Subject)

640.1	NURSERY RHYMES
A475	5
	Arnold, Samuel
	Jack and Jill [filmstrip] / Samuel Taylor New York:
	Hamilton Films, 1937.
	2 filmstrips (40 fr. each): col. and b & w; 30 mm. + 4
Ć	sound cassettes (20 min. each).
	Intended audience:Grades 2-4.
<b>N</b> Y	
$\bigcirc$	
	1. Nursery rhymes. I. Title.
6021	

23 | Page



### Added entry (Title)

640.1	Jack and Jill
A475	
	Arnold, Samuel
	Jack and Jill [filmstrip] / Samuel Taylor New York:
	Hamilton Films, 1937.
	2 filmstrips (40 fr. each): col. and b & w; 30 mm. + 4
	sound cassettes (20 min. each).
	Intended audience:Grades 2-4.
	s V
	0
	5
	1 Nursery rhymes I Title
6021	

# **1.9 SUMMARY**

In this lesson, an attempt has been made to describe the cataloguing rules item-wise for each of the non-book materials as laid down in AACR-2. Also many appropriate and relevant examples are provided along with each area of bibliographic description for easy understanding. Besides, the physical description of each type of non-documentary resource which differ from one another are also mentioned exhaustively after explaining rules vividly and clearly. Even in many cases, entries are prepared citing the information about a non-book material following the rules for cataloguing (including the choice of access point and areas of description) for quick and easy understanding.

# **1.12 REFERENCES**

International Standard Bibliographic Description for Non-Book Materials. (n.d.). 84.

# **1.13 SUGGESTED READINGS**



American Library Association. (2005). Anglo-American Cataloguing Rules, 2nd Revised Edition (2nd 2002 ed.). New York: American Library Association.

Lal, C., & Kumar, K. (2006). Practical Cataloguing AACR-2. New Delhi: EssEssPublications.

Pradhan, S. (2019). Cataloguing of Non-Print Resources: A Practical Manual. New Delhi: EssEss Publications.

Ranganathan, S. R. (1964). Classified Catalogue Code: With Additional Rules for Dictionary Catalogue Code. New York: Asia Pub. House.

Weihs, J. R., Lewis, S., & amp; Macdonald, J. (1989). Nonbook Materials: The Organization of Integrated Collections (3rd ed.). Ottawa: Canadian Library Association.

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# **LESSON 1**

# **CATALOGUING OF ELECTRONIC RESOURCES**

Naqvi

Shehbaz Husain

Associate Professor Jamia Millia Islamia Dr Zakir Husain Library shehbaz.n@gmail.com

# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Rules for Description of Electronic Resources
  - 1.3.1 Chief Source of Information
  - 1.3.2 Organization of bibliographic information
  - 1.3.3 Levels of description
- 1.4Sound Recordings
- 1.5Motion Pictures & Video recordings
- 1.6Electronic Resources (Computer Files & Web Resources)
- 1.6 Summary
- 1.7 Glossary
- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

# 1.1 LEARNING OBJECTIVES

In BLIS Course you were taught cataloguing of various kinds of print resources. In this Unit, you will be taught about the cataloguing of Electronic Resources. Like other non-print material, the difference in the cataloguing of Electronic Resources is with respect to physical media only, i.e., the same information may be available both in print or non-print media (e.g., microform) whereas, in some, the information content is intrinsic to the media (music, computer files, etc.)

After studying this Unit, you will be able to:



- know different types of information sources for cataloguing the Electronic Resources;
- prepare the various entries of a for different types of Electronic Resources; and
- list data elements associated with Electronic Resources.

# **1.2 INTRODUCTION**

AACR-2R provides specific rules for cataloguing different types of print and non-print materials including electronic resources. The General Rules for Description are given in Chapter 1 of AACR- 2R, which is for the description of all types of library material, both print, and non-print. The following steps are followed in the cataloguing of electronic resources:

- Identify the type of format;
- Identify the material it belongs to; and
- Then refer to the rules given in the specific chapter for that type of material.

Cataloguers are directed to the General Rules in Part I, Chapter 1 by the individual chapters for the description of non-print material.

In this Unit, we will restrict our learning to the description of electronic resources especially Sound Recordings, Motion Pictures and Video recordings, Computer Files, and Web

Resources only.

It is not possible to provide complete AACR rules in this Unit. We will give a brief outline of these rules for

# **1.3RULES FOR DESCRIPTION OF ELECTRONIC RESOURCES**

Chapter 1, Part 1 of AACR-2R 2002 Edition provides general rules for the description of all types of material- print and non-print both. Rules for specific kinds of materials are found in chapters 3 to 12. The rules for sound recordings are in chapter 6, motion pictures and video recordings in chapter 7, and electronic resources rules are in chapter 9.

In this Unit, we will confine ourselves to specific rules which are relevant for cataloguing non-print materials, especially for **Sound Recordings, Motion Pictures and Video recordings, Computer Files, and Web Resources**.

According to AACR-II, 2002 Edition, Chapter Number 9 has been renamed as "**Electronic Resources**" to include "all types of data (information representation numbers, text, graphics, images, maps, moving images, music, sounds, etc.) programs (instruction, etc., that process



the data for use), or combinations of data and programs.<sup>1</sup> Therefore this study material also we have to describe rules for cataloguing both Computer Files and Web Resources in one place as prescribed in AACR-II, 2002 Edition.

# **1.2.1 CHIEF SOURCE OF INFORMATION**

AACR-2R provides guidelines for the chief source of information for each type of non-print material separately. It has given a list to guide which source of information should be given first preference. These are given as follows:

(a) The material itself including the container where this forms an integral part of the item, for example, a cassette, or cartridge.

(b) The container where this is completely separate from the item for example; a box.

(c) Accompany data that is guides and other leaflets issued with the item.

(d) Other sources for example reference work.

If required information cannot be found in the sources mentioned above, the information is to be taken from the following sources, in order of preference:

- a) any other source that, forms part of the item 🔨
- b) accompanying item
- c) any available source
- d) compose yourself.

As you already know, if any information is taken from outside the item, it is to be enclosed in square brackets.

# **1.2.2 ORGANIZATION OF BIBLIOGRAPHIC INFORMATION**

The main entry of a catalogue according to AACR-II, consist of the following areas:

Title and statement of responsibility Edition Material (or type of publication) Publication, distribution, etc Physical distribution Series Note Standard number and terms of availability

Each of these areas is further divided into a number of elements.

# **1.2.3 LEVELS OF DESCRIPTION**



The rules in AACR-2R has provision of three levels of description of bibliographic information in an entry. The first level gives the minimum information, necessary to identify a resource. It is generally used in small libraries. The second level of description gives all the dataof the resource. It is used in for medium size libraries. The third level of description gives each element available in the resource under cataloguing. This level is mostly used in large libraries.

#### (i) The first level of Description

"Title proper/first statement of responsibility, if different from main entry heading in form or number or if there is no main entry heading. - Edition statement. - Materials (or type of publication) specific details. - First publisher, etc., date of publication, etc. - Extent of the item. - Note(s). - Standard number."<sup>1</sup>

**Example:** 

	<u>N</u> V	
971.2 Kur	Kurele	k, William
	c1982.	Selections from A prairie boy's summer [filmstrip] Random House,
456	I. Title	<ul><li>147 fr. + 1 sound cassette + 1 sheet.</li><li>1. Prairie Provinces- Social life and customs 2. Children Prairie Provinces</li></ul>

#### (ii) Second Level of Description

"Title proper (general material designation)- parallel title: other title information/first statement of responsibility relative to the edition: Material (or type of publication) specific details-First place of publication, etc.: first publisher, etc., date of publication etc.-Extent of item: other physical details; dimensions. - (Title proper of series/ statement of responsibility relating to series, ISSN of series: numbering within the series. Title of subseries, ISSN of subseries; numbering within subseries). -Note(s). Standard number."<sup>1</sup>

971.2 Kur	Kurele	k, William
	stories	Selections from A prairie boy's summer [filmstrip] / paintings and by William Kurelek. Westminster, Md.: Md.: Random House, c1982.
456	sec.) +	1 filmstrip (147 fr.): col.; 35 mm. + 1 sound cassette (17 min., 58 1 sheet. (Children's literature series)

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1. Prairie Provinces - Social life and customs. 2. Children -Prairie Provinces. I. Title



Based on a book published in 1975

Cassette has 1 side manual, 1 side automatic advance signals.

#### (iii) Third Level of Description

971.2 Kur	Kurelek, William
	Selections from A prairie boy's summer [filmstrip] / paintings and stories by William Kurelek; Random House/Miller-Brody Productions. Westminster, Md.: Random House School Division, c1982.
	1 filmstrip (147 fr.): col.; 35 mm. in container 23 x 19 x 5 cm. $+ 1$ sound cassette (17 min., 58 sec.) $+ 1$ sheet (28 cm.) (Children's literature
456	Credits: Music, John Pearce; narration, Richard Davidson; editor and designer, Sara KurtzBased on the book published: Montreal: Tundra; U.S.A.: Houghton-Mifflin, 1975 Cassette has 1 side manual, 1 side automatic advance signals Summary: A boy's summer in the 1930s on the Canadian prairies Producer's no.: 0-394-62944-2.
	1. Prairie Provinces - Social life and customs. 2. Children-Prairie Provinces. I. Title

#### **IN-TEXT QUESTION**

1. How many levels of description are provided in AACR-II?

(a) Four (b) Three (c) One (d) None of these

# 1.4 SOUND RECORDINGS

According to the glossary of AACR II, sound recording is described as "the recording on which sound vibration has been registered by mechanical or electronic means so that the sound may be reproduced". <sup>1</sup>Itincludes following items: Tapes, Rolls, Discs, sound pages, and sound recordings on film".

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# **1.4.1 Chief Sources of Information**

The AACR-II has prescribed the following chief sources of information for Sound Recordings. These are given in Table 2.

Туре	Chief Source
Disc	Disc and label
Tape (open reel to reel)	Reel and label
Tape cassette	Cassette and label
Tape cartridge	Cartridge and label
Roll	Label
Soundrecording on film	Container and label

**Table 2: Chief Sources of Information for Sound Recordings** 

# 1.4.2 Main Entry

The main entry for sound recordings is based on the same principles of authorship governing other types of library materials; entry will be under "the person chiefly responsible for the creation of the intellectual or artistic content of a work".

#### 1.4.2.1. Sound Recording of one work

The work(s) of one composer or author are entered under the name of that composer or author.

#### 1.4.2.2. Sound Recording of a Collection when the principal performer is indicated

A sound recording that contains musical or literary works composed or written by two or more persons is entered under the principal performer or group of performers as the case may be.

#### **1.3.2.3.** Sound Recording of a Collection when the principal performer is not indicated

A sound recording that contains musical or literary works composed or written by two or more persons and has no principal performers or more than three principal performers is entered:

(a) Under the title, if the sound recording has a collective title for the component parts.

(b) Under the heading appropriate to the first work; e.g., that on side 1, band 1 of a sound disc, if the item does not have a collective title for the component parts.

#### 1.4.2.4. Items without a collective title

These may be described in either of two ways:

- (a) As a unit.
- (b) In separate entries for each work.

These entries are linked by a "With" note.

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# 1.4.3Statement of Responsibility

If a person or group of persons are responsible for creating the intellectual content of the sound recording or who have contributed more to the recording than performance, then their names are recorded in the Statement of responsibility area. However, if they have merely performed, executed, and interpreted, then their names are given in the Note area only. This is as per Rule Number 6.1F of AACR-II.

# **1.4.4 Physical Description Area**

#### 1.4.4.1 Extent of Item (including SMD)

Record the number of physical units of a sound recording by giving the number of parts in arabic numerals and one of the following terms as appropriate: (Rule No. 6.5B1 of AACR-II)

nivers

Sound cartridge Sound cassette Sound disc Sound tape reel Soundtrack film Example: **1 sound disc** 

#### 1.4.4.2 Playing Time

Give the playing time of a sound recording. (Rule No. 6.5B2 of AACR-II)

Example: 1 sound disc (50 min.)

# **1.4.5 Other Physical Details**

# 1.4.5.1 Type of recording:(Rule No. 6.5C1 of AACR-II)

Give, for a disc or tape, the type of recording.

# Example: 1 sound disc (4.1) min.): analog 1 sound disc (56 min.): digital

1.4.5.2 Playing speed:(Rule No. 6.5C2 of AACR-II)

i) Give the playing speed of an analog disc in revolutions per minute (rpm).

# Example: I sound disc (45 min.): analog, 33 1/3 rpm

ii) Give the playing speed of a digital disc in meters per second (m. per sec.).

# Example: 1 sound disc (16 min.): digital, 71/2 m. per sec

iii) Give the playing speed of an analog tape in inches per second (ips).

# Example: 1 sound tape reel (16 min.): analog, 71/2 ips

iv) Give the playing speed of the soundtrack film in frames per second (fps).

# Example: 1 sound track film reel (to min.): magnetic, 24 fps

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rsity



#### 1.4.5.3 Groove characteristic:(Rule No. 6.5C4 of AACR-II)

Give the groove characteristic of an analog disc, if it is not standard for the type of disc.

#### Example: 1 sound disc (7 min.): analog 78 rpm. microgroove

1.4.5.4 Track configuration: (Rule No. 6.5C5 of AACR-II)

For sound track films, give the track configuration (e.g., centre track, edge track).

Example: 1 sound track film reel (10 min.): magnetic, 25 fps, centre track

**1.4.5.5Number of sound channels:** Give the number of sound channels, if the information is readily available, using one or more of the following terms as appropriate: (Rule No. 6.5C7 of AACP, II)

of AACR-II)

mono stereo quard

Example:

1 sound dis (56 min.): digital, stereo. 2 sound disc (66 min.): analog, 331, rpm, mono., stereo.

#### 1.3.5.6Dimensions

Give the dimensions of a sound recording as set out in the following rules.

Sound discs: Give the diameter of a disc in inches. (Rule No. 6.5D2 of AACR-II)

Example: 1 sound disc (20 min.): analog, 33 rpm, stereo.; 12 in.

Sound track films: Give the gauge (width) of a film in millimeters. (Rule No. 6.5D3 of AACR-II)

Example: 1 sound track film reel (10 min.): magnetic. 25 fps, center track:16 mm.

**Sound cartridges**: Give the dimensions of a cartridge in inches if other than the standard dimensions (5% x 3 7/8 in). Give the width of the tape in fractions of an inch if other than the standard width (in). (Rule No. 6.5D4 of AACR-II)

**Sound cassettes**: Give the dimensions of a cassette if other than the standard dimensions (e.g., the standard "dimensions of an analog cassette are  $37/8 \times 2\%$ . in.). Give the width of a tape if other than the standard width (e.g., the standard width of an analog tape is 1/8 in). (Rule No. 6.5D5 of AACR-II)

#### Example: 1 sound cassette (85 min.): analog, mono.; 7 1/4 x 31/2 in., 1/4in. tape

**Sound tape reels**: Give the diameter of a reel in inches. Give the width of a tape in fractions of an inch if other than the standard width (in.). (Rule No. 6.5D6 of AACR-II)



Example: 1 sound tape reel (60 min.): analog, 7 <sup>1</sup>/<sub>2</sub> ips. 2 tracks, mono; 7 in., <sup>1</sup>/<sub>2</sub> in. tape

# **1.4.6 Accompanying Material**

Give the details of the accompanying material if available. (Rule No. 6.5E1 of AACR-II)

Example: 1 sound tape reel (60 min.): analog, 7 <sup>1</sup>/<sub>2</sub> ips. 2 tracks, mono; 7 in., <sup>1</sup>/<sub>2</sub> in. tape + 1 pamphlet (12 cm)

# 1.4.7Note Area

General rules for descriptive information are also applied here. Other important things to be recorded in the note area are as follows:

(i) If the medium of performance for a musical work is not clear. from the title or the uniform title, it is given in notes; or if appropriate, these can be combined with contents note, e.g.: The second work for violin and string orchestra.

(ii) Date of recording is given.

(iii) Source of title paper. e.g.: Title on container:

(iv) Names of the performers, if considered important, are included in notes.

(v) Duration time may be given for a multipart item without a collective title that has been described as a unit, e.g.: Durations: 31 min.; 28 min.

(vi) A brief summary may be given for the contents of a spoken sound recording, e.g.: Summary: Store is and poems, told by Miranda with booklet for the child to read along with the recording.

(vii) Contents: Titles of the individual works catalogued under a collective title, if considered important may be recorded. If time is given for individual works, include this information.

(viii) Notes on publisher numbers: Serial album and record numbers are given as notes. The number is to be preceded by the label name and a colon, eg.: K-Tel: NU 9580

# EXAMPLE 1 MODERN VOICES PRESENTS Alice's Adventures in Wonderland The Lewis Carroll Classic-Complete



, De



Music composed by

Alec Wilder

Released by

**Bill Graurer Productions** 

New York

1957

**Other Information**:

Information on container

4 analog sound discs, total playing time 2 hrs. 56 min., 33 1D 3 revolution per minute, Mono track Size of each disc: 12 inches.

#### MAIN ENTRY



Example 2 <b>The Mikado</b> By	
Sir Arthur Benjamin And Sir Gilbert William	
New York	
	<b>10  </b> P a g e


Moss Music Group 1977 **Other Information**: Call Number: 782.8 BEN No. of disc: 1 Duration: 7 min. 58 Sec. Note: Sound Recording. Accession Number 9002 Size: 7 inch; Type and speed: Analog, 45 rpm.

#### MAIN ENTRY

782 8 BEN	Benj	amin Asthur
	New	Mikado [sound recording]/by Arthur Benjamin and Gilbert William - York : Moss Music Group, 1977.
		1 sound disc (7 min , 58 sec.): analog, 45 spm; 7 in.
		and the
		1. Musicale, T. William Gilbert. II Title

In both examples 1 & 2, the main entry is prepared according to rules mentioned in Chapter 6 of AACR-II. Since the composer has been named on the title page, therefore, the main entry is prepared in his name. As per Rule Number 6.1F1, the name of the composer is also written in the statement of responsibility area. The physical description area has also been written as per the rules mentioned in Rule Number 6.5. In both cases following added entries will be prepared:

1) Subject Entry (s)

2) Title Entry

3) Joint Author, in case of Example 2

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## **IN-TEXT QUESTION**

2. The playing speed of a digital disc is mentioned in

(a) meters per second (b) feet per second (c) inch per second (d) revolution per second

## 1.5 MOTION PICTURE & VIDEO RECORDING

According to the glossary of AACR 2 Motion pictures are described as "a length of the film, with or without record sound, bearing a sequence of images that create the illusion of movement when projected in rapid succession". Loops, cartridges, Cassettes, Kinescopes, Strockshots, trailers, etc., are included under this heading and designated by the term "motion pictures".

The following Table 3 depicts the General Material Descriptions (GMDs) and Specific Material Descriptions (SMDs) prescribed by AACR2.

 Table 3: General Material Descriptions (GMDs) and Specific Material Descriptions (SMDs) are prescribed by AACR2 in the case of Motion Picture & Video Recording

General Material Descriptions (GMD)	Specific Material Descriptions (SMD)
Motion picture	film cartridge
	film cassette
	film loop
	film reel
Videorecording	video cartridge
	videocassette
	videodisc
	video reel

## 1.5.1 Chief Source of Information

The chief source of information for motion pictures and video recordings is the film itself (e.g., the title frames) and its container (and its label) if the container is an integral part of the piece (e.g., a cassette).

If the information is not available from the chief source, take it from the following sources in the order of preference accompanying textual material (e.g., scripts, shots list, publicity materials), container (if not an integral part of the piece), and other sources.

## 1.5.2 Main Entry



If authorship responsibility can be attributed to definitions and rules of "Personal authorship" (Rule 21.1) then the main entry will be under personal or corporate author. In the case of animated films, there is one person who is clearly the creator. So the main entry will be under his personal name.

## 1.5.3 Statement of Responsibility

Generally, the producer and director are given in the statement of responsibility area. The animator and the writer may also be included in this area. Other persons or bodies who have contributed to the work may be recorded in the note area.

## **1.5.4Physical Description Area**

#### 1.5.4.1 Extent of item

Record the number of physical units of motion pictures and video recordings, followed by one of the specific material designations is the first element. (Rule Number

A.

7.5B1 of AACR-II)

Film cartridge Film loops Film cassette Videocassettes Video cartridge Film reel Videodisc Video reel Example:

1 film cartridge 2 film loops 1 film cassette

#### 1.5.4.2 Playing Time

Give the playing time of motion pictures and video recordings. (Rule Number 7.5B1

of AACR-II) Example:

1 film reel (27 min.) 1 videocassette (15 min.)

## 1.5.5 Other physical details

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ofDelhi



1.5.5.1 Special projection ratio: If a film has a Special projection ratio, give it. (Rule Number 7.5C2 of AACR-II)

Example: Panavision, multi-projector

**1.5.5.2 Sound characteristics**: Indicate whether the film is sound (sd) or silent, (si). (Rule Number 7.5C3 of AACR-II)

Example:

1 film reel (52 min.); sd., 25 fps

**1.5.5.3 Colour:** (Rule Number 7.5C4 of AACR-II)

Give whether it is in colour or black and white

Example:

1 film reel (52 min.); sd., b & w, 25 fps

versity **1.5.5.4Projection speed**: (Rule Number 7.5C5 of AACR-II)

Give projection speed in frames per second (fps)

Example:

## 1 film reel (52 min.) Panavision; sd., col., 25 fps

#### 1.5.5.5 Dimension

The dimensions are the width of a film (in millimeters) and the width of a videotape (in inches). A videodisc dimension is a diameter in inches.

Examples:

2 film reels (152 min.) Panavision; sd., col., 25 fps; 35 mm. 1 videodisc (4i nun.) sd., col., 1500 rpm; 8 in.

## 1.5.6Note Area

(i) The name of a person such as performers or other participants not included in the statement of responsibility but likely to be of interest. The names are prefixed by an appropriate term such as Cast, Presenter, Narrator, Credits, and if appropriate, a statement of functions.

(ii) Date of original production if it differs from the date (s) listed in the publication, distribution area.

(iii) A brief, objective summary of the content and intended use is necessary in order to judge the suitability. If appropriate, information on technique, cast, and audience level may also be included.

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EXAMPLE 3 The Mission

Directed by Roland Joffé

Produced by Fernando Ghia and David Puttnam

Written by Robert Bolt

Enigma production Burbank, CA Warner Home Video 2003

#### **Other Information**:

Call Number: 791.43 MIS

Accession Number: 45896

2 videodiscs of 125 minutes, with sound and colour, widescreen presentation;

Dimension: 4 3/4 in.

Credits: Director of photography, Chris Menges; production designer, Stuart Craig; costume designer, Enrico Sabbatini; editor, Jim Clark; music composed, orchestrated and conducted by Ennio Morricone.

#### MAIN ENTRY

791.43	
MIS	The Mission [motion picture] /
	directed byRoland Joffé ; produced byFernando Ghia and David Puttnam; written byRobert Bolt Burbank, CA: Warner Home Video, 2003.
45896	2 videodiscs (125 min.): sd., col., widescreen; 4 3/4 in. Credits:Director of photography, Chris Menges; production designer, Stuart Craig; costume designer, Enrico Sabbatini; editor, Jim Clark; music composed, orchestrated and conducted by Ennio Morricone.
	1. Motion Picture

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#### **EXAMPLE 4**

#### **Mission possible**

#### A film on post super-cyclone Orissa 1999

Director Bhaskar Parichha

Bhubaneswar Sanchar Films Production for Orissa State Mitigation Authority 2003

#### **Other Information**:

ofDelhi Call Number: 658.47754 MIS Accession Number: 45896 1 videodisc of 26 minute duration with sound and colour Dimension: 4 3/4 in. Script & narration: Satya N. Mishra, Editing: Ajaya Mishra, Concept: Aurobindo Behera. In English and Oriya with some English subtitles Relief and rehabilitation measures for the cyclone in Orissa, India, October 29, 1999

#### **MAIN ENTRY**

658.47754	Mission possible [motion picture]: a film on post super avalance Origge 1000/
MIS	Mission possible [motion picture], a min on post super-cyclone Orissa 1999/
45986	directed by Bhaskar Parichha. – Bhubaneswar: Sanchar Films Production for Orissa State Mitigation Authority, 2003 1 videodisc (26 min.); sd., col.; 4 3/4 in. Script & narration: Satya N. Mishra, Editing: Ajaya Mishra, Concept: Aurobindo Behera. In English and Oriya with some English subtitles Relief and rehabilitation measures for the cyclone in Orissa, India, October 29, 1999. 1. Cyclone-Rehabilitation

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minerestry of Delhi



#### EXAMPLE 5

**BBC** Home Entertainment

#### FROZEN PLANET THE COMPLETE SERIES

Narrated by David Attenborough Alec Baldwin

Produced By BBC Natural History Unit

Released by British Broadcasting Corporation Home Entertainment

Bristol, UK 2012

#### **Other Information**:

Call Number: 508.311 BRI Accession Number: 457896

Subtitles English, French, Spanish

Container 3 video discs of 350 minutes of playing coloured with sound and dimension 43/4 inches.

1

ISBN 9781846079627

Formats, AC-3, Box set, Colour, Dolby digital, NTSC, Subtitled, Widescreen

Note: The Frozen Planet DVD and Blu-ray will feature the original BBC broadcast version, with narration by world-renowned naturalist David Attenborough (Planet Earth, Life, The Blue Planet).

Summary: This is a documentary film originally broadcast on the Discovery channel in eight episodes in 2011 and it focuses on the life and the environment in Polar Regions.

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## MAIN ENTRY

508·311 BRI	British Broadcasting Corporation Natural History Unit
457896	Jrogen Planet [indeo hecording]: The complete lerice/BBC Natural Hietory Unit - Widescreen ed - Brietol, UK Released by BBC Home Entertainment, @ 2012. 3 video diece (5 hrs. 50 min), col., Sd., Dolly digital; 4 <sup>3</sup> / <sub>4</sub> in. Note: Narrated by David Allenborough and Alec Baldwin Summary: This is a documentary film originally broad- cast in Discovery channel in eight episodes in 2011 and it focuses on life and the environment in Polas Regions Contents: 1 Planet earth -2. life - 3. Blue planet Also available on multiple formate: HDTV, Bhe-ray. ISBN 9781846079627
Continued 508-311 BRI	British Broadcasting Cooperation Natural History Unit
457896 I	1. Natural Hietory-Polas Regime. 2. Nature - Documentary 3. Ecology-Documentary I. Attenborough, David I Baldwin, Alec. III British Broadcasting Cosporation Home Intertainment. II Discovery channel

In the above catalogued examples 3, 4, and 5, the main entry is prepared according to the rules mentioned in Chapter 7 of AACR-II. In the case of Motion Pictures and Video recordings, it is very difficult to contribute responsibility to any one of them, therefore the main entry is generally prepared under the Title. In our examples also the main entries have been prepared under the Title. Since the composer has been named on the title page, therefore, the main entry is prepared in his name. As perRule Number 7.1F1, the names of all the persons mentioned on the title page are entered in the statement of responsibility area. The physical description area has also been written as per the rules mentioned at Rule Number 7.5. In both cases following added entries will be prepared:

- 1) Subject Entry (s)
- 2) Collaborator (s)

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3) Production House (s)

#### **IN-TEXT QUESTION**

3. The presence of Sound in motion pictures is denoted in catalogue by

(a) Sound (b) si (c) sd (d) None of these

In AACR-II, 2002 Edition, the Chapter 9 has been renamed from "Computer File" to "Electronic Resources". The Chapter 9 describes the electronic resources as: "Electronic resources consist of data (information representing numbers, text, graphics, images, maps, moving images, music, sounds, etc.), programs (instructions, etc., that process the data for use), or combinations of data and programs.(Rule No. 9.0A1 of AACR-2R)"

" In this Chapter, you will be taught rules for cataloguing Electronic Resources instead of rules for cataloguing Computer Files and Web resources separately. The GMD [computer file] has been changed to [electronic resource].

## **1.6.1** Chief source of information

For electronic resources, the resource itself and the information from any formally presented evidence within the entire resource.

## **1.6.2 Type of resource**

The term for the electronic resource to be catalogued is indicated. E.g. Electronic data and program (s) Extent of Resource: The number of records be given electronic data (1 file: 100 records, 10,000 bytes) Electronic program (4 files: 650 statements) Electronic data (2 files: 950, 1550 records) and programs (1 file: 505 and 290 bytes) Electronic data (2 files : 1,6 megabytes)

## 1.6.3 Extent of item

For direct access electronic resources, record the number of physical units of the carrier by giving the number of them in Arabic numerals and one of the following terms as appropriate.

## **1.6 ELECTRONIC RESOURCES (COMPUTER FILES & WEB RESOURCES)**

(Rule Number 9.5B1 of AACR-II)

Computer chip cartridge Computer disk Computer optical disc Computer tape cartridge

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Computer tape cassette Computer tape reel Example: **1 computer disk** 

## **1.6.4 Other physical details**

**1.6.4.1**If the resource is specified to have sound, give sd. If it is specified to display in two or more colours, give col. (Rule Number 9.5C1 of AACR-II)

Example: 2 computer disks: sd., col.,

**1.6.4.2**Give other physical characteristics. (Rule Number 9.5C2 of AACR-II)

## Examples: 3 computer disks: sd., col., single sided, single density, soft sectored

**1.6.4.3**When recording the extent of an electronic resource that is available only by remote access, give other details about the resource (e.g., file types) if readily available and considered to be important. (Rule Number 9.5C3 of AACR-II)

Example: 2 photographs: digital, JPEG file

## 54 p.: digital, PDF file

## **1.6.5 Dimensions**

Give the dimensions of the physical carrier as instructed below. (Rule Number 9.5D1 of AACR-II)

a) Discs/Disks. Give the diameter of the disc or disk in inches, to the next  $\frac{1}{4}$  inch up.

## Example: 3 computer disks: col.; 7 in.

b) Cartridges. Give, in inches to the next 4 inch up, the length of the side of the cartridge that is to be inserted into the machine.

Example: 2 computer chip cartridges; 3/4 in.

c) Cassettes. Give the length and height of the face of the cassette in inches, to the next inch up.

## Example: 1 computer tape cassette; 3 X 5 in.

d) Reels. Do not give dimensions for reels.

e) Other carriers. Give the appropriate dimensions of other physical carriers in inches or in centimetres, rounding up as appropriate.

#### Example: 1 computer card; 7 X 4 cm.

If the item consists of more than one physical carrier and they differ in size, give the smallest or smaller and the largest or larger size, separated by a hyphen. (Rule Number 9.5D2 of AACR-II)



#### Example: 2 computer disks; 3-5 in.

Give the details of the accompanying material as follows: (Rule Number 9.5E1 of AACR-II)

Example: 1 computer disk; 5 <sup>1</sup>/<sub>2</sub> in. +1 user manual + 1 e-book +2 sound cassettes (25 min.: analog, stereo).

1.6.6 Note Area

Nature and scope, system requirement, and mode of access: (Rule Number 9.7B1 of AACR-II)

a)System requirements: Make a note of the system requirements when describing an electronic resource that is readily available. Precede the note with "System requirements:"

Example:

System requirements: LINUX System requirements: UNIX workstation with Mosaic software System requirements: HP PC; 32K; colour card; 1HDD

b)Mode of Access: If a resource is available only by remote access, always specify the mode

of access.

Example:

Mode of access; DELNET Mode of access: INTERNET

c) Type and extent of resources: (Rule Number 9.7B8 of AACR-II)

Example: Hierarchical fill structure, File size: 420, 310 records, File size: unknown

d) Other formats:(Rule Number 9.7B16 of AACR-II)

Example: Issued also for HP PC

e) Numbers: (Rule Number 9.7B19 of AACR-II)

Give important numbers associated with the item other than ISBN or ISSN.

**f) Copy being described, library's holdings and restrictions use**. (Rule Number 9.7B20 of AACR-II)

Example: Library's set lacks disk 19

**Restricted to research scholars** 

**g**) **Item described:** For remote access resources, always give the date on which the resource was viewed for description. (Rule Number 9.7B22 of AACR-II)

Example: Description based on contents viewed Jan. 28, 2013.

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#### EXAMPLE 6 (DIRECT ACCESS)

#### AN INTERACTIVE MULTIMEDIA RESOURCE IN CD-ROM

**HUTCHINSON** EDUCATIONAL ENCYCLOPEDIA 1999 **CD-ROM** Epic Group Plc. Senior Producer **David Roughton** 

Program Design Martin Rees

versity of Delhi Helicon publishing Oxford **Other information**: Call Number: 030 HUT Accession Number: 56423 1 CD ROM contains electronic data and program consisting 7 files of 655 megabytes with sound and coloured illustration.

#### **MAIN ENTRY**

030 HUT	tutchinson educational encyclopaedia, 1999 [electronic	
56423	Acchordice]/ Designed and produced by Epic Group Plc[Inlinedows [98] Electronic date and program (7 fike: 16 megabytes). Inford: Helicon Publishing, © 1998. I Computer optical disc: ed., col., ill; 4 $\frac{3}{4}$ in. Renior produce: David Roughton; program design: Martin Rece. Multimedia encyclopaedia with Links to articles 1. Encyclopaediae. I. Roughton, David. I Rece. Martin	

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Example 7 (Remote Access)

#### SCHEMES OF COCONUT DEVELOPMENT BOARD

Developed by Technology Mission on Coconut

COCONUT DEVELOPMENT BOARD

Kochi

2013

#### **Other Information:**

Call Number: 634.6150954 IND

Accession Number: 89896

Available at: World Wide Web: http://coconutboard.nic.in/tech.htm

Viewed on July 18, 2022

This website is based on "Technology Mission on Coconut", a project undertaken by Coconut Development Board, Government of India.

## MAIN ENTRY

634 615 095 4 Agsiculture Coconcet Development Baad IND CDB [electronic Resource]: Technology coconut/Coconut Development Board. - Kochi Board, 2013. The 89896 online Resource Available at world wide web: http://coconutboard nic. m/lech (viewed on November 18, 2016) Website of coconut Development Board, Government of India based on its project "Technology Mission on Coconut" 1. Fourt Culture - coconut 2 Fruit Culture - India I Title

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#### **IN-TEXT QUESTIONS**

4. Which two chapters were renamed in 2001 by AACR-II?

(a) Chapter 5 & 6 (b) Chapter 9 & 12 (c) Chapter 10 & 11 (d) None

5. To note down the System requirement in "Electronic Resources" is now:

(a) Mandatory (b) Optional (c) Not required at all (d) Depends on the decision of a cataloguer

6. The earlier known GMD "Computer File" is now known as:

(a) Continuing Resources (b) Remote Access (c) Electronic Resources (d) None of these

## 1.7 SUMMARY

In this chapter problems faced by the cataloguers in cataloguing non-book materials especially Sound Recordings, Motion Pictures, and Video recordings, Electronic Resources (Computer Files and Web Resources) were discussed. The rules for cataloguing these resources in the light of AACR-II, 2002 edition were described in brief. Illustrative examples were also provided to help the students in making entries for such types of non-book materials.

## 1.8 GLOSSARY

Non-book materials	Any document which is not in traditional
	They document which is not in ducitional
	printed form. It needs a special device to
OV OV	get information from it.
Sound Recordings	Any type of resource in which sound is
	stored so that can be reproduced later.
Motion Pictures and Video recordings	a length of the film, with or without
	recorded sound, bearing a sequence of
	images that create the illusion of
	movement when projected in rapid





	succession
Electronic Resources	It covers all the resources which are
	available in electronic format.
Computer Files	Files that were used to get data on the
Web Resources	Resources which be accessed online or
	remotely. They do not reside on a
	computer.
AACR-II	The Cataloguing Code was developed in
	1976.

## 1.9 ANSWERS TO IN-TEXT QUESTIONS

- 1. Three
- 2. meters per second
- 3. sd
- 4. Chapter 9 & 12
- 5. Optional
- 6. Electronic Resources

## 1.10 SELF-ASSESSMENT QUESTIONS

1. Describe the level of description which is suitable for the National library by giving a suitable example.

2. Catalogue the following title:

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FDella



## MOZART MASTERPIECE CLASSICAL

Midas Delhi 1987

Other Information: Call No.: 782.1073 MOZ Accession No.: 4856 Contents: 1<sup>st</sup> Movement - Allegro Molto 2<sup>nd</sup> Movement- Andante

It is a 60-minute audio cassette, analog and stereophonic sound. The cassette is of 4 <sup>3</sup>/<sub>4</sub> inch

#### Note: i) Make a catalogue card of Size 12.5 X 7.5 inch in your notebook.

3. Catalogue the following title:



Note: i) Make a catalogue card of Size 12.5 X 7.5 inch in your notebook.



4. Catalogue the following title:

Collected Software for Your IBM PC
Compiled by
Jim God
Tejaras
Apple Software Company
1991
Other Information:
Call No.: 006.43 GOD
Accession No.: 45689
3 program files, 650 statements
1 codebook (100p., 25 cm.) with coloured illustrations + 1 Manual $\propto$
2 CD both sides recorded, 8 in. diameter
System Requirements: IBM PC IV, Windows XP, 2.6 GB, Colour Monitor
Contents: Ms. Office, Mail Merge, SPSS

Note: i) Make a catalogue card of Size 12.5 X 7.5 inch in your notebook.

## **1.11 REFERENCES**

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## 1.12 SUGGESTED READINGS

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## LESSON 1.1

# IMPLICATION OF WWW ON LIBRARY WEBSITES, WEB OPACs

niver

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## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 The World Wide Web (WWW)
  - 1.3.1 Benefits of using Web
  - 1.3.2 Objective of different library websites
- 1.4 Web based library services
- 1.5 Web OPAC
- 1.5.1 Advantages of Web OPAC
- 1.6 Summary
- 1.7 Glossary
- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

## **1.1 LEARNING OBJECTIVES**

After reading this lesson, you will be able to:

- familiarise yourself with the new ICT enabled library and information services, particularly in a web-based environment
- Know about different web based library services
- Understand Web OPAC and its advantages in the library



## **1.2 INTRODUCTION**

The Internet and its associated technologies have resulted in the rapid expansion of electronic information. The web has seen a remarkable increase in the number of all forms of publications. It has expanded to include a wide range of information sources, including electronic journals, electronic pre-prints, e-prints, technical e-ports, databases, library catalogues, educational materials, career resources, and so on.The World Wide Web has transformed how individuals access information and created new opportunities in fields such as digital libraries, virtual libraries, scientific information retrieval, and dissemination

The functions of libraries and the Internet in providing information in the twenty-first century are inextricably linked. Any librarian working today should grasp not only how to find things on the World Wide Web, but also how it works in general. Librarians will be asked to become information architects, capable of developing Web sites with clearly stated goals, that are aesthetically beautiful and rich with relevant content and usefulness. As more libraries create comprehensive Web sites, there is a growing demand for librarians who understand HTML as well as other sorts of Internet programming skills including javascript, SQL etc.over a hundred searchable databases are frequently available on library websites. These databases, often known as "Electronic Resources," enable users to search library catalogues, journal articles, company financial data, and a wide range of other data from a wide range of information providers, each with its own searching interface.

## **1.3** THE WORLD WIDE WEB (WWW)

**World Wide Web (WWW) or Web** is a practical and existing real-world application of the age-old dream of a universal information database - information that is not only accessible to people all over the world, but also links to other pieces of information so that only the most useful information is quickly found by a user. The World Wide Web, which was created by Tim Berners-Lee of the European Particle Physics Laboratory (CERN), is a "distributed heterogeneous collaborative multimedia information system."

The World Wide Web is a collection of websites or web pages stored in web servers and linked to local computers via the internet. These websites include text pages, digital photos, audios, and videos, among other things. Users can access the content of these sites through the internet from anywhere in the world using devices such as computers, laptops, cell phones, and so on. The WWW, like the internet, allows you to retrieve and display text and media on your device.Web pages formatted in HTML and linked by "hypertext" or hyperlinks and accessed over HTTP are the building blocks of the Web. These are electronic linkages that connect relevant pieces of information so that users can easily get the needed information. The ability to select a word or phrase from text and so visit other sites that provide further information on that word or phrase is a benefit of hypertext.

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A Uniform Resource Locator (URL) is assigned to a web page (URL). A website is a distinct collection of online pages that belong to a single URL, such as www.yahoo.com, www.google.com, and so on. As a result, the World Wide Web is analogous to a massive electronic book, with pages saved on many servers throughout the world.

WWW performs following task:

- It is a navigational tool that enables browsing information linked to other related information.
- It is Hyperlinks/ Hypertext/ Hypermedia based.
- It provides unlimited access to large universe of e-documents

The World Wide Web is everyone's initial source of information, including students, research scholars, faculty, practitioners, Information Officers, and so on. The information in web resources is in the form of Uniform Resource Identifiers (URIs), and therefore is not machine readable. People use keywords to search for information about a specific topic on a web portal. The Internet and the World Wide Web are extremely powerful and are influencing not just librarianship but also his daily professional operations.

Since the creation of the United States Machine Readable Cataloguing (USMARC) record in the late 1960s, and the subsequent proliferation of online catalogues, librarians have been spurred by technological advancements to become more efficient organisers, indexers, abstractors, and archivists, in addition to assuming new roles such as intermediary, facilitator, end-user trainer/educator, web organiser & designer, researcher, interface designer, knowledge manager/professional aficionado. While the librarian serves several functions in an organisation, it is difficult to pinpoint a core function because it varies depending on the business's aims and requirements.

## **1.3.1** Benefits of using Web

The Web's most fundamental and powerful properties are:

- The ability to distribute information across multiple sites on the Internet.
- The ability to incorporate all types of media objects (video, sound, images, text, etc.) into a single document.
- The use of hypertext or hypermedia-oriented architecture, in which a document contains embedded links to other documents that can exist locally or anywhere in the world.
- A data object stored on virtually any server platform that supports almost all protocol types, such as email (Simple Mail Transfer Protocol), Telnet (Telnet Protocol), FTP (File Transfer Protocol), USENET (Network News Transfer Protocol), Gopher (Gopher Protocol), and Web pages (Hypertext Transfer Protocol), can be viewed from any client platform (DOS, UNIX, etc.)
- Capability to assist the creation of information resources throughout the Internet

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• Revolutionizing the way people access information and bringing up new opportunities in fields such as digital libraries, virtual libraries, scientific information retrieval and distribution, education, commerce, entertainment, government, and health care.

Many libraries are transitioning from traditional to digital formats. Not only are modern publications being digitised, but so are many older library holdings. These digital collections enable users to consult the material from anywhere at any time without causing any harm to the fragile materials.

The tools used by librarians in their daily job have evolved dramatically in recent years. In addition to traditional card catalogues and microfiche readers, most libraries now include an Online Public Access Catalog (OPAC), as well as public PCs with CD-ROM drives, DVD drives, scanners, or Internet terminals. A growing number of libraries are creating home sites on the World Wide Web from which visitors can access a range of services without having to physically enter a library. Furthermore, information push and pull technologies have enabled librarians to automate the necessary information gathering and dissemination to users.

#### **1.3.2** Objective of different library websites:

Librarians should understand the fundamentals of establishing an effective information resource. As the Internet becomes more interactive, there is a desire to make databases available online; the library card catalogue is the clearest example of this.Other interactive choices include e-mail and bulletin board service, as well as a shift away from CD-ROMs and toward online subscriptions.A library Web site is more than just a presence on the Internet. It can function as a virtual extension of the existing library organisation, reaching out to patrons 24 hours a day and delivering essential information resources. A library's website is also a significant source of information about the library. Internet policies, special programming, and new materials can all be accessed on the library's website at any time. Libraries, too, should create their own Web sites that serve as portals to fascinating sites assessed and annotated by professional librarians. Librarians will continue to play an important role as information professionals well into the twenty-first century in the Information Age.

Every library now has their own **webpage** to represent their resources. Every library and documentation centre describes numerous web libraries and information services, as well as the ongoing process of upgrading from time to time. It describes various facts about the library's genesis, working hours, holidays, building layout plan, library rules and regulations for different kinds of members, circulation rules, and details about the various staffs. **Web OPAC** provides multiple methods of document access by author, title, publisher, accession number, collaborators, etc. in the specified library



Everyone should understand that the mission of a library Web site is linked to the type of library represented. As a result, academic, public, and special library Web sites will all serve various functions.

- The academic library's website can help with research in higher education by offering access to Internet research tools and full-text databases. It can help with teaching by providing online full-text reserves and other resources. It can also help public service by allowing the public to use its online resources, such as the online public access catalogue.
- Public library websites provide a variety of functions. A typical public library could seek to give free and open access to information for all local inhabitants, which could be reflected on the library Web site through links to community information resources, job posting links, access to the library's online catalogue, and so on. While a public library may wish to provide unrestricted access to its Web resources, licencing constraints on some electronic databases may limit this scenario.
- When it comes to developing a website, special libraries have still another mission. Special libraries must typically service their parent company or organisation, and the library Web site will reflect this by focusing nearly entirely on the parent firm's workers and clientele. This can take the shape of a tightly passworded Web site, or it can prevent the library from even appearing on the publicly accessible Web page, limiting it to a locally accessible Intranet.



Any type of development requires access to information. However, information is growing by leaps and bounds these days. In terms of knowledge propagation, a person who needs to collect information will find it difficult. Internet plays a significant role in resolving these issues in libraries and information centres. The following are the effects of the internet on library and information services. Web-based services are becoming more popular in libraries,



offering users a more robust search and retrieval experience. Web resources are e-resources obtained directly by libraries or through participation in consortiums. These web resources are full-text resources that exist outside of the physical library space and are accessible through the Internet as virtual resources. Authorized users can connect to them via the Internet from any location, including their home or office, 24 hours a day, seven days a week.

The use of online portals into library services has altered and improved the process of providing or making information available to users, and the benefits are:

- It has reduced the time required to look for and retrieve information.
- It has promoted resource sharing between two or more libraries.
- It has increased the value of information professionals.
- It has increased user patronage in terms of access to library collections.
- It allows for the rapid transmission and reception of information.
- It has simplified the arranging and processing of library contents.

## **1.4.1Digital Library**

A digital library, like any other, is a collection of books and reference resources. However, unlike a traditional library, the collection of a digital library is digital and is typically served via the World Wide Web. Virtual library, library without boundaries, and, more recently, digital library are some of the phrases that have been used to depict these electronic libraries at various times.

A digital library includes both electronic (digital) and print items, as well as additional elements (such as audio, video, graphics, animation, and so on). These resources are organised and made available to the user community. The Internet and web technologies are the primary processes used in a digital library to search for, navigate, and transmit electronic resources worldwide. It provides users with immediate, ubiquitous access to a massive amount of information, regardless of their location.

## 1.4.2 Subject Gateway

Subject gateways are web search engines that specialise in a single topic. Subject gateways are websites that compile comprehensive information on the numerous resources available on a specific topic. Subject gateways facilitate access to network-based resources in a particular subject area. They provide a straightforward web-based interface for searching databases and indexes. They are subject-centric in the sense that they only host information on a single topic. The high-quality resources gathered by topic gateway experts are appropriately catalogued and classified using data organisation and categorization systems based on classic and well-established library science concepts.

These are peer-reviewed sites that are typically used to ensure that the gateway is current and relevant. It may avoid a significant site that has recently appeared but has not yet been



reviewed because it has been peer reviewed. Among the advantages are relevance, efficacy, and overall high content quality. Their weaknesses include a lack of depth in their subject coverage. Such websites are also known as portals.For Example:

- Intute (http://www.intute.ac.uk/)
- LibrarySpot.com: (http://www.libraryspot.com/)
- Librarians' Index to the Internet (LII) (http://lii.org/)
- Argus Clearing House (http://www.clearinghouse.net/)
- Galaxy (http://galaxy.einet.net/)
- Direct Search (http://gwis2.circ.gwu.edu/~gprice/direct.htm)
- Academic Info (http://www.academicinfo.com/)
- BUBL (http://bubl.ac.uk/)
- BIOME (http://biome.ac.uk/)
- The Scout Report (http://scout.cs.wisc.edu/report/sr/current/)
- LivingInternet.com (http://www.livinginternet.com/)
- Edinburgh Engineering Virtual Library (EEVL) (http://www.eevl.ac.uk)
- Social Science Information Gateway (SOSIG) (http://sosig.ac.uk/)
- Digital Librarian (http://www.digital-librarian.com/)
- QUEST.net (http://www.re-quest.net/)
- BioMedNet (http://www.bmn.com/)

#### 1.4.3 Bulletin Board

For their web-based library services, several libraries use bulletin boards. Bulletin or message boards allow for conversation on a variety of topics. They enable users to respond to existing topics or threads in the group, or to start a new topic or thread by posting a comment or query. Messages posted to a discussion board are visible to everyone who has access to it indefinitely. On the Internet, there are millions of bulletin boards. Many libraries and information services have bulletin boards on their websites where users can discuss ideas and share information. They offer a forum for conversation under numerous topic headings, but not in real time. They enable people to comment to issues or start new ones. Any message sent to a discussion group is visible to everyone who has access to it indefinitely. Many news websites, search engines, social networking websites, and special interest sites, such as people using a specific type of computer or sharing an interest, hobby, or political topic, have **INFLIBNET** Bulletin bulletin boards. For example: Board (http://www.inflibnet.ac.in/forum)

## **1.4.4 Developing websites**

We'll need a domain name (for example, www.du.ac.in) and a web host to get your website up and running. You must also be aware of the content that will be hosted on that site. The content of a website is the information that the user can access. While hosting your library's website, for example, you may want to include the following attributes: about, who's who,

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collection, services, user details, and so on. The more information content you have and how well it is organised for search engine retrieval, the more likely it is that people will visit your page. A library website should primarily serve as

- a venue for publicising the library,
- a resource for answering frequently asked questions (FAQs) about the library, and
- a tool for accessing web resources or providing web-based information services.

## 1.4.5 Union Catalogue

Librarians, as the first users of the Internet and the online, began publishing their content on the web. The libraries not only created meta resources for their home pages, but they also web-enabled their library catalogues. The catalogues in the majority of mainstream library software programmes feature web interfaces. Several integrated library packages are now shifting to using Internet clients for all operations.

## 1.4.6 Electronic Journals/ E-Books

Electronic journals make up a sizable portion of a library's web-based resource collection, and their availability is an important web-based service. Many journals are now available online, some with full text and others only with bibliographic information and abstracts. The main advantage of electronic journals is that they are constantly updated and easy to access; however, there is a high risk of copyright infringement. For Example: Major e-journal portal **'J-Stor'** (https://www.jstor.org/)

An e-book is a text similar to a book that is in digital form and may be seen on a computer screen. E-books can be read just like paper books, either with a dedicated E-book reader like **Kindle** or on a computer screen after downloading it. There are also some newer technologies in development, such as electronic paper, which is similar to paper but has the ability to modify the text and talking books in MP3 format. E-books have benefits such as portability, 24-hour access, text search, annotation, linking, and multimedia and self-publishing options. The development of eBooks is still in its early stages, and difficulties such as compatibility, e-book readers availability, and intellectual property rights must be addressed before it can be widely used.

## **1.4.7 Electronic Theses and Dissertations**

University dissertations and theses are vital sources of information and knowledge for future research. Many universities have converted their theses and dissertations collections into digital libraries and made them available on the Internet for worldwide access. Several universities have also adopted Electronic Theses and Dissertation programmes, in which researchers submit theses in electronic form. Some noteworthy initiatives include the **Networked Digital Library of Dissertations and Theses (NDLTD)** (http://www.ndltd.org)



in the building of web-based union catalogues of ETDs supplied by over 100 libraries worldwide.

#### 1.4.8 Listservers

Mailing lists, discussion lists, and listservs are services that make it simple to send e-mails to a large group of people. These many titles all refer to the same procedure of sending e-mail to a wide group of people, similar to how CC capability is given by various mail systems. They are usually fully or partially automated using software such as GNU's Mailman, Listserv, Mailbase, and so on.On the Internet, the most common methods for mass email communication are mailing lists, listservers (called after the software used to host electronic mailing and discussion lists), and list forums, which allow mail recipients to discuss matters of common interest.

The listserv address and the list address are the two e-mail addresses of a listserver. The former normally accepts commands for joining/exiting a list, receiving acknowledgements, and so on, whereas the latter allows messages of genuine conversation, which are scanned by a list moderator (optional) and delivered to all list members. Any message sent to the e-mail list address will be distributed to all members of that list. Members can reply or comment on these messages based on their interests; they do not have to actively engage by sending messages all the time; alternatively they can just browse the debate and remain a silent spectator to the activity; they are also free to exit the list at their discretion. To participate in a forum, the user does not need to be an expert in software and hardware. A person who understands the fundamentals of sending and receiving e-mail messages can successfully join and communicate with a list forum of her/his choice. Because of the speed with which electronic mail is transmitted, electronic mailing lists can accomplish far more than traditional paper distribution lists.

Some examples of Indian listserv in the field of library & information science are:

#### 1) LIS-FORUM

List address: lis-forum@ncsi.iisc.ernet.in

List server address: listserv@ncsi.iisc.ernet.in

Website: http://ncsi.iisc.ernet.in/mailman/listinfo/lis-forum

#### 2) INDIA-LIS

List address: INDIA-LIS@infoserv.inist.fr

Listserver address: LISTSERV@infoserv.inist.fr

Websites: http://infoserv.inist.fr/wwsympa.fcgi/info/india-lis

#### 3) Yahoo Groups

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Some yahoogroups of interest to library science community arenmlis@yahoogroups.com, <u>digilib\_india@yahoogroups.com,iatlis@yahoogroups.com</u>,corporatelibrns@yahoogroups.com, etc.

## **1.4.9 E-Publishing**

Traditional players supplying electronic copies of their printed resources, as well as various new firms delivering new goods and services that are digital are among the publishers of electronic information resources. Several subscription agents are also operating in the industry as electronic aggregators. Higher education institutions, particularly distance and continuing education departments, are actively supporting and contributing to the development and implementation of computer-assisted instruction and multimedia interactive educational courseware.

Some well-known commercial publishers of printed resources, such as Elsevier Science, Kluwer Academic Press, Academic Press, Springer, Wiley, and Sage Publications, offer electronic versions of their printed resources through their web sites or through special interfaces and web-based services developed for this purpose. For example:

- Elsevier Science Publishers offer electronic versions of theirjournals, onlinedatabases and other products through a separate interface called**ScienceDirect** (http://www.sciencedirect.com/)
- **Springer** offers their electronic resources including e-journalsthrough their interface called Link Information Services (http:/flink.springer.de/)
- MCB University Press offers their electronic resources through their electronic resources through their electronic called **Emerald(http://www.emeraldinsight.com/**)
- Institute of Scientific Information (ISI) provides their web-based products and services including citation indices through their interface called "Webof Science" (http://www.webofscience.com/)

#### 1.4.10 Current Awareness Services

Publishers post journal updates on their websites on a regular basis, and they distribute journal content pages to libraries and end users informing them of new papers that have recently been published. They also provide information about new articles that have appeared in respective magazines. Book reviews and book categorization are available on online retailers such as Amazon.com. These tools from publishers and online retailers help libraries make better title selections. Publishers frequently track which titles customers buy on the internet. They use such user data to promote and market their titles. Libraries can capitalise on such marketing characteristics of web resources by appropriately adjusting and modifying them at the institutional level to provide Selective Dissemination of Information (SDI) services using library user profiles.

## **1.4.11Document Delivery Service**

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Libraries cannot possibly have all that their clients may require. Libraries use document delivery services from other libraries and commercial organisations to obtain copies of research papers and other materials that they do not own. Finding a source and obtaining the document takes time and effort, and the process is fraught with uncertainty. ICT has simplified and increased the reliability of document distribution services. The usage of ICT has benefited everything from searching the holdings to ordering and delivery. Many libraries now have up-to-date holdings on their websites, which can be searched on the Internet. Many library networks, **like INFLIBNET and DELNET**, maintain a centralised database of their members' journal collections. They also provide union catalogues of books, serials and theses.Since 1952, **INSDOC** has been providing Document Delivery Service (DDS) at the national level. The service is supplied by employing all of the country's resources, including those of the National Science Library and the INSDOC Pilot Electronic Library. Requests are accepted via mail, fax, telex, and e-mail.

#### **1.4.12Virtual Library Tour**

Individuals and businesses can use web technology to advertise their products and services in order to expand their client base and compete with others. Libraries are also recognising the need to reach out to their customers and are investigating ways to do so via the Internet. A virtual library tour is a web page on a library's website. It is a virtual guide to the physical facilities in a library that familiarises you with the library and helps you find your way around. It includes maps, layouts, and floor plans for libraries, as well as photographs of collections, services, and infrastructure.

#### 1.4.13Ask a Librarian

Through Internet-based question and answer services, Ask-a-Librarian services connect people with librarians. Users are encouraged to submit inquiries through web forms, e-mail, or live chat. When the service provider in charge receives an inquiry, it is routed to a specific expert for response. An expert responds to the inquiry by e-mail or online, providing accurate information and/or a list of information resources.

## 1.4.14Web OPAC

The library catalogue is, without a doubt, the most significant instrument for locating materials in the library. Unfortunately, until recently, its worth was limited by its physical form, which was typically a big card catalogue or a collection of printed volumes. With the advent of computers and their ability to handle enormous amounts of information and output in a number of forms, the library has finally come to the consumer, wherever he or she may be, in the form of OPAC. Another benefit of OPAC is access from outside the library using a computer connected to the library's Local Area Network (LAN). With modern library systems providing interfaces to OPAC, it is also possible to enable access over the Internet from anywhere in the globe. Web OPAC is an Internet-enabled OPAC. Any common browser, such as Microsoft Internet Explorer or Netscape Navigator, can be used to search



the Web OPAC. Aside from searching the OPAC, some libraries offer online services such as book reservations, loan requests, loan renewals, membership applications, address changes, book suggestions, and so on.

## 1.5 WEB OPAC

Web OPAC is an online catalogue of a library's or libraries' resources on the Internet. It is a library's primary tool for locating material inside its collections. Web OPAC, which is integrated into a Library Management System, allows users to access and search the library catalogue from anywhere on the internet. Web OPACs have also emerged as standalone online catalogues accessible to users all over the world via a server. "A Web OPAC interfaces, which uses the World Wide Web protocol to act as an OPAC," according to Washington University in St. Louis. "An Online Public Access Catalogue (OPAC) that uses a graphical user interface (GUI) accessible via the World Wide Web, as opposed to a textbased interface accessible via telnet," according to ODLIS. The Web Online Public Access Catalogue (Web-OPAC) allows users to search for resources, request materials online, and receive e-mail notifications when materials are overdue. You can also download or scan content pages from books or journals using Web OPAC.Web OPAC has the following features:

- It has the ability to link to full text
- You can search individually by "Author," "Keyword" in title, or "Year."
- Hypertext links can be used to navigate around bibliographic records
- It provides complete bibliographic information and is available via the internet.
- It is simple to search for items in the library.

Web OPAC is no longer a tool for discovering what a library has, but rather for discovering everything to which a library has access. This can guide visitors to an electronic resource that is located outside of the actual library area, as well as develop links to resources such as ejournals and e-books. Web OPAC is more beneficial because it displays electronic resource results together with their URL (web address). This can direct users to resources outside of the physical library and create links to resources like ejournals and e-books.

Web OPAC outperforms local OPAC systems in many ways. It has progressed from a simple list to a sophisticated method of distribution. Web OPAC provides remote access, online reservations, borrower status, and consolidates print, electronic, and digital documents into a single interface.

Users can explore or search the catalogue using Web OPAC from any web browser. Webbased OPAC interfaces are easier to use. The majority of web OPACs provide both basic and advanced search capabilities. Simple searches are used to look up required fields such as author, title, subject, accession number, keyword, and so on. Users can use advanced search to search the database on a single field or a combination of fields, as well as proximity and



truncation features. In addition to these, users can search indexed fields. For example, if you want to know all of Ranganathan's books, simply type 'Ran' into the author index, and the author index will reveal all writers whose names begin with these words; scroll down the list, select the author of your choice, and then browse the collection. You can mark individual items in the web OPAC and create a list of marked records from all of your searches in a given session. These records can then be viewed in your browser or directly emailed to you via the web OPAC. Web OPAC has emerged as a service portal for libraries. Major web OPACs include INNOPAC, WebCat, Voyager, GeoWeb, and ALEPH. The following are some Web OPACs in India:

• Central Library, Indian Institute of Bombay

http://www.library.iitb.ac.in/newsearchbook/opac\_s.php?m\_memchk\_flg=&m\_summarN

• National Social Science Documentation Centre (NASDOC)

http://www.icssr.org/doc\_main.htm

• JRD Tata Memorial Library, Indian Institute of Science, Bangalore.

http://www.library.iisc.ernet.in/

• American Centre Information Resource Centers in India

http://americanlibrary.in.library.net/

• British Council Libraries in India

http://library.britishcouncil.org.in/simplecatsearch.asp

• Indian Institute of Ahmadabad

http://vslopac.iimahd.ernet.in/

• Indian Institute of Delhi

http://10.217.116.6:8080/webopac/sso

• Indian Institute of Management Kolkata

http://203.197.126.103/BCRoylibrary/catalog.asp

• Indian Institute of Science Library, Bangalore

http://anagha.library.iisc.ernet.in/

• Indian Institute of Technology Library, Delhi

http://www.iitd.ernet.in/search/index.html#site

• Indian Statistical Institute Library, Delhi

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http://www.isid.ac.in/~library/new\_search\_lib.html

• Indian Statistical Institute Library, Kolkata

http://library.isical.ac.in/

• Indira Gandhi Institute of Development Research Library, Mumbai

http://www.igidr.ac.in/lib/opac.htm

ofDelhi • NAL Information Centre for Aerospace Science and Technology, Bangalore

http://www.icast.org.in/opac.html

• National Science Library, New Delhi

http://www.niscair.res.in/InformationResou rces/nsl/BookSearch.asp Jersity

• Tata Institute of Social Sciences Library Mumbai

http://202.141.154.107/slim/Default.php

## 1.5.1 Advantages of Web OPAC

The following are the advantages of the Web OPACs

• It is available at any time and through the entire web.

• The status of each document may be known as required documents issued or not, lost/transferred, and so on. An acquisition order's status may be viewed at both staff and public terminals positioned throughout the library.

• Users can send reprint requests via e-mail promptly and compiling diverse lists of reprints becomes very simple.

• There are no space or time constraints for document searches. Anyone can search a document in any networked library, not just his or her own.

#### **SUMMARY** 1.6

With the advent of information technology, the applications of web technologies in libraries and documentation centres have altered. Every library and documentation centre is developing a library portal. It is the responsibility of library and information professionals to stay up to date on the latest advances in order to provide web-based services to their users and to provide personal attention during the service lifetime. The library's online page offers web-enabled services. Access to the Internet and Internet-based tools and services, as well as access to electronic information sources and a digital library of local and institutional

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records, are among the new offerings. OPAC and Web OPAC employ computers to identify library materials and give numerous extra features such as online book reservations, remote access, requesting books for loan, loan renewals, book suggestions, and so on.Web OPACs helps libraries improve the quality, speed, and performance of their services. The usage of email and the web makes interlibrary loan easier. Members can view the collection and issue status of each information centre document. They might reserve or request the document of their choice online.

# 1.7 GLOSSARY

**WWW**: A system of Internet servers that support specially formatted documents. The documents are formatted in a language called HTML (HyperText Markup Language) that supports links to other documents, as well as graphics, audio, and video files. **http**: Short for HyperText Transfer Protocol, the underlying protocol used by the World Wide Web.

**Hypertext:** Hypertext simply means non linear text. A novel or magazine article is an example of linear text because it is meant to be read from beginning to end. Non linear communication is much harder to create because you must allow for the possibility of each reader accessing the material in a different order.

**HTML**: Short for HyperText Markup Language, the authoring language used to create documents on the World Wide Web. Hypertext, for easy navigation among resources. **Web page:** A document on the WWW. Every web page is identified by a unique URL (Uniform Resource Locator)

**Web site:** A site (location) on the World Wide Web. Each Web site contains a home page, which is the first document users see when they enter the site. The site might also contain additional documents and files. Each site is owned and managed by an individual, company or organization.

**Home page:** The main page of a Web site. Typically, the home page serves as an index or table of contents to other documents stored at the site.

## 1.8 ANSWERS TO IN-TEXT QUESTIONS

1. IP address

2. Hypertext

9. Conversational style

## 1.9 SELF-ASSESSMENT QUESTIONS

- 1. Explain in detail various web based library services.
- 2. What is Web OPAC? What are the advantages of using web OPAC?

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## **1.10 REFERENCES**

BRADLEY (Phil). 2007. How to use web 2.0 in your library. Facet Publishing, London.

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## 1.11 SUGGESTED READINGS

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# LESSON 1.2

# WEB 2.0 AND WEB 3.0: FEATURES AND FUNCTIONS

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niversity

## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Web 2.0: Definition
  - 1.3.1 Features of Web 2.0
- 1.4 Web 2.0 Technologies used in libraries
- 1.5 Web 3.0
- 1.5.1 Features of web 3.0
- 1.6 Comparison between Web 1.0, Web 2.0 and web 3.0
- 1.7 Summary
- 1.8 Glossary
- 1.9 Answers to In-text Questions
- 1.10 Self-Assessment Questions
- 1.11 References
- 1.12 Suggested Readings

## **1.1 LEARNING OBJECTIVES**

After reading this lesson, you will:

- attain knowledge on tools and techniques of Web 2.0
- understand how libraries can foster a collaborative and participatory environment through the use of user-centric web 2.0 library services and tools such as wikis, blogs, podcasts, vodcast, file sharing, tagging, mashups, instant messaging, social networking, social bookmarking, and so on.
- understand the features of Web 3.0
- different between Web 1.0, Web 2.0 and Web 3.0



## **1.2 INTRODUCTION**

Over the last few years, the World Wide Web has undergone yet another profound upheaval. A new web environment (Web 2.0) emerged as a result of the merging of social web, web application, and technology.

Social Web + Web Application + Technology = Web 2.0

Libraries and information services are functioning in a constantly changing world where technology and social developments bring new opportunities, difficulties, and issues. The current information landscape is fragmented, with Google, Amazon, and Wikipedia perceiving "good enough" for what they need to perform for the user. This could pose new issues for library services. To meet these issues, Web 2.0 concepts and technology provide libraries with several chances to serve their customers and to go out beyond the institution's walls and web sites to prospective beneficiaries wherever they may be undertaking.

## 1.3 WEB 2.0

Darcy DiNucci coined the term "Web 2.0" in 2004, following the First Web 2.0 conference (later known as the Web 2.0 summit) hosted by Tim O'Reilly and Dale Dougherty. Web 2.0 websites are those that emphasise user-generated content, usability, and interoperability for end users. The participatory social web is another name for Web 2.0. It does not refer to a change in technical specifications, but rather to a shift in how Web sites are built and used. The transition is smooth, though this does not appear to be the case while the changes are being implemented. As the creation of user-generated content in a virtual community, Web 2.0 allows for interaction and cooperation in a social media discussion.

Web 2.0 is a term used to separate the new Web from the old Web (1.0). It denotes web applications that enable interactive information exchange, interoperability, user-centered design, and collaboration on the Internet. It gives its users the freedom to connect or cooperate with one another in a social network as creators of user-generated content in a virtual community, as opposed to websites that limit users to passive viewing of content provided for them or being simple consumers of information. Social networking sites (Orkut,Facebook, twitter), blogs, wikis, video-sharing sites, hosted services, online apps, mashups, and folksonomies are examples of Web 2.0.Web 2.0 development makes advantage of web browser technologies such as AJAX and JavaScript frameworks. AJAX and JavaScript frameworks have recently gained popularity as a technique of constructing web 2.0 sites.

Instead of simply reading a Web 2.0 site, users are encouraged to contribute to its content by commenting on published articles or creating a user account or profile on the site, which may allow for increased participation. They urge users to rely more on their browser for user



interface, application software, and file storage by putting more focus on these alreadyexisting capabilities. This is known as "network as platform" computing.

Examples: eBay, craigslist, Wikipedia, skype, lodgeball and Google AdSense.

The added advantage of Web 2.0 over predecessor Web 1.0:

**Collaboration**: Web 2.0 has opened up new possibilities for collaborative networked services in web based environments.

Flexibility: Web 2.0 environments are always open for changes, updates, remixing and reuse.

Architecture of participation: Web 2.0 is structured around open programming interfaces that allow widespread and greater levels of participation where users act simultaneously as readers and writers.

**Interactivity**: Web 2.0 also encourages significantly more interaction between users which is vital in e-learning. Web 2.0 encourages a more human approach to interactivity on the Web, supports group interaction and fosters a greater sense of community in a potentially social environment.

#### 1.3.1 Features of Web 2.0

Web 2.0 is a strategy for liberating and reusing data and services that were previously locked into specific web pages for human viewing. It has resulted in a global information explosion.Web 2.0 websites generally include some of the following features/techniques, which Andrew McAfee referred to as SLATES:

- Search: the ease of finding information throughkeyword search which makes the platformvaluable.
- Links: they guide us to the important piece of information and connects information together through meaningful links.
- Authoring: the ability to create continually updated content on a platform that has transitioned from being the creativity of a few to many. The content in Wikis is continuous in the sense that users undo and redo each other's work.
- **Tags:** Categorise material by establishing tags that are basic, one-word descriptions to make searching easier and to avoid inflexible, pre-made categories.
- Extensions: automation of some of the work and pattern matching by using algorithms e.g. amazon.com recommendations.
- **Signals:** The use of RSS (Really Simple Syndication) technology to notify consumers of changes to the content via e-mail.

The following are other key features of Web 2.0:

• User as Contributor


In traditional web, the site owner frequently provides the information, and the user is always the receiver. One Way was the information model. Web 2.0 users, on the other hand, contribute to the content through evaluation, review, and commenting. The most common examples are Amazon.com's customer review section and Google's Page Rank algorithm.

### • Multimedia character

It provides the multimedia experiences (both the collection and services of Web 2.0). It should be used by user to record his/her experiences or intellect in library.

### • Rich user experience

Traditional websites are built with HTML and CSSCGI and are available as static pages. Web 2.0, on the other hand, employs Ajax (Asynchronous JavaScript + XML) and HTML5 (for interactive video and audio) to provide users with a dynamic, rich user experience. These technologies replace traditional SWF Flash media and enable webmasters to embed dynamic video directly into HTML code. If everything is done correctly, videos will play in any web browser and on any device, such as with the help of this HTML5 video converter. Because Web 2.0 does not limit webmasters with tools, modern user experience is more accessible than ever.For example, Google Provided Google Maps and Google Suggest.

# 1.4 WEB 2.0 TECHNOLOGIES

Web 2.0 tools are web-based services that enable users to access, contribute, and describe web-mediated material in a variety of formats, including text, video, audio, photos, and graphs. Popular Web 2.0-based websites include Flickr, which can be used to share photos, YouTube, which can be used to share videos, Last.fm, which can be used to share audio, and MySpace, which can be used to publish text-based content. Users can use these sites to produce, describe, post, search, discuss, share, and communicate online material in a variety of formats. Libraries employ Web 2.0 tools to teach patrons about information literacy.

Blogs can be used by libraries to update clients about changes, additions, and other advancements in library services and collections. Using podcasts and vodcasts, libraries can disseminate images, events, and instructions. Libraries are also aggressively embracing the usage of these tools to better serve its customers and attract new ones. These tools assist libraries in providing proactive resources and services to its users.

### **Library Portals**

The library portals serve as a portal to information, services from various sources, and access to the organization's resources. The integration of Semantic Web technologies in the development of Library portals makes it easier for users to search for, access, and retrieve learning resources. The portal should attempt to enable access to a coalition of learning repositories that provide learning content in various formats. Implementing Library portals



with Semantic Web services will help libraries realise their vision. Large collections of learning resources are semantically annotated using various technologies, allowing users to access the information in one or more learning repositories. Ontologies are used to annotate web material with information and convey its semantics in a machine-readable fashion.

The Ontology schema will allow for greater flexibility in giving semantic descriptions of information in learning object repositories while also facilitating automated functions and task delegation to intelligent agents. The search interface of the library portal should be capable of searching across heterogeneous materials. The Semantic Library portal should have automatic interaction with a search engine at the resource, combined with web ontologies, and information tagged content. Technology adoption and execution will enable ontology-enabled sharing and reuse of learning resources. A gateway like this will enable the library to provide the finest services possible.

#### **Web Directories**

There are two types of search services offered to the Web community: web directories and search engines. They are used to retrieve relevant information from the internet. Web directories, often known as subject directories, are designed to help visitors identify all relevant websites within specific categories or subcategories. Web directories route users to a list of websites by utilising layers of categories and subcategories, which users may then select to find a list of all relevant websites.Web directories differ in terms of coverage, size, and purpose. Some directories, such as Yahoo! or the Open Directory Project, are enormous and provide extensive coverage of all types of websites on the Internet. Some directories are intended for specific types of searches, such as phone books, concentrate on a small range of information, such as phone numbers and addresses.

Human editors help web directories construct their indexes. Expert volunteers update many human-edited directories, including the **Open Directory Project and the World Wide Web Virtual Library.** The World Wide Web virtual Library web directory, has been active since 1991, making it the oldest web directory online. Tim Berners-Lee, the man who invented HTML and the web, built it. Volunteers oversee compiling pages in their areas of expertise, resulting in a directory widely recognised as among the best accessible.

**Librarians' Internet Index:** LII (Librarians' Internet Index) is an online directory that public librarians maintain and index. It has approximately 20,000 entries in thirteen major categories that are evaluated by public librarians. Each entry includes a brief description of the site as well as the website's URL. The sites listed are for general interest.

LII was founded in the early 1990s by Carole Leta, a reference librarian, and was combined with Berkeley Public Library in 1994, when it was renamed Berkeley Public Library Index to the Internet. The directory was relocated to UC Berkeley SunSITE in 1997 and renamed Librarians' Index to the Internet.



#### **Subject Gateways:**

Subject gateways are web-based services that provide searchable and browsable catalogues of information from the Internet. Subject gateways frequently focus on a subset of academic subject areas. Subject gateways in their most basic form are collections of websites that provide lists of links to resources. Some gateways index their link lists and provide a straightforward search function. Some offer additional services, such as a resource database and numerous indexes that can be searched via a web-based interface. The majority of gateways allow the end user to search or browse the resource description database. Other names for these include subject-based information gateways, clearing houses, subject trees, pathfinders, and so on.

Subject gateways are intended to provide the user community with high-quality information. They are valuable sources of information for users because they are subject-specific. The primary benefit of such sites is that they are man-made. The content is handcrafted by someone who is knowledgeable about the subject and its complexities. As a result, the generated resource entries are frequently superior to those provided by a traditional search engine.

With the advent of the Internet, many libraries are eager to go online. They frequently discover that the amount of material available on the Internet is enormous, and that if only that amount of material could be handled and made available to the user community, it would meet its information needs. In order to do so, they developed subject-based portals known as Subject Gateways in the information society. A subject gateway is not required to run a library. It can be managed by people who are interested in information and want to share useful information. The main idea behind subject gateways arose from search engines' inefficiency in providing focused information, and because of the information explosion, it is difficult for academics and researchers to sit and browse the internet for information.

#### **Features of Subject Gateways:**

Following are the features of subject gateways(Thomas, 2017):

- Each resource selected is evaluated explicitly defined quality selection criteria.
- Resources are classified using a range of schemes, e.g., DDC-MESH
- Metadata (Standard resource description) are provided based on a particular standard e.g., Dublin Core.
- Written resources descriptions are provided for each resource often by library subject specialist.
- Currency of resources is checked by link checking software (e.g., ROADS), database such as OMNI.
- Institutional commitments are the vital component for continued development of subject gateway.

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#### Weblogs (blogs)

Blogs are nothing more than an online diary, a website where entries are posted in chronological order and are typically presented in reverse chronological order. Individuals usually maintain blogs with regular updates of comments, event descriptions, or additional material such as images or video. Most blogs are interactive, allowing users to leave comments and even message one another via widgets, and it is this interaction that distinguishes them from other static websites. A typical blog includes text, photographs, and links to other blogs, websites, and media. Many blogs allow readers to leave comments in a more interactive format.

Blogs can be used by libraries to exchange information, solicit user feedback, promote information services, notify readers about the availability of new resources or the establishment of new facilities, and so on. When used wisely, blogs can be effective marketing tools, bridging the gap between people and libraries. To improve the user-centeredness and service features of libraries, we can simply solicit user feedback and make it participatory and collaborative.

Application of Blog in libraries:

- Blogs serve as a platform where the users can file their concerns, queries and suggestions regarding the services and activities of the library.
- Blogs can also be used for the collection development where the users request the resources.
- Blogs can be used as a tool for marketing of the information as well as the library.
- Blogs can serve as discussion forum.

#### Podcasts

Podcasts are MP3 audio recordings of talks, interviews, and lectures that can be listened to on a desktop computer or a variety of handheld MP3 players. A podcast is a collection of digital-media audio or video files that are distributed over the Internet via syndicated download, Web feeds, portable media players, and personal computers. Although the same content can be obtained through direct download or streaming, a podcast differs from other forms of digital media in that it can be syndicated, subscribed to, and automatically downloaded when new content is added.

Application of Podcasting in Libraries:

- The library that works hard to produce audio content such as recordings of programs or library tours, podcasting can be an effective means of making that content more widely available.
- Podcast highlights about new resources
- Podcasts enable librarians to share information with anyone at any time.

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• Podcasting can be a publishing tool for users and librarians' oral presentations

#### **RSS Feeds**

RSS (Really Simple Syndication or Rich Site Summary) is a web content delivery format used to provide frequently changing and updated web content such as blog posts, news headlines, audio, and video. It is basically a way of alerting people to changes and sharing new developments with others who are interested in the same. Web feeds help publishers by allowing them to automatically syndicate content. They serve readers by providing timely updates from favourite websites or by aggregating feeds from multiple sites into a single location. Many news sites, blogs, and other online publishers syndicate their information as an RSS Feed to anyone who requests it. It allows us to simply stay up to date by retrieving the most recent content. Not only does it save time, but it also protects your privacy by not signing up for e-mail newsletters.

RSS feeds can be read using RSS reader, feed reader, or aggregator software, which can be web-based, desktop-based, or mobile-device-based. Feed Reader or News Aggregator software collects and displays RSS feeds from multiple websites. Amphetadesk (Windows, Linux), FeedReader (Windows), and NewsGator are some prominent feed readers (Windows - integrates with Outlook). RSS feeds are used by libraries to keep up with blogs, world and local news, images, podcasts, weather forecasts, product price changes and sales, new publications from favourite authors or publishers, social bookmarks, professional organisation announcements, and so on. There are hundreds of electronic journals that have RSS feeds that notify users when new content is updated or published. RSS updates, in particular, news regarding the world of writing, such as new books published that are of interest to our readers.For example:

- Edmonton Public Library (http://www.epl.ca/RSSFeeds/EPLRSSFeeds.cfm)
- Hennepin County Library (http://www.hclib.org/pub/search/RSS.cfm)

Application of RSS in Libraries:

- Announcement of the availability of new books and other resources in a given subject area.
- Librarians can subscribe to RSS from the sources for compiling their customized alerts.
- Promote events organized in the library for Library Users.
- Enhance Library Instruction for different Web 2.0, Library 2.0, Blogs, Wikis, RSS, Tagging, Podcasting, IM programs/courses by integrating appropriate resources.
- Announce availability of new research and learning opportunities in various academic/ research

### **Instant Messaging**



Instant Messaging (IM) allows two or more people to communicate in real time online by sending text-based brief messages over the internet. The reference staff can respond to ready reference questions, directions, or policy-related inquiries via IM and SMS. The reference staff must be brief and to the point when responding to instant messaging (IM) and short text messaging (SMS) queries. If the response to a query is lengthy, the staff may request an e-mail address and provide more context on the topic, or the reader may be encouraged to visit the library. Users value IM and SMS for their convenience, anonymity, and quick assistance. Instant messaging is used in academic libraries to provide virtual reference services and improve access.

#### Wikis

A website that each reader can personalise. Wikis enable anyone to share knowledge and information, but they are not typically considered "authoritative" or "scholarly." They contain a lot of information because users can make up facts or pass off ideas as facts on a wiki. Despite the fact that some major wikis (such as Wikipedia) attempt to verify information or reference sources, these sites are not regarded as credible or trustworthy. If you find information on a wiki, cross-reference it with data from another source, such as an encyclopaedia, dictionary, or index. Example: The most prominent example is Wikipedia (http://en.wikipedia.org/), which has approximately 3.4 million articles available on the Internet for free use.

#### Flickr

Flickr is a digital media platform that allows people all over the world to share and manage online images. This application was developed by Ludicorp in 2004, and it has since been used by both professional and amateur photographers. They can share their high-resolution photographs and Flickr photos with this software. The site has a variety of features; simply create a free account on this media platform and upload your photos using your Flickr account. This platform is used by several professional bloggers and researchers to host photographs that are used in social media and online blogs.

### **Social Networking**

Individuals are classified as members of social networks. Although social networking can occur in person, particularly in the workplace, universities, colleges, and schools, it is most common online because there are so many people looking to meet others on the Internet. MySpace, Facebook, Orkut, Twitter, and LinkedIn are all popular social networking sites. On these platforms, you can now see not only people, but also businesses and products. Social networking sites function in the same way as an online community of Internet users. We can begin socialising after joining a social networking website by reading other members' profile pages and possibly contacting them. Making new friends from different social, economic, religious, and cultural backgrounds is just one of the many benefits of social networking online.



### **IN-TEXT QUESTIONS**

- 1. Web 2.0 term was invented by \_\_\_\_
- 2. Web 2.0 has given vendors more power over unhappy customers. True / False
- 3. Which among these is not a Web browser?
  - a) www
  - b) Chrome
  - c) Opera
  - d) Netsurf

### 1.5 WEB 3.0

Web 3.0 refers to the increased use and interaction with the web, which involves transforming the web into a database with the integration of DLT (Distributed Ledger Technology blockchain, for example), and that data can be used to create Smart Contracts based on the individual's needs. It enables the advancement of the web's back end following a period of emphasis on the front end (Web 2.0 has mainly been about AJAX, tagging, and other front-end user-experience innovation). Web 3.0 is a concept used to describe multiple evolutions of web usage and interaction between different paths. In this case, data is shared rather than owned, with services displaying different views of the same web / data.

The Semantic Web (3.0) promises to establish "the world's information" in a more logical manner than Google's current engine schema. This is especially true when comparing machine conception to human comprehension. Instead of simply matching keywords, the Semantic Web requires the use of a declarative ontological language, such as OWL, to create domain-specific ontologies that machines can use to reason about information and draw new conclusions.

#### 1.5.1 Main features of Web 3.0:

#### **└**1. Semantic

The Semantic Web is the next step in the evolution of the Web. The semantic web enhances web technologies in demand for creating, sharing, and connecting content via search and analysis based on the ability to comprehend the meaning of words rather than keywords or numbers.

#### 2. Artificial

Combining this capability with natural language processing, in Web 3.0,

Intelligence

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#### Web



computers can distinguish information like humans to provide faster and more relevant results. They become more intelligent to fulfill the requirements of users.

#### 3. **3D**

Graphics

In Web 3.0, three-dimensional design is widely used in websites and services. Museum guides, computer games, e-commerce, geospatial contexts, and other applications that use 3D graphics are all examples.

#### 4. Connectivity

Because of semantic metadata, information is more connected in Web 3.0. As a result, the user experience evolves to a higher level of connectivity that makes use of all available data.

#### 5. Ubiquity

Content is accessible by multiple applications, every device is connected to the web, and the services can be used everywhere.

6. **DLT** and Smart Contracts With the help of DLT, we can have a nearly impossible to hack database from which one can have value to their content and things they can own virtually; this is the technology that enables a trustless society by the integration of smart contracts that do not require a middle man to be a guarantor to make that contract occur on a specific date because it is based on data from that DLT. It's a powerful tool that has the potential to make the world a better place by creating more opportunities for everyone on the internet.



## 1.6 COMPARISON BETWEEN WEB 1.0, WEB 2.0 AND WEB 3.0

 Table 1.1: Comparison between Web 1.0, Web 2.0 and web 3.0 (Source: "Comparison

 Between Web 1.0, Web 2.0 and Web 3.0," 2018)

Web 1.0	Web 2.0	Web 3.0
Mostly Read-Only	Wildly Read-Write	Portable and Personal
Home Pages	Blogs / Wikis	Live-streams / Waves
Company Focus	Community Focus	Individual Focus
Owning Content	Sharing Content	Consolidating Content
WebForms	Web Applications	Smart Applications
Directories	Tagging	User behavior
Page Views	Cost Per Click	User Engagement
Banner Advertising	Interactive Advertising	Behavioral Advertising
Britannica Online	Wikipedia	The Semantic Web
HTML/Portals	XML / RSS	RDF / RDFS / OWL
Data was not Focused.	Data of many was controlled by	Data was personalized and no
	some mediatory.	use of mediatory.



Information sharing is the goal.	Interaction is the goal.	Immersion is the goal.	
It connects information as its primary goal.	It aims to connect people.	Focuses on relating knowledge.	
Static websites	Introduction of web applications	Intelligent web-based functions and apps	
A simpler, more passive web.	An enhanced social Web	A semantic web exists.	
Web and File Servers, HTML, and Portals are technologies connected to Web 1.0.	AJAX, JavaScript, CSS, and HTML5 are examples of related technology.	Web 3.0 technologies include blockchain, artificial intelligence, and decentralized protocols.	
Associated Technologies:- • Web and File Servers • Search Engines (including AltaVista and Yahoo!) • E-mail accounts (Yahoo!, Hotmail) • Peer-to-Peer File Sharing (Napster, BitTorrent) and others.	<ul> <li>Associated Technologies:-</li> <li>Frameworks for Ajax and JavaScript</li> <li>Microsoft.NET</li> <li>Blogs</li> <li>Wikis and others.</li> </ul>	<ul> <li>Associated Technologies:-</li> <li>Searching Using Semantics</li> <li>Databases of Information</li> <li>Ontologies</li> <li>Intelligent Digital Personal Assistants and others.</li> </ul>	



## 1.7 SUMMARY

In this lesson, we learnt how the web evolved from its original static form to its dynamic form known as Web 2.0. This is also known as a Read/Write web. You were given an overview of web 2.0 technology and standards. We also looked at major web 2.0 concepts as well as some essential tools. Web 2.0 and Web 3.0 will attract and draw attention to the world by offering interactive web services. Libraries have positioned themselves to quickly and expertly absorb its successors. The text-based aspect of instant messaging applications is giving way to more multimedia experiences, with audio and video messaging becoming more common. It has become more common as they provide more multisensory experiences.

# 1.8 GLOSSARY

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**Blogs:** is an abbreviation for 'web log'. It is a type of website that people use to update regularly, where entries are shown on date wise as in a diary.

Social networking: is a set of software system that provides people to join, share,

interact and build a communication network on the web.

Tagging: is a process of giving keyword (tag) by the user to an object on the Internet.

**Wiki**: is a website that allows the easy creation and editing of any number of interlinked web pages via a web browser using a simplified markup language or aWYSIWYG text editor.

# **1.9 ANSWERS TO IN-TEXT QUESTIONS**

Tim O'Reilly
 True

3. www

# 1.10 SELF-ASSESSMENT QUESTIONS

- 1. What is Web 2.0? Elaborate the Web 2.0 tools.
- 2. Explain the features of Web 3.0.

# **1.11 REFERENCES**

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# LESSON 1.3

# WEB DIRECTORIES, SUBJECT GATEWAYS, LIBRARY PORTALS, etc.

Unive

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Web based library services
- 1.4 Web Directories
- 1.5 Subject Gateways
- 1.6 Library Portals
- 1.7 Summary
- 1.8 Self-Assessment Questions
- 1.9 References
- 1.10 Suggested Readings

# 1.1 LEARNING OBJECTIVES

After reading this lesson, you will be able to:

- discuss the importance of library portals and gateway
- Learn about web directories

# **1.2 INTRODUCTION**

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Subject gateways or portals refine the work of subject directories by presenting subject specific information channels governed by strict quality criteria, usually compiled by human experts. Resources included in gateways cover a wide spectrum, from electronic journals and books to academic and government reports, as well as referring users to relevant web sites.

Gateways are usually constructed at academic institutions and follow the principle of open access.

# **1.3 WEB BASED LIBRARY SERVICES**

Web-based library services are primarily delivered via the library portal, which serves as a special type of portal to web-based library resources. It enables seamless access to the metadata of a library's various databases. It compiles a variety of useful information resources into a single webpage, allowing users to customise their information resources by selecting and viewing information they find personally useful.

# **1.4 WEB DIRECTORIES**

A web directory is a collection of websites that have been organised to make navigation easier. These web address links are classified using specific criteria, such as alphabetical order. This assists users in searching for information in a specific manner. Before search engines, the only way to find websites on the internet was through web directories.

A web directory is an online directory that lists websites, businesses, and industry-related content. Although web directories used to focus on general website links, modern web directories focus on specific industries such as local businesses, travel, and used goods, among many others. Because most directories include a search engine on their website, web directories are becoming an increasingly important part of vertical search.

Web directories are used for a variety of reasons, including improved search results, more relevant search results, and greater variety within a broader topic. Their primary benefits in marketing and SEO include driving traffic to a website, improving a company's reputation, and increasing a site's visibility in the SERPs.

Web directories were once an important part of the link-building process because they enabled the creation of backlinks to a site. They are now used more for building local citations and increasing topical relevance than for link building. Nonetheless, they continue to be an important part of off-page SEO.

Web directories, also known as subject directories, are designed to help users find all relevant websites within specific categories or subcategories. Web directories direct users to a list of



websites by utilising layers of categories and subcategories, which users can then select to find a list of all relevant websites.

The outcome of a search engine search is determined by key words. Search engines, like computers, only respond to specific terms that many users may not be familiar with. Users must understand what the web directory allows and does not allow among search techniques such as phrase searching, Boolean logic, truncation, and field searching because each subject directory has slightly different search mechanisms. (*What Is Web Directory - Definition, Meaning and Examples*, 2021)

Types of web directories (https://www.arimetrics.com/en/digital-glossary/web-directory):

We can classify web directories in different ways according to their typology.

- According to the cost: si these allow us to include the link to our website without any cost, we will talk about free directories, if on the contrary it is necessary to pay to register our website we will refer to paid directories. The latter are usually much more beneficial for SEO as a general rule, since they are less saturated and transmit greater authority, while with free ones the opposite happens in many and can even be as webspam issuers. There is a variant within the payment directories known as bid directories in which this payment method is used to define the visibility that our website will have within the directory.
- According to the correspondence: there are numerous directories that are free, but in exchange for including our website they demand in return a link to it, which is known as reciprocal directories, normally these are more relevant than free non-reciprocal directories.
- According to the geographical area: if it is a web directory that includes only web pages from a certain geographical region, we are talking about a local directory, if it does not have any type of geographical limitation, it is a global directory.
- According to the specialization: if it is a directory that is not specialized in any specific topic, it is called a general directory, when if it is it is a thematic directory. Thematic directories are as varied as disciplines exist and we can find directories of sports, news, health, technology, shopping, etc ... Within the thematic directories we can highlight the academic directories that focus on certain subjects as support for research or teaching.

The main **advantages of** web directories are:

- You may delegate authority to our website.
- They include website descriptions.
- They present the classified data.
- They categorise websites based on their content.
- They increase the visibility of our website.

The **disadvantages** of web directories are:



- In most cases, they do not provide a significant benefit to our website's increased traffic.
- They are not usually updated very frequently.
- Their databases are much smaller than search engine databases.
- The descriptions they provide about websites are usually quite generalist and do not provide too much detail; and many of them are no longer in use.

Someexamplesofwebdirectoriesare(https://www.newworldencyclopedia.org/entry/Web\_directory):

### Yahoo! Directory

The Yahoo! Directory is a web directory that rivals the size of the Open Directory Project. Yahoo's first product was a directory. When Yahoo! switched to crawler-based listings for its main results in October 2002, the significance of the human-edited directory diminished, but it is still being updated. The Yahoo! Directory provides two options for submitting websites for possible inclusion: "Standard," which is free, and a paid submission process with expedited review. When recommending a commercial site, payment is required.

Yahoo! offers both a search engine and a directory service, with the directory searchable independently of the rest of the search engine results.

#### **Open Directory Project**

The Open Directory Project (ODP), also known as demos (from its original domain name, directory.mozilla.org), is a multilingual open content directory of World Wide Web links owned by Netscape and built and maintained by a community of volunteer editors.

For organising site listings, ODP employs a hierarchical ontology scheme. Listings on a similar topic are grouped into categories, which can then be subdivided further.

### Librarians' Internet Index

LII (Librarians' Internet Index) is a web directory maintained and indexed by public librarians. Over 20,000 entries are evaluated by public librarians in thirteen major categories. Each entry contains a brief description of the site as well as the URL. The listed websites are of general interest. A well-known example is the LII.

Carole Leta, a reference librarian, founded LII in the early 1990s, and it was merged with Berkeley Public Library in 1994, when it was renamed Berkeley Public Library Index to the Internet. In 1997, the directory was moved to UC Berkeley SunSITE and renamed Librarians' Index to the Internet. (*Web Directory - New World Encyclopedia*)

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# 1.5 SUBJECT GATEWAYS

A subject gateway is an organised collection of resources on a specific topic that includes a retrieval mechanism. This essentially means that the search domain's scope is well defined and limited to a subset of what is available in general. In its most basic form, the resources may be made available as a structured hyper-linked directory, as some search engine sites that provide directory services do. (https://lispweb.wordpress.com/subject-gateways/)

According to Lorcan Dempsey: "Subject gateways are internet services which support systematic resource discovery. They provide links to resources (documents, objects, sites or services) predominantly accessible via the internet. The service is based on resource description. Browsing access to the resource via a subject structure is an important feature".

Subject gateways are characterized by two key factors:

- a) They are selective, pointing only to Internet resources that meet with quality selection criteria.
- b) They are built by subject and information specialists- often librarians.

Some examples of subject gateways are:

• AERADE: Reports Archive AERADE is a Gateway for aerospace and defence devised and maintained by information professionals at Cranfield University Library and the Royal Military College of Science Library. http://aerade.cranfield.ac.uk/

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• ELDIS

Eldis is an online information service providing free access to relevant, up-to-date and diverse research on international development issues. Eldis includes over 30,000



summaries and links to free full-text research and policy documents from over 8,000 publishers. Each document is selected by the team of editors for maintaining relevance and quality. http://www.eldis.org/

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• **INFOMINE:** Scholarly Internet Resource Collection INFOMINE is a virtual library of Internet resources relevant to faculty, students, and research staff at the university level. It contains useful Internet resources such as databases, electronic journals, electronic books, bulletin boards, mailing lists, online library card catalogues, articles, directories of researchers, and many other types of information.

http://infomine.ucr.edu/

Internet Public Library Information (ipl2)trust \_ you can ipl2 is a public service organization and a learning/teaching environment and it the first public library of and for the Internet community. Started as an an experiment, now trying to discover and promote the most effective roles and contributions of librarians to the Internet and vice versa. A group of highly talented, creative, strongwilled people, working hard for collecting, organising and providing access to Internet based resources.

### http://www.ipl.org/

### Intute

Intute is a free online service that helps you to find the best web resources for your studies and research. Intute is the internet Guide to Engineering, Mathematics, Computing, Agriculture, Law, Physical Science, Social Science, Management, Biological Science, Geography, Medicine and many more. With millions of resources available on the Internet, it can be difficult to find useful material. We have reviewed and evaluated thousands of resources to help you choose key websites in your subject. http://www.intute.ac.uk/



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#### • Science

#### Accelerator

Science Accelerator is a gateway to science, including R&D results, project descriptions, accomplishments, and more, via resources from the Office of Scientific and Technical Information (OSTI), U.S. Department of Energy. http://www.scienceaccelerator.gov/

#### • Scout

#### Report

#### Archives

Scout Research Group (Scout) has focused on developing better tools and services for finding, filtering, and presenting online information and metadata. Scout has access to highly educated content specialists and a world-class array of computer science and library resources.

https://scout.wisc.edu/archives/

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TechXtra is a free service which can help you find articles, books, the best websites, the latest industry news, job announcements, technical reports, technical data, full text e-prints, the latest research, thesis & dissertations, teaching and learning resources and more, in engineering, mathematics and computing. http://www.techxtra.ac.uk/

- Vifamath: the Virtual Library of Mathematics Vifamath, the Virtual Library of Mathematics is the central access point for your search for mathematical information. It allows to search both for conventional forms of media and for electronic resources. http://vifamath.de/
- WorldWideScience.org: One-stop searching of worldwide science sources WorldWideScience.org is a global science gateway comprised of national and international scientific databases and portals. WorldWideScience.org accelerates scientific discovery and progress by providing one-stop searching of databases from around the world. Multilingual WorldWideScience.org provides real-time searching and translation of globally dispersed multilingual scientific literature. http://worldwidescience.org/

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### Other subject gateways

http://vlib.org/

- LibrarySpot.com: (http://www.libraryspot.com/)
- Librarians' Index to the Internet (LII) (http://lii.org/)
- Argus Clearing House (http://www.clearinghouse.net/)
- Galaxy (http://galaxy.einet.net/)
- Direct Search (http://gwis2.circ.gwu.edu/~gprice/direct.htm)
- Academic Info (http://www.academicinfo.com/)
- BUBL (http://bubl.ac.uk/)
- BIOME (http://biome.ac.uk/)
- The Scout Report (http://scout.cs.wisc.edu/report/sr/current/)
- LivingInternet.com (http://www.livinginternet.com/)
- Edinburgh Engineering Virtual Library (EEVL) (http://www.eevl.ac.uk)

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- Social Science Information Gateway (SOSIG) (http://sosig.ac.uk/)
- Digital Librarian (http://www.digital-librarian.com/)
- QUEST.net (http://www.re-quest.net/)
- BioMedNet (http://www.bmn.com/)

### CHARACTERISTICS OF A SUBJECT GATEWAY

- An online service that provides links to numerous other sites or documents on the internet
- Manual creation/intervention, often by information and/or subject specialists
- Selection of resources according to published quality and scope criteria
- Intellectually produced content descriptions, ranging in length from short annotation to review
- Search and browse access, and
- Collection management policy, supported by maintenance and updating procedures

#### SEARCH ENGINES V/S SUBJECT GATEWAYS

(https://www.geeksforgeeks.org/difference-between-search-engine-and-subject-directory/)

SEARCH ENGINE	SUBJECT GATEWAY
It is an online tool that is used to locate or search for information on WWW.	It is an online database of websites and online information set up by subject and category.
It is generally maintained and reviewed by	It is created, maintained, and reviewed by
computer robotics.	human editors or experts.
	It allows users to find or locate information
It allows users to find or locate information	on the internet using hierarchy.
on the internet using phrases and keywords.	
General resource is available.	It is a "gathering place of discipline specific resources"
It totally depends on the powerfulness of	High level of human input is there, as the
the search-engines algorithms.	selected resources must meet a number. Of criteria applied by a librarian or academic, who ensures that only high quality,
	relevant resources are included in the database.
The results can be overwhelming,	The results are specific, precise, and linked
unmanageable, full of irrelevant references	to relevant documents.
and are often too prolific to meet user	
needs.	



Records are created by an automatic process and typically consist of a mixture of metadata offered by the author of the page (if this is available) and text picked up from the page itself. Records are created by a cataloguer, which is designed to highlight the main features of resource in an easily readable, concise fashion.

# **1.5 LIBRARY PORTALS**

A portal is a website or web service that provides information content to serve a specific community. It is derived from the Medieval Latin word 'portale', meaning 'city gate'. American Heritage Dictionary defines a portal as "a doorway or an entrance, or a gate, especially one that is large and imposing". Library Portals are the subset of web portals and serve specific academic research communities. Library portals typically provide a gateway to an institution's resources by listing them for users and creating a direct link to the interface of each resource. Library portals in this digital era enhance the value and function of electronic resources with the facility of searching multiple resources. Library portals offer access to a broad array of resources and services to libraries such as e- journals, online databases, web-OPAC, new addition and any other static information about library services.

### Library Portal:

A library portal is an interface to access library resources and services through a single access and management point for users: for example, by combining the circulation and catalog functions of an integrated library system (ILS) with additional tools and facilities.

According to Wikipedia, A library portal is defined as "a combination of software components that unify the user experience of discovering and accessing information" in contrast to a "single technology" to provide "services that support discovery, access and effective use of information." (https://en.wikipedia.org/wiki/Library\_portal)

The term Portal describes a variety of web based interfaces, everything from a relatively static homepage with generally product and contact information to a dynamic one "stop homepage where users can customize the content to meet their needs. or many portal is the epicenter of the web experience, a place to return to when you get lost, a place to keep your information, a place from which to communicate with others. The point -information % systems 40mmittee defines a portal as Ha network service that brings together content from diverse distributed resources using technologies such as cross searching, harvesting altering, and collates this into an amalgamated form for presentation !ia a web browser to the user. & Library portal is a single access point combining the library catalogues, subscription database, subject gateways, electronic journals etc. Library portal meets in individual needs



of users, which either the system itself can tailor the delivery and presentation of information content or the users themselves can customize the type and format of information displayed. Library portal is now the standard interface to generate library resources and services through a single access a management point for users.

### Significance of Library portal

Librarians have become increasingly aware that the multiplication of electronic resources is a problem for end-users. Users find it difficult to locate the most appropriate database or resources to search for information relevant to their need. Even if they locate the right resources, since each service tends to have its own unique interface, they may struggle to search it effectively. -f information is difficult to find using library tools and services, users are looking for alternative sources. This new reality translates into the need for making library web environments effective and useful. This trend is especially challenging for librarians, who were and continue to see themselves as the traditional keepers of knowledge, which untillery recently was housed in many millions of books and journals that are rapidly becoming digitized. Portals are transformational environments that address the problem of information glut by customizing information content to meet specific end-user needs. Library Portal is growing in its importance as the preferred way of organizing and using information. Web portals are seen as positive potential frameworks for achieving order out of chaos. &s portals become a primary means for transacting information and commerce, libraries of all types are becoming involved in thinking, planning and building various frameworks and services. Library portals reduce the barrier of users having to remember multiple log-ons. The portal gives the library a tool to channel users towards preferred resources. -t increases the ability of the library to ensure that costly electronic journals and databases are used by offering a simple way to browse the available resources. supports searching by carrying users through from bibliographic searches to full text options.

### • Ease-of Use

One of the most important features to consider is ease of use, which can be determined by an effectively organised home page. The ease with which users find information is determined by the number of paths provided to find information while keeping the number of clicks to a minimum in finding relevant information. To interact with the system frequently, the user should perceive ease-of-use with the accessibility and usability of the library portal. Text should be kept brief and clear so that users can scan and find the needed information quickly and, in some cases, obscured information.

### • Search and Navigation

In addition to a consistent and logical navigation framework, the homepage must include effective search functionality and site maps. The library portal should provide direct access to commonly used services, as users expect to be able to complete tasks online. Search boxes are preferable to search buttons and should be placed prominently.

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### Resource Linking

A library can seamlessly connect electronic resources by using resource linking. An index or abstract, for example, can be linked to a full-text database, while a bibliographic record can be linked to a review or an e-book. Users may prefer to have more than one path to the same information; cross linking ensures that users find the information they seek.

#### • Personalization

Each individual user or a community and/or group of users can have settings for each of the portal functions that they use. A portal provides a framework for users to store the settings and tailor the content that they are interested in seeing. A portal can be personalized using user-profile to deliver personalized content. Each user can gain a view that is tailored to his or her access privileges. User has to sign on with a username and Personal Identification Number on entry to the library portal to access personal profile information and tailor the design based on customization feature. Or else, a portal may give users the ability to create their personalized pages by selecting what they want to see whenever they get access to the library portal. This personal page may keep track of resources for a user, his library account, queries kept until the session ends, request and reserves and also renewals.

#### • User Authentication

User authentication also known as patron's authentication determines whether patrons are eligible for service by checking patrons against a library database. This authentication is usually done with a proxy server to limit access to resources the patron is authorized to use. For example, a library may allow anyone to access its catalogue, its community information file and other locally created files on its web server, or it may limit access to subscription databases to only registered borrowers.

### Interactive Services

Although most portals can support interactive services, only a few academic libraries have incorporated interactive services in to their portal. Typical of such services are e-mail, chat rooms and forums. Library portal should facilitate knowledge sharing online by providing collaborative space for interactive tools. However, in order to assist the users in the fair use of tools and services offered, library portal should facilitate web-based information literacy programs.

### **Core functionality of Library Portal**

90% searching would be fare easier for the user if the library could present resources in a consistent, organized gateway. This should be customized for different user groups.98;'sers would learn to search more effectively if there is one fully functional library-maintained search interface available for any database they wanted to use. It should often be convenient to search multiple databases from one search box. This implies the ability, in a single search,



to interrogate databases that use different metadata standards, especially in different curatorial domains specifically the system should be able to search databases of images and a proliferating array of multimedia types, and ideally show thumbnails or previews in search results. The search results from spread searches need to be presented in an intelligible way to the user, ideally with duplication and sorting of results. The user should be able to sale hits or searches, including for reuse on databases other than the one it was first created for.

The system must provide central management tools for handling a variety of http-based query syntaxes, since standards are developing rapidly to meet the needs of specific domains.

# 1.6 SUMMARY

The main points and themes covered in the lesson must be reviewed and highlighted at the end of the lesson in the form of a summary. Please note that 'this is not a conclusion: rather it will help the learners in remembering the main points of the lesson and therefore it is written at the end of the lesson. It should be one paragraph and should not be too long. Further, if the author feels the need, key points can be given as a numbered or bulleted list or a diagram chart.

# 1.9 SELF-ASSESSMENT QUESTIONS

- 1. Explain the concept of learning. Discuss personal factors that influence learning, with suitable examples.
- 2. Discuss some effective methods of learning that you would like your students to practice in class and at home. Illustrate your answer with relevant examples.

## 1.10 REFERENCES

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# LESSON 1.4

# WEBLOGS (BLOGS), PODCASTS, RSS FEEDS, INSTANT MESSAGING, WIKIS, FLICKR, ETC.

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Web 2.0 Applications in Library
  - 1.3.1 Synchronous Communication
    - 1.3.1.1 Instant Messaging (IM) and Virtual Meetings

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- 1.3.2 Content Delivery
  - 1.3.2.1 RSS Feeds
    - 1.3.2.2 Streaming Media
    - 1.3.2.3 Podcasting
    - 1.3.2.4 Vodcasting
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- 1.3.3 Collaborative Publishing Tools
  - 1.3.3.1 Blogs
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- 1.3.4 Collaborative Service Platforms
  - 1.3.4.1 Social Networks
  - 1.3.4.2 Tagging
  - 1.3.4.3 Social Bookmarking Services
- 1.3.5 Hybrid Applications, Programs and Programming Tools
  - 1.3.5.1 Mashups
  - 1.3.5.2 Ajax (Asynchronous JavaScript and XML)
  - 1.3.5.3 Application Programming Interface (API)
  - 1.3.5.4 Library Tool Bars
- 1.4 Summary
- 1.5 Glossary

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- 1.6 Answers to In-text Questions
- 1.7 Self-Assessment Questions
- 1.8 References
- 1.9 Suggested Readings

### **1.1 LEARNING OBJECTIVES**

After reading this lesson, you will be able to:

- Know about Instant Messaging (IM) and Virtual Meetings
- Understand content delivery tools like RSS feeds, Podcasting, Vodcasting, SMS
- Understand collaborative publishing tools like Blog, Wiki.
- Familiarize with different platforms like socia networks, tagging.

## **1.2 INTRODUCTION**

The World Wide Web (WWW) was originally intended as a visual medium for publishing ideas and information to a potentially large audience online. Users could only read and learn from websites created by individuals or institutions in the web 1.0 environment. As a result, it is referred to as "read-only" media. With the advancement of technology, the "read-only" web has evolved into the "read and write" web, also known as Web 2.0. It enables the general public to interact, contribute, coordinate, and collaborate in the collaborative delivery of web-based services and products. In comparison to the traditional web 1.0 model, web 2.0 technologies represent a revolutionary approach to managing and repurposing online information and knowledge repositories. Web 2.0 is being extended to several sectors, resulting in newer concepts such as Travel 2.0, Business 2.0, and Library 2.0. With their responsibilities of facilitating access to information resources and providing services to their user communities, libraries found this interactive platform most suitable and were thus early adopters. Library 2.0 is commonly regarded as the selective use of Web 2.0 tools and techniques with an emphasis on user services. The module describes Web 2.0 and Library 2.0 applications, as well as their application in libraries to facilitate collaborative services for users.

## 1.3 WEB 2.0 APPLICATION IN LIBRARY

librarian can not only provide user-centric services, but also foster a collaborative and participatory environment through the use of web 2.0 technologies, resulting in the creation of new resources and the expansion of existing ones through the collective intelligence of users. "Library 2.0" refers to the application of Web 2.0 concepts and technologies to library services and collections. To meet the needs and expectations of today's library users, a new generation of library services and activities can be designed or built in the library 2.0



environment with active participation and feedback from the user community. The term "Library 2.0," coined by Michael Casey in 2006 on his blog "Library Crunch," refers to a number of social and technological changes that are having an increasing impact on libraries, their staff, and their patrons, as well as how they interact.

### **1.3.1** Synchronous Communication:

The content should be broken down into smaller chunks and organised using headings and sub-headings. The goal is to present subject matter in a logical and graded order. The language should be simple and straightforward. It should not be stuffy or full of jargon. The language used should be appropriate for the learner's level.

#### Instant Messaging (IM) and Virtual Meetings

Instant messaging (IM) is a type of real-time, nearly instantaneous communication between two or more people. It allows users to send images, audio and video files, and other attachments to one another. IM client software includes Paltalk, Google Talk, Windows Live Messenger, and Yahoo Messenger. Using Instant Messaging, libraries can provide "real-time assistance" to their patrons. Hundreds of people can participate in a real-time audio and video conference as well as textual conversations. Libraries can also use Amrita University's A-View (Amrita Virtual Interactive E-learning World) Classroom to provide an interactive social environment for E-Learning. The software used in libraries for "live reference services" is typically far more robust than the simple IM applications.

### 1.3.2 Content Delivery

### **RSS Feeds**

RSS, which stands for Real Simple Syndication or Rich Site Summary, is a set of XMLbased web-content distribution and republication/syndication protocols used to announce recent content/updates to a website, such as the arrival of new articles, blog entries, news, audio, video, and so on. It enables the free exchange of content between applications and websites. On the one hand, the technology enables a web site (or e-publisher) to list the most recently published updates (such as table of contents of journals or new articles) via XML; on the other hand, it enables a web user to keep track of new updates on a chosen website (s). Users can get timely updates from their favourite website or aggregate data from multiple websites.RSS feed readers visit pre-defined websites, look for updated information, and download it to the user's desktop automatically. RSS can be processed by NewsGator(http://www.newsgator.com/home.aspx), a web-based RSS aggregator, Feedster (http://www.feedster.com/), and the latest versions of Windows Internet Explorer and Mozilla Firefox.

### **Streaming Media**



Streaming multimedia is the sequential delivery of multimedia content over a computer network to the end user, which is displayed as it is delivered by the provider. Streaming video and audio media is an important application that existed prior to Web 1.0 and continues to exist in Web 2.0. It refers to the medium's delivery method. The static, text-based tutorials are being transformed into interactive multimedia tutorials. Several tutorials combine media presentations with interactive quizzing, using Flash programming, screen-cast software, or streaming audio or video. Tutorials were the first library applications to evolve into more socially rich Web 2.0 environments.

### Podcasting

The term "podcasting" is a combination of two words: "broadcasting" and "iPod" (popular MP3 player from Apple Computer). Podcasting is defined as "the process of capturing audio digital-media files for distribution over the Internet via RSS feeds for playback on portable media players and computers." Podcast is defined by Merriam Webster Dictionary as "a programme made available in digital format for automatic download over the Internet." It's also referred to as a time and location independent digital file. Users can subscribe to such feeds and have the files automatically downloaded into an audio management programme on their PCs.A podcast differs from other digital media formats in that it can be syndicated, subscribed to, and downloaded automatically when new content is added, using an aggregator or feed reader that supports feed formats such as RSS or Atom. Podcasts are used by several libraries to supplement library orientation programmes. Using podcasting and other consumer technologies (for example, PDAs, iPods, and other MP3 players) to deliver library content and services is a significant step forward for the library profession.

#### Vodcasting

The term "VODcasting" refers to "video-on-demand." It is the same as podcasting. Unlike podcasting, which is used to deliver audio files, vodcasting is used to deliver video content. Vodcasts, like podcasts, can be listened to on a laptop or a personal media assistant (PMA).

### **SMS Enquiry Service**

Short Message Service (SMS) is a method of sending short messages over mobile networks. Patrons can use their mobile phones to SMS their inquiries to a library's SMS enquiry services. The reference staff assigned to handle such inquiries can respond immediately with answers or links to more detailed answers.

### **1.3.3** Collaborative Publishing Tools

### Blogs

A blog (a shortened version of the term web log) is a discussion or informational website published on the World Wide Web that consists of discrete entries displayed in reverse chronological order. (Wikipedia, 2014). It is simple to update diaries or online journals.



Blogs are regarded as simple publishing tools. Blogs give an individual or group of individuals control over publishing content or making comments on it.Blogs are more user-friendly, platform-independent, and accessible via the Internet. Blogs, in general, can be described as online diaries; however, thousands of blogs are maintained by experts in various subject areas who are willing to share their knowledge, understanding, and opinions with others. Multi-author blogs have recently emerged, with posts written by a large number of authors. The rise of Twitter and other "micro blogging" systems aids in the integration of multi-author and single-author blogs into a new societal stream.

LibraryCrunch is a blog on Library 2.0 maintained by Michal Casey. A blog on Open Access is being maintained by Peter Suber. Blogs are easy to create using free services like LiveJournal (http://www.livejournal.com/) and Google Blogger (http:// www.blogger.com/). Some services like NETCIPIA (http://www.netcipia.com/) allow the creation of blogs with wiki support (blikis). The founder of Wikipedia is now offering Openserving (http://www.openserving.com/), another service featuring free tools for building community sites. The most obvious application of blogs for libraries is to use it as a tool for promotion, publicity and for outreach services. Libraries can disseminate information to their users, make announcements for its new resources and events through its blogs. Blogs can be used to initiate debates and interaction amongst users and staff. Moreover, library staff and user can be encouraged to use Library blogs to get to know each other and interact at personal level.

#### Wikis

A wiki is a web application which allows people to add, modify, or delete content in collaboration with others. In a typical wiki, text is written using a simplified markup language or a rich-text editor. (Wikipedia, 2014). A wiki is a collaborative software that allows users to add content that can be edited by anybody. Ward Cunningham, developer of the first wiki software called WikiWikiWeb, originally described it as "the simplest online database that could possibly work" (Wikipedia, 2014). Wikis can essentially be equated to open web-pages, where anyone registered with it can publish on to it, add to it, amend it and change it. As in case of blogs, Wikis do not have reliability as traditional resources. Inspite of this, their value as information resource cannot be undermined. Libraries can use wiki as a communication tool to enable social interaction among librarians and patrons. Users can share information, ask and answer questions, and librarians can do the same within a wiki. Moreover, a record of these transactions can be archived for perpetuity. Transcripts of such question-answer sessions would serve as a resource for the library to provide as reference. Furthermore, wikis (as well as blogs) will ultimately evolve into a multi-media environment, where both synchronous and asynchronous audio and video collaborations will take place.

### 1.3.4 Collaborative Service Platforms

#### **Social Networks**



A social networking service is a platform to build social networks or social relations among people who, share interests, activities, backgrounds or real-life connections. It allows users to locate links with people through mutual friends or acquaintances, build profiles, and update address books. Social networks are relatively new kinds of virtual communities that delineate and build on member relationships by virtue of their being part of that community (Barsky and Purdon, 2006). Most social network services are web-based interfaces that facilitate community of users to interact with each other deploying tools such as chat, messaging, email, video, voice chat, file sharing, blogging, discussion groups, etc. Facebook, Google+, YouTube, LinkedIn, Instagram, Pinterest, Tumblr and Twitter are some of the social networking services that are very popular. There are a number of projects that aim to develop free and open source software to use for social networking services. The projects include Anahita Social Networking Engine, Diaspora, Appleseed Project, OneSocialWeb, Kune, Movim. These technologies are often referred to as Social engine or Social networking engine software. Social networking services could enable librarians and patrons not only to interact, but to share and exchange resources dynamically in electronic environment. Users can create accounts with the library network service, see what other users have in common to their information needs, recommend resources to one another. Besides, libraries can also recommend resources to users through their network, based on similar profiles, demographics, previously-accessed resources, and a host of data that users provide.

#### Tagging

A tag is a non-hierarchical keyword or term assigned to a piece of information such as an Internet bookmark, digital image, or computer file. This kind of metadata helps describe an item and allows it to be found again by browsing or searching. Tags are generally chosen informally and personally by the item's creator or by its viewer, depending on the system (Wikipedia, 2014). Tags are typically used for resources such as computer files, web pages, digital images, and Internet bookmarks. The user can define and categorize information based on his or her own perception and assigned keyword to a given piece of information. In Library 2.0, users could tag the library's collection and thereby participate in the cataloguing process. The best thing about tagging is that everyone is allowed to categorize the information the way they want. The catalogues of Library 2.0 would enable users to follow both standardized and user tagged subjects, whichever is more convenient or makes better sense to a user. In turn, they can add tags to resources. This tagged catalogue would be an open catalogue, a customized, user centered catalogue. The University of Huddersfield, West Yorkshire, UK, for example, has introduced Web 2.0 features into their library catalogue and options for rating the books as well as dynamic floor plans showing locations of subject areas with an aim to make the catalogue more interactive tool.

#### **Social Bookmarking Services**

Social bookmarking is a method of storing, organizing, searching and managing bookmarks of web sites using descriptive metadata. In a social bookmarking system, users can save links

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to web pages that they want to remember and /or share with other users. These bookmarks can be made public, or saved privately or shared only with specified people or groups of people. Visitors to social bookmarking sites can search for resources by keyword (tag), person, or popularity and see the public bookmarks, tags, and classification schemes (folksonomies = 'folk taxonomies' made of tags) that registered users have created and saved. The authorized people can usually view these bookmarks chronologically, by category or tags, or via a search engine. Most social bookmark services encourage users to organize their bookmarks with informal tags instead of traditional browser-based system of folders, although some services feature categories / folders or a combination of folders and tags. These services also enable viewing of bookmarks associated with a chosen tag, and include information about the number of users who have bookmarked them. Some social bookmarking services also draw inferences from the relationship of tags to create clusters of tags or bookmarks. itList, Blinklist, Clip2, ClickMarks, HotLinks, del.icio.us, Furl, Simpy, Citeulike and Connotea, Stumbleupon, Ma.gnolia, Blue Dot, Diigo, etc. are some of the popular bookmarking services. Libraries can make use of social bookmarking sites using RSS feeds for subject disciplines or in areas of specialization relevant to them.

### **1.3.5** Hybrid Applications, Programs and Programming Tools

#### Mashups

A Mashup is a web application that uses content from more than one source to create a single new service displayed in a single graphical interface. (Wikipedia, 2014). Mashup originally referred to the practice in pop music (notably hip-hop) of producing a new song by mixing two or more existing pieces. Content used in mashups is typically sourced from a third party via a public interface or API (web services). Other methods of sourcing content for mashups include Web feeds (example RSS or Atom), and screen scraping. Many people are experimenting with mashups using Amazon, eBay, Flickr, Google, Microsoft, Yahoo, YouTube and APIs, which has led to the creation of mashup editor (Wikipedia, 2014). Mashup is a hybrid of blogs, wikis, streaming media, content aggregators, instant messaging, and social networks. Mashups are applications, where two or more technologies or services are merged into a completely new, novel service. For example: WikiBios, a site where users create online biographies of one another, essentially blending blogs with social networks. Mashup in Library 2.0 environment remembers a user when they log in. It allows the user to edit OPAC data and metadata, saves the user's tags, IM conversations with librarians, wiki entries with other users (and catalogues all of these for others to use), and the user is able to make all or part of their profile public; users can see what other users have, similar items checked-out, borrow and lend tags, and a giant user-driven catalogue is created and mashed with the traditional catalogue. There are a number of mashup platforms that can be used to create mashups, For example, Intel Mash Maker, Google Mashup Editor, LiquidApps, Microsoft Popfly, Serena Mashup Editor, Yahoo pipes, etc.

#### Ajax (Asynchronous JavaScript and XML)

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Ajax (Asynchronous JavaScript and XML) or AJAX, is a group of inter-related web development techniques used for creating interactive web applications. The technology facilitates web pages to interact with users by exchanging small amounts of data with the server "behind the scene" so that entire web pages do not have to be reloaded each time when there is a need to fetch data from the server. This is intended to increase the web page's interactivity, speed, functionality and usability. The term Ajax has come to represent a broad group of Web technologies that can be used to implement a Web application that communicates with a server in the background, without interfering with the current state of the page. Ajax is a cross-platform technique usable on many different operating systems, computer architectures, and web browsers as it is based on open standards such as JavaScript and the Document Object Model (DOM). There are free and open source implementations of suitable frameworks and libraries.

#### **Application Programming Interface (API)**

An application programming interface (API) is a source code interface provided by an operating system, library or service to support requests made by computer programs. Language-dependent APIs are available only in a particular programming language. They utilize the syntax and elements of the programming language to make the API convenient to use in this particular context. Languageindependent APIs are written in a way that they can be called from several programming languages. This is a desired feature for a service style API which is not bound to a particular process or system and is available as a remote procedure call. Examples of API are Windows API, Scopus API that enables a user to select Scopus data elements into a mashup.

#### **Library Tool Bars**

A toolbar is a graphical user interface consisting of a panel of buttons, icons, menus or commands that are used more often in an application. Toolbars are used in common applications such as Microsoft Word, and as add-ons for web browsers such as Internet Explorer and Mozilla Firefox.

### 1.4 SUMMARY

Web 2.0 services could enable librarians and patrons not only to interact, but to share and exchange resources dynamically in electronic environment. Using instant messaging, libraries can provide "real-time assistance" to their patrons. Library can also provide latest published update in their user's favorite areas using RSS Feed. Blog is the most obvious application which can be used as a tool for promotion, publicity and for outreach services. Libraries can disseminate information to their users, make announcements for its new resources and events through its blogs. Wiki can also be used as a communication



tool to enable social interaction among librarians and patrons. Using tagging services, libraries can allow their users to categorize the information the way they want by tagging the library's collection. The SMS enquiry services in a library allow patrons to use their mobile phones to SMS their inquiries to the library. Several libraries use podcasts to support library orientations programmes. Library can merge two or more web 2.0 technologies or services into a completely new service by developing web application called mashups which allows the user to edit OPAC data and metadata, saves the user's tags, IM conversations with librarians, wiki entries with other users etc

# 1.5 GLOSSARY

**Blogs**: also known as Web logs, these allow users to post thoughts and updates about their life on the Web.

**Wikis**: sites like Wikipedia and others enable users from around the world to add and update online content.

**Social networking:** sites like Facebook and MySpace allow users to build and customize their own profiles and communicate with friends.

Web applications: a broad range of new applications make it possible for users to run programs directly in a Web browser.

## 1.6 SELF-ASSESSMENT QUESTIONS

1. Discuss in detail web 2.0 technologies application in the library.

# 1.7 **REFERENCES**

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## **1.8 SUGGESTED READINGS**

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# **LESSON 1**

# OPEN SOURCE LIBRARY SOFTWARE AND APPLICATIONS

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 The Open Source Initiative (OSI)
- 1.4 Why Open Source Library Software
  - 1.4.1 Benefits
  - 1.4.2 Demerits
- 1.5 Use cases of Open Source Library Automation Software
  - 1.5.1 ABCD
  - 1.5.2 BiblioteQ
  - 1.5.3 CDS/ ISIS and WINISIS
  - 1.5.4 Espabiblio
  - 1.5.5 Evergreen
  - 1.5.6 Jayuya
  - 1.5.7 Koha
  - 1.5.8 Kobli Koha
  - 1.5.9 Kuali Open Library Environment (OLE)
  - 1.5.10 Learning Access ILS
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### **1.1 LEARNING OBJECTIVES**

- To explore Open Source Library Software
- To find out Why Open Source Library Software
- To explore some Open Source Library Software

# **1.2 INTRODUCTION**

Open source software is computer software that has its "source-code" made freely accessible under a licence (OSS). In the 1970s, when open source first started to take shape, MIT professor Richard Stallman used the term "free software" for the first time. Growing dissatisfaction with the restrictions placed by proprietary software led to the creation of the free software movement. Software that is "closed" or proprietary is managed by a company or an individual.

Commercial businesses frequently place access limitations on their source code to protect their intellectual property. Although the "source-code" is not distributed, public copies of the "binary" are. Open source software (OSS) is software that is given along with its source code. There are licences available that let programmers and users use, modify, and share the code. Nevertheless, "free" was usually taken to mean "no cost." As a less controversial and more "business-friendly" name, "open source software" was developed as a result. According to Richard Stallman's Free Software Foundation (FSF), the term "free" should not be taken as "free-of-charge," but rather as the user's freedom:

- To utilise the application for any purpose.
- To evaluate the program's functionality and alter it to serve a specific purpose.
- Distributing copies of the program's original or unaltered version.
- The ability to modify programmes as desired and make those modifications available to the public so that the entire community can benefit. This requires having access to the source code (www.gnu.org/philosophy/freesw.html).

# **1.3 THE OPEN SOURCE INITIATIVE (OSI)**

The Open Source Initiative (OSI), which is tasked with maintaining the Open Source Definition (OSD), is in charge of examining and approving licences that follow the OSD. Although the requirements that each licence imposes can vary substantially, they all satisfy the OSD. Eleven standards were developed by the OSD to identify open source software.

# UNIT - II:Integrated Library Automation and Networking Software



- Free redistribution: The programme must be accessible for free distribution.
- Source code: The software should either be made available with the source code or with well-publicized access to it.
- Derived works: The licence must permit derivative works and modifications, and it must permit their distribution under the same conditions as the licence of the original software.
- To maintain the integrity of the author's source code, it is acceptable to distribute "patch files" that are used to reconstruct derived works.
- There must be no discrimination against any individuals or groups of individuals in the licence.
- There must be no prejudice against professions; for instance, the programme cannot be utilised to conduct genetic research or to run a business.
- License distribution: All parties to whom the programme is transferred must be covered by the rights connected to it without the requirement for them to execute a separate licence.
- Licenses must not be product-specific, meaning that they cannot be contingent on the programme being delivered along with any other particular software.
- The licence must not impose restrictions on any other software that is distributed with the licenced software.
- License must be technology-neutral: No licence clause may be based on a specific technology or interface design.

# **1.4 WHY OPEN SOURCE LIBRARY SOFTWARE**

Library users are evolving with the passage of time and changes in the knowledge society. In more recent pandemic-affected societies, the transition is more noticeable. There are several causes for the transformation, but in recent years, emphasis has been placed on the growing use of ICT to manage and remotely access knowledge resources. Given the financial difficulties that the entire library system is experiencing, using open source software can be shown to be extremely beneficial for the survival of the library. In the context of libraries, applications of Open Source Software (OSS) have a number of benefits above those of commercially distributed software.

# 1.4.1 Benefits:

• Despite significant financial outlay, a library's housekeeping operation requires the implementation of library automation. The primary task of the library would become quicker, more precise, and user-friendly if OSS could be used to automate cleaning.

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- Access to the source code allows for the modification, improvement, and customization of a practical and affordable solution. Liberty to examine the logic of the application
- Localization in accordance with a person's unique and particular needs
- Compared to commercial products, development is quicker and more responsive.
- There are lower maintenance costs and no download or installation fees.
- Simple evaluation Freedom from licensing restrictions imposed by a vendor's lock-in, freedom to innovate, and freedom to redistribute in a supportive setting.
- Choices for implementing user-cantered customisation
- It narrows the gap in automation between libraries. Open Source Software Difficulties.

#### **1.4.2 Demerits:**

The following are considered to be the disadvantages of Open Source software

- If done by a business, the initial cost of OSS implementation may be considerable. If • the setup and annual upkeep are contracted out to a service provider, the cost could be high.
- Progress in fixing the problems may be delayed if community interaction is terminated and individual accountability for bugs and errors is not prioritised.
- The degree of personalization will be relatively minimal, and the librarian will put forth more effort to adapt for regional needs.
- Inadequate technical assistance for users to quickly resolve issues insufficient • documentation when compared to commercial software, the programme is slower and less scalable.
- Developing software and troubleshooting.

#### **IN-TEXT QUESTIONS**

- 1. OSS stands for
  - a) Open Source Software
  - c) Online Sourced Software
- b) Open Supply Software
- d) None of the above
- 2. OSI stands for Open Source Initiative. True / False
- 3. OSD developed \_\_\_\_\_\_\_standards to identify open source software
- 4. \_\_\_\_\_\_ narrows the gap in automation between libraries
- 5. If done by a \_\_\_\_\_, the initial cost of OSS implementation may be considerable

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# **1.5 USE CASES OF OPEN SOURCE LIBRARY AUTOMATION SOFTWARE**

Integrated Library Management Systems (e.g., Koha, Evergreen, ABCD, NewGenLib); Digital/ Repository Software (e.g., Dspace, E Prints, Fedora); and Discovery Interfaces (e.g., Vufind, Blacklight, SOPAC (Social OPAC), eXtensible Catalog) are the three broad categories into which OSS services can be divided depending on how they are used. OSS is frequently created cooperatively by a collection of institutions or software enthusiasts as a service for the good of society and the field. Developers have the creative freedom to modify and customise free source code thanks to open source software (OSS).

Following is the brief description of List of Integrated Library Management Systems that are Open Source. Open source Integrated Library Management Systems can be used to improve a library's resource management and service management effectiveness.

### 1.5.1 ABCD

Web-based ILMS ABCD, which was derived from older ISIS software, is free to use. The acronym ABCD, or Automation of Libraries and Centers of Documentation, is short for "Automation des Bibliotheques et Centers de Documentation" in French and "Automatización de Bibliotecas y Centros de Documentación" in Spanish. Indian libraries have been familiarising themselves with this programme. WinISIS and Koha capabilities were combined to create the ABCD programme, which can be used as ILS or Digital Library software with UNICODE support and is compatible with both Windows and Linux. Several languages, including English, French, Portuguese, Spanish, and others, are available for the software. Because it complies with UNICODE, it can be easily adopted for any Indian language. ABCD was created in 2009 by BIREME (WHO, Brazil) and VLIR (the Flemish Interuniversity Council, Belgium). The programme includes automation features for both traditional libraries and documentation centres and may be used in both small and large libraries. There are several important modules available, including those for book and serial cataloguing, acquisitions, circulation, statistics, and OPAC.

# 1.5.2 BiblioteQ

It was created in 2005 as free software that is good for small libraries; however the public cannot access the source code. The programme is distributed under the BSD licence and is available in two versions: a desktop version and an online version. The desktop version, which is simple to install, features 129 modules for cataloguing and circulation, and the online version has an OPAC module for carrying out library tasks. In order to be interoperable with any system that supports Qt, the software employed the SRU and Z39.50 protocols to fetch data from its database and a Qt interface to offer connectivity to PostgreSQL and SQLite. Z39.50 protocols are used by software that runs on the Windows,

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Mac OS X, and LINUX operating systems to retrieve data. It supports the Advanced RISC Machines architecture (ARM). The software may attach digital copies of books, journals, photographs, etc. in MARC format. The software's circulation module is not highly developed, but it is regularly updated by a team of engaged community members. The most recent progress was seen in July 2016 with the release of its revised version 2016.07.04. Since its initial release, the software has undergone about 150 versions as of 2016.

#### 1.5.3 CDS/ ISIS and WINISIS

It supports the Advanced RISC Machines architecture (ARM). The software may attach digital copies of books, journals, photographs, etc. in MARC format. The software's circulation module is not well developed, but it is often updated by a team of community members, and the most recent upgrade was made in July 2016 with the Computerized Documentation System/Integrated Set of Information System is known by the abbreviation CDS/ISIS. The division of software development application office of information programmes and services of UNESCO created the free and non-profit library software. A text-retrieval tool with bibliographical data cataloguing capabilities is CDS/ISIS. Although it is free to use, it is not open source software till 2005. Developed by UNESCO, the CDS/ISIS is a potent information storage and retrieval system that is freely available but not subject to the terms and conditions of an open source licence. It is mostly used to catalogue library collections. The software comes with straightforward installation instructions and is accessible in a number of languages, including English, French, Arabic, Chinese, German, Portuguese, Russian, and Spanish, among others. Indian language versions have also been created by 130 local organisations, with Malayalam being one example. The ILO ISIS family of programmes gave birth to CDS/ISIS, which first ran on DOS.

The WinISIS software, a Windows version of the application, is available for download, however it lacks several OSILS-like functionality. The public can access a Windows version of the programme called WinISIS, however it lacks many of the features of a typical OSILS. The CDS/ISIS Windows version was developed to make it work with the Windows operating system, and the first version was evaluated in 1995. The WinISIS software's 1.31 version, which was released in 1998, is regarded as the official one. (Database software from CDS/ISIS, 2015). Despite not having all the qualities of a standard ILS, CD/ISIS aids in the development of automation software packages based on it, such as WINISIS, GENISIS, SANJAY, ABCD etc.

#### 1.5.4 Espabiblio

Espabiblio is an ILS designed to carry out the fundamental tasks of library housekeeping that was created under the GNU General Public License version 2.0 (GPLv2) as a modified version of OpenBiblio 7.1. To carry out the fundamental tasks, it has circulation, cataloguing, OPAC, administration, and report generating modules. However, it is missing modules for serial control and acquisition. Espabiblio, which translates to "Library



in Spanish," is the name of the software, which was created primarily for libraries in Spanishspeaking nations. Presenting cover images, showing member photos, implementing search via Z93.50, allowing users to post and download digital content, and other small changes are only a few of the new features added to this system. The programme supports any operating system and is platform neutral. It supports operating system based on Apache, PHP, and MySQL. MARC standard is followed by the software. Although the programme is actively released, community and support activity are rather minimal.

#### 1.5.5 Evergreen ILS

Evergreen ILS was created in 2006 for Georgia's Public Information Network for Electronic Services (PINES), a consortium of public libraries, and it was released in 2007 with a GNU General Public License. Applications are provided by the programme, which was created for a very large consortium of tiny public libraries. In the United States and Canada, school and public libraries utilise the Evergreen software more frequently than other types of libraries, both small and large. The infrastructural parts are written in C, whereas the software is written in Pearl. Apache is the web server being utilised, and PostgresSQL is the database. The MARC 21, Z39.50 (Client & Server), Unicode 3.0, SRU/W (Client & Server), ISO 2709 (MARC communications format), Dublin Core, MODS, and OAI-PMH standards are supported by this ILS. The primary firm that supports the software is Equinox Software, Inc. The OpenSRF (Open Scalable Request Framework) framework is used to build the programme.

#### 1.5.6 Jayuya

Jayuya is otherwise called as Jayuya THEY. It is a French-language ILMS that was distributed under the GNU General Public License (GNU GPL). Basic functional modules for circulation, cataloguing, reports, and statistics are included in the software.Since 2005, there have been no development-related activities, including mailing lists, forums, user communities, developer communities, or download statistics.

#### 1.5.7 Koha

The most widely used ILMS in Indian libraries is Koha, the first OSILS in the world with all available features. Koha was created in New Zealand between 1999 and 2000 for the Horowhenua Library Trust and deployed there in 2000, although it wasn't officially released until 2005. Public, academic, and specialty libraries all across the world use the programme. The main support organisation for the distribution, transition to, and deployment of Koha is LibLime. In 2009, the business released Enterprise Koha, a version of Koha that was exclusive to it.

The circulation module of the 139 software can handle issue, return and transfer and has a provision for online reservations and renewals by library patrons themselves. The software has a strong cataloguing module for recording the holdings of the library and the



details can be viewed through the OPAC. Koha has a well-developed user records management system to record and retrieve the detailed information of each registered user. Koha can be used for any type of libraries ranging from school to public to academic libraries, museums, special libraries etc. The software's circulation module can manage issue, return, and transfer requests and provides a feature for online reservations and renewals made by library users directly. The programme contains a robust cataloguing module for logging the library's holdings, and the OPAC allows users to access the details. Koha features a sophisticated system for managing user records that allows it to store and retrieve the specific data about each registered user. Any form of library, including school, public, academic, museum, and special collections, can use Koha.Up until version 3, Koha supported Linux, UNIX, and Windows. However, the software is currently only more compatible with Linux and uses Zebra for indexing and MySQL for operational data. Since Koha is written in the Perl programming language and uses Apache as its web server, source code distribution is automated. The programme was initially created for public libraries but was later improved to meet the needs of academic research and special libraries. Web-based software Koha uses the Z39.50 (Client & Server) protocol to exchange records with other systems and saves its records in the MARC21 format. Koha also adheres to standards such Dublin CoreMODS, ISO 2709 (MARC communications format), and UNIMARC support. Z39.71 (serials display), OAI-PMH, etc. With modules for circulation, cataloguing, acquisitions, serials, OPAC, reservations, patron administration, branch relationships, and more, Koha is available under the terms of the GNU General Public License.

#### 1.5.8 Kobli Koha

It's based on the Koha ILMS, Koha is a web-based Open source ILMS.In terms of the capacity to add a variety of features to Koha modules, Kobli Koha differs from Koha. With the same Koha features, Koha Kobli created a digital repository and enhanced its cataloguing module. The software has many functional modules, including Administration, Acquisition, Cataloging, Circulation, OPAC, and Serial Control. Perl is the only programming language supported by the software, which only supports the LINUX operating system. The database and server are respectively named Apache and MySQL, and they both support the MARC standard for the cataloguing process. Additionally, it supports the Z39.50 standard for information retrieval and search.

# **1.5.9 Kuali Open Library Environment (OLE)**

In 2010, the Andrew W. Mellon Foundation, a collection of institutions, and the founding partners of Kuali OLE collaborated to create a library system for organising and retrieving intellectual outputs and digital content from academic and research libraries. The software's version 0.3 was the first public release, though, and it happened in November 2011. The software's licence was modified from The Educational Community License Version 2.0, an open source project, to The Affero General Public License (AGPL). The software includes an acquisition module to control choice, purchases, payment, invoicing,



licensing, and maintenance of electronic resources, as well as cataloguing, circulation, OPAC, and system interaction. Since the beginning, the software has been actively being developed and has received many new capabilities to compete with the next generation library system. The software is created using the Java and Maven programming languages and functions on the Windows, Mac OS X, and Linux operating systems with the help of MySQL and Apache Tomcat database applications. The programme supports Z39.50 protocol for information retrieval and searching, as well as MARC for cataloguing.

#### 1.5.10 Learning Access ILS

As Willem Scholten, the executive director of the Learning Access Institute, was also affiliated with TRF, the Learning Access ILS was created by the Seattle Learning Access Institute, a nonprofit organisation, with sponsorship backing from TRF. OpenBook was the previous name for the programme. The programme includes modules, such as Acquisition, OPAC, Circulation, and Cataloguing. The programme makes use of the Apache Web server and is compatible with both Windows and Linux operating systems. The interface and functional modules of the software were developed using the PHP and Perl programming languages. To access the software, a formal authorization is required. The software's source code is accessible for download, and it works best with medium-sized libraries.

#### 1.5.11 DB Librarian

The programme is a web-based library management system that was published in 2007 under the terms of the GNU General Public License version 2.0 (GPLv2). PHP is the programming language used to create the software, and MySQL is the web server. The programme includes two main functional modules, catalogue and OPAC, which are used to capture bibliographic information and follow it through a web-based catalogue.

#### 1.5.12 NewGenLib

Another well-liked OSILS that is utilised in libraries as a tool for automation is NewGenLib. the first Indian OSILS that VSPL (Verus Solutions Pvt. Ltd.) created on the Kesavan Institute of Information and Knowledge gave the domain knowledge Management, India (KIIKM), Hyderabad. The software's initial release, or version 1.0, was launched as a commercial product in March 2005. Three years after its initial deployment, on January 9th, 2008, the public was given access to the NewGenLib software's source code. And listed as Open source software under the GNU General Public License. The first Indian library ILMS is NewGenLib. NewGenLib can be used in any type of library and is popular among Indian libraries for roughly ten years. Functional components such acquisitions, technical processing, serials management, circulation, administration, and OPAC are included in NewGenLib as an ILS. Java is the programming language used by NewGenLib, and Linux is the most suited operating system. The programme is supported by the Apache web server and the PostgreSQL database. MARC 21, Z39.50 Client, Unicode 3.0, SRU/W Server, ISO 2709 (MARC communications format), Dublin Core, MODS, OAI-PMH, and Z39.71 are the





standards that NewGenLib Software adheres to (serials display). This RDBMS-based database management system for managing metadata material complies with international standards like Dublin Core, XML, MARC, and UNICODE. Operating system agnostic, NewGenLib can be used with both Windows and Linux. The software version is accessible in both English and Arabic, and RFID technology can be combined with the versions that are already in use and are supported by an infinite number of RFID clients. The Online Public Access Catalogue (OPAC) of NewGenLib offers a completely web-based interface that is completely customisable, and its Android application makes it possible to access the library catalogue on mobile devices like smart-phones and tablets.



# 1.6 SUMMARY

Open source software has its "source-code" made freely accessible under a licence (OSS). OSD developed eleven standards to identify open source software. There are several causes for the transformation, but in recent years, emphasis has been placed on the growing use of ICT to manage and remotely access knowledge resources. Given the financial difficulties that the entire library system is experiencing, using open source software can be shown to be extremely beneficial for the survival of the library.

# 1.7 GLOSSARY

**Open Source Software:** It is computer software that has its "source-code" made freely accessible under a licence (OSS).

**Integrated Library Management System (ILMS):** It is an enterprise resource planning system for the Library. This automates the basic tasks performed by Library staff & Library Patrons.

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# 1.8 ANSWERS TO IN-TEXT QUESTIONS

1. a)	6. Internal Library Management Systems
2. Open Source Initiative	7. d)
3. Eleven	8. a)
4. Open Source Software (OSS)	9. GNU General Public
5. business	10. NewGenLib

### 1.9 SELF-ASSESSMENT QUESTIONS

- 1. Discuss merits and demerits of Open Source Software in Libraries
- 2. Open Source Software a boon or bane. Explain your views with justifications.
- 3. Narrate the evolution of OSS in Libraries.
- 4. Write a brief note on any one ILMS and discuss its merits & demerits.

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# **LESSON 2**

# WEB BASED LIBRARY MANAGEMENT SOFTWARE

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# STRUCTURE

- 2.1 Learning Objectives
- 2.2 Introduction
- 2.3 Services
  - 2.3.1 Record Keeping
  - 2.3.2 Acquisition
  - 2.3.3 Cataloguing
  - 2.3.4 Circulation
  - 2.3.5 Web OPAC
- 2.4 Features and Advantages
- 2.5 Instances of Web based LMS
- 2.6 Library 2.0
- 2.7 Future Scenario
- 2.8 Summary
- 2.9 Glossary
- 2.10 Answers to In-text Questions
- 2.11 Self-Assessment Questions
- 2.12 References
- 2.13 Suggested Readings

# 2.1 LEARNING OBJECTIVES

- Understanding Web Based Library Management Software
- Its features and advantages.

# 2.2 INTRODUCTION

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The importance of the library in academic institutions is rising. The operations of the library as we know it are impacted by competition from other digital platforms that are accessible on android devices. As a result, every educational institution now maintains its own library automation software. The static method is gradually being replaced by web-based library management software, which enables a library to handle the same functions in a much more uniform manner. The users receive timely, accurate service from it. Koha and Libsys are some examples of Web-Based Library Management Software. Web Library Management Systems have a tradition of managing web content successfully. Now with the huge proliferation of information, and the different information needs, it is important that there exists a shared interoperability in the management of information. LMSs usually offer a lot of modules to enhance the workflow. The main aim is to make the data well-defined which will ensure findability. To add context to the information and to inter-link the information present on site.

The concept of Library 2.0 has been adapted from Web 2.0. It includes a spectrum of nascent technology and services designed using them. Using these technological implementations libraries are able to provide old and many new services in a much better way. These old services with latest technology have made life of Library users very easy, they are able to find relevant information at their fingertips within a blink of an eye. Library 2.0 proposes to bring revolutionary changes in libraries that are bound to bring about conceptual, cultural and physical changes in libraries to keep pace with the changes in communities and their information seeking behaviour. With the advent of Library 2.0, the Librarians have to rethink their procurement policies by keeping in mind the nature of access of Library's collection by Patrons. Nowadays the collection of Libraries must be a blend of Digital and non-digital items. Because the younger generation are highly technological savvy and prefer to access digital contents. The digital contents has made the collection more interactive with the help of several multimedia technologies. The Services which a traditional library used to offer also has to be redesigned in the technological era of Library 2.0. Now Librarians cannot keep their collection in closed access because the Web based Library software enables Patrons to access Library resources through networks. Services are more oriented towards transfer and literacy of information than mere controlled access to the library resources. These Web Based Library Management Software are the outcome of these Web 2.0 or Library 2.0.

# 2.3 SERVICES

Koha and Libsys are some examples of Web-Based Library Management Software.

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### ACTIVITY

Visit your University Library and try to identify services available in your Librarys' Web-Based Library Management Software.

#### 2.3.1 Record Keeping:

Traditional record keeping operations, such as adding and deleting books, e-books, newspapers, periodicals, CDs, and so on, could be managed precisely in web-based library management software.

#### 2.3.2 Acquisition:

In modern web-based library management software that manages budgets, vendors, orders, etc. Stock taking has become very easy.

#### 2.3.3 Cataloguing:

Metadata and cataloguing are both maintained by modern systems. Dublin Core, RDA, and MARC formats.

#### 2.3.4 Circulation:

To ensure seamless and effective operations in the distribution of documents and the maintenance of serials, contemporary technologies such as barcodes, RFID, and biometrics are used.

### 2.3.5 Web OPAC:

It is a standard search interface for remote access of contents.

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### **IN-TEXT QUESTIONS**

- 1. Fill in the correct word: Web-Based Library\_\_\_\_\_Software.
- 3. Koha is a Open Source Software. True / False
- 4. Libsys is a Open Source Software. True / False
- 5. Web Based Library Management Software are the outcome of these Web \_\_\_\_.

# 2.4 FEATURES AND ADVANTAGES

Features of Web Based Library Management System

- Integration of all user information
- Organize the data systematically.
- Any internet information can be monitored.
- It can generate the reports.
- Online information management
- Library 2.0 facilities, interactive interface
- Facilities for multiple users and multiple languages
- Export and import of data
- A cutting-edge, integrated library management system
- Simple to keep records
- It enables rapid book entry.

# 2.5 INSTANCES OF WEB BASED LMS

• CodeAchi Library Management System: A web based Library management tool for Public, Academic and School Libraries. It has lots of features with convenient user interface.

• Libero: Famous internet library management system Libero is distinguished by its high degree of customizability. It can be used in a variety of library operations, including those run by academic libraries, public libraries, and industrial libraries. Additionally, it offers a version for unique library management settings, such as those for archives, galleries, and libraries for cultural assets. Libero GO, a mobile version of the product, can be used as a manager and card reader in addition to being a mobile portal.



- Alexandria: The internet integrated library system (ILS) Alexandria is renowned for enabling librarians to personalise patron experiences. This is made possible by the tool's interface building feature, which enables users to include unique sections, menus, logos, and pictures.
- WorldShare Management Services (WMS): It is a cutting-edge internet based library management system that employs use of patron and software vendor collaboration to design a solution that precisely meets their requirements.
- Inifiniti Library Software: A library management system that may be customised is called Inifiniti Library Software, and it was primarily created for educational purposes. As a result, it has tools for fostering a love of learning and fundamental self-directed learning abilities.
- Evergreen ILS: An innovative open-source library management system with a thriving design group is Evergreen ILS. Well over 2,000 libraries throughout the world utilise it, and it is managed by dedicated individuals.
- Mandarin M5: It is a mobile-friendly web library control system that may be customised. It is renowned for giving customers the ability to customise it in accordance with their requirements and tastes.
- Koha: The most widely used ILMS in Indian libraries is Koha, the first OSILS in the world with all available features. Koha was created in New Zealand between 1999 and 2000 for the Horowhenua Library Trust and deployed there in 2000, although it wasn't officially released until 2005. Public, academic, and specialty libraries all across the world use the programme.
- LIBSYS 10: New web-based Library Management tool from Libsys Ltd. It has a light weight version named LSEase. LSEase also supports modern days Semantic web (Web 3.0) technologies.

# 2.6 LIBRARY 2.0

Michael Casey first mentioned the term "Library 2.0" in his personal blogging platform in September 2005 on "LibraryCrunch" (http://www.librarycrunch.com/). The concept of the Library 2.0 in the Library and information domain has been adapted from the Web 2.0. Web 2.0 has brought a plethora of services with it like various multimedia formats, collaborative and interactive platforms for hosting different web services. In web 2.0 the host provides just the platform with services and users reuse, contribute and drive the information ecosystem. When these web 2.0 applications are adapted in the Library ecosystem to provide Library services to its users by harnessing the technological tools of Web 2.0, then it is known as Library 2.0 or Lib 2.0. According to Wikipedia, Library 2.0 is a modern model based on Web 2.0 which reflects the transition of the way services used to be delivered to Library Patrons within the Library world. In Library 2.0, similar to web 2.0 users taking the prime position, all the services are continually designed and implemented based on Library



users feedback and recommendations. Services are re-evaluated, revised, updated and upgraded to better serve the Library Patrons. Web based Library Management Software can tap the benefits of Lib 2.0 to offer a wide range of services.

### 2.7 FUTURE SCENARIO

The future of web-based library management software is being shaped by the knowledge society and the inclination towards online education as witnessed during the pandemic. The future web-based library management system must take knowledge management theories and Learning Management Systems (LMS) into account. Every institution of the future is going to have its own LMS. In this context, the web-based management system assumes greater significance. The creation of a system architecture is a prerequisite for any web design software. The System architecture is based on a meticulous demand analysis for that particular software.

Future web-based library management software is required to manage the tacit knowledge of the library personnel regarding the organisation of the knowledge in the system. It also needs to collect, organise, store and retrieve knowledge generated from the institution by the resource persons from every department in the academic setup. At the same time, it needs to receive and streamline queries that are generated by the knowledge-seeking community there; students. The future lies in the linking process of these two aspects of knowledge development in society. The larger digitised society produces lots of data, the building block of knowledge. Future web-based library management systems have to come out of the walled existence of the library and cater to and manage the big data that is produced in the digital world. Creating and linking Open data could be the way forward.

#### **IN-TEXT QUESTIONS**

- 6. \_\_\_\_\_\_ is a standard search interface for remote access of contents.
- 7. Library 2.0 facilities, interactive interface. True / False
- 8. \_\_\_\_\_\_ first mentioned the term "Library 2.0"
- 9. In web 1.0 the host provides just the platform with services and users reuse, contribute and drive the information ecosystem. True / False
- 10. LMS stands for\_\_\_\_\_

### 2.8 SUMMARY

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The importance of the library in academic institutions is rising. Every educational institution now maintains its own library automation software. Web-based library management software enables a library to handle the same functions in a much more uniform manner. The users receive timely, accurate service from it.

# 2.9 GLOSSARY

**Web OPAC:** It's an Online Public Access Catalogue which is accessible through the internet using Web Browsers like Firefox, Google Chrome etc.

**Library 2.0:** Lib 2.0 (in short) as the application of interactive, collaborative and multimedia based technology for library services and collection.

WLMS: Web based Library Management System

# 2.10 ANSWERS TO IN-TEXT QUESTIONS

1. Management	6. a)
2. a)	7. True
3. True	8. Michael Casey
4. False	9. False
5. 2.0	10. Learning Management Systems
	Y

# 2.11 SELF-ASSESSMENT QUESTIONS

- 1. Discuss the need of Web Based Library Management Software in Libraries.
- 2. Write a note on Future prospects of Web Based Library Management Software.
- 3. Discuss the pros and cons of Library 2.0.
- 4. Write few examples of Web based LMS.

# 2.12 REFERENCES

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# **LESSON 3**

# LIBRARY SOFTWARE SECURITIES PARAMETERS

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# STRUCTURE

- 3.1 Learning Objectives
- 3.2 Introduction
- 3.3 Present Status of the Security in Library Software
- 3.4 Library Software Data Security Requirement
  - 3.4.1 Data access and usage control
  - 3.4.2 Data protection of authenticity and integrity
  - 3.4.3 Identification by metadata
  - 3.4.4 Copy detection systems
- 3.5 Library Software Network Security
  - 3.5.1 Z39.50
- 3.6 Infrastructure

3.7

- 3.6.1 Securing the Hardware
- 3.6.2 Software security
- Library Software Data Security Challenges
- 3.7.1 System vulnerability
  - 3.7.2 Virus
  - 3.7.3 Leak of the password
  - 3.7.4 Malicious attacks
- 3.8 Data Protection Technology
  - 3.8.1 Restriction on Access
  - 3.8.2 System Protection
  - 3.8.3 Network Protection
- 3.9 Appropriate Procedures
- 3.10 Summary
- 3.11 Glossary
- 3.12 Answers to In-text Questions
- 3.13 Self-Assessment Questions

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3.14 References

3.15 Suggested Readings

# 3.1 LEARNING OBJECTIVES

- To tableau the present status of Security of library Software
- To examine the library data security requirement
- To check the infrastructure such as hardware, software, and network security
- To find out the library software data security challenges and protection technology

### 3.2 INTRODUCTION

Library patrons have been increasingly dependent on ICT (Information Communication Technology) for several years to now. ICT in libraries supports the delivery of data sharing and library resources to local and remote patrons (Khan, 2016). Data sharing has been made easier and less expensive from Internet and network technologies. Security of the data in library software is the main worry for every organization. Main role of data security measure in library software is a check against the unauthorized users and hackers, who may destroy the valuable data. Security in library software can be achieved in a easiest way by using passwords. Library software administrator has power to control over the operational data. He must ensure the security of data against attack and misuse by unauthorized persons (Aldossary and Allen, 2016).

Data is one of the integral organs of any software and uses of Library software remotely are normally treated as one of the vulnerable link in security ecosystem. Today's library services and products face increasing data security threats.

# 3.3 PRESENT STATUS OF THE SECURITY IN LIBRARY SOFTWARE

The libraries are maintaining security by site planning, building planning, security personnel, window protection, door protection, securing the library using telecommunication, burglary protection, collection security, electronic access control, securing the library resources using video surveillance, and using surveillance camera.

As per literature review, majority of the Library Software are creating awareness for data security responsibility, periodical updates on vital vulnerabilities and security issues, notifications on security guidelines and roadmaps, and security implementation trainings. Library Software have their own administrative tools and methods like asset and personnel classification, internal and external audits, risk analysis procedures. These have procedures



and controls such as guidelines and disciplinary procedures, intellectual property rights, methods for handling secret or vital data, techniques for re-evaluating present information security strategies and need for outsourced tasks (Ismail and Zainab, 2011).

Some studies cited on security policies for data in these software such as on permissible use, safeguarding asset, backup, classifying data and guidelines for retention, staff responsibilities, permission to access resources, archiving and sharing of resources, user confidentiality and privacy, display of notifications, generating reports, secured disposal of requests over wireless communications.

#### **IN-TEXT QUESTIONS**

- 1. Full form of ICT \_\_\_\_\_
- 2. Operating System is a platform on which other application programs can be installed. True/ False
- 3. Library Software data security is an important factor in library software design. True/ False
- 4. Digital rights management provides data access and usage control by encrypting the data, with a digital license, and \_\_\_\_\_
- 5. The goal of \_\_\_\_\_\_ is to enable resource searching, accessing & sharing under networked environment

# 3.4 LIBRARY SOFTWARE DATA SECURITY REQUIREMENT

Library Software data security is an important factor in library software design. Weaknesses of security in software, facilitates data attacks or other type of data failures. Some of the data security factor involved are integrity and access control. Software need following data security requirements.

#### 3.4.1 Data access and usage control:

Digital rights management provides data access and usage control by encrypting the data, with a digital license, and password protection.

#### **3.4.2 Data protection of authenticity and integrity:**

Watermarking with reflected ownership image or characters, and digital signature to protect the authenticity and integrity of library data in the software.

#### 3.4.3 Identification by metadata:



It works by allowing description of an object in suitable categories, covering the digital content, rights owner, and conditions.

#### **3.4.4** Copy detection systems:

Search engines can also help, locate such copied objects.

### **3.5 LIBRARY SOFTWARE NETWORK SECURITY**

Nowadays the Internet has become a backbone for almost all major service providers to reach to their users. Library Software too are utilising this boon of network communication for reaching out to their users but this may become a curse too, if software service provider is not actively vigilant towards the data security measures. If the library software server is not protected and secured properly then it may become a target for malicious attacks, which may result in severe damage to the library resources.

The goal is to enable resource searching, accessing & sharing under networked environment. Most of the networks are secured by firewalls between the external and internal network by utilizing IP based packet-filtering at the interface.

#### 3.5.1 Z39.50

The Library of Congress created and maintains Z39.50, a worldwide standard client-server, application layer communications protocol for finding and retrieving data from databases through TCP/IP computer networks. Both ISO standard 23950 and ANSI/NISO standard Z39.50 address it. Z39.50 is frequently implemented into integrated library systems, personal bibliographic guide tools, and social media sites like LibraryThing. It is used extensively in library environments for interlibrary catalogue discovery and loan. The Z39.50 protocol was first developed in the 1970s, and subsequent revisions appeared in 1988, 1992, 1995, and 2003. Z39.50 semantics serve as the foundation for the Contextual Query Language, originally known as the Common Query Language. For security, networks frequently have "screening firewalls." These might cause issues for Z39.50 customers. A screening firewall only permits communications on designated port numbers. On a certain port, for instance, the internet utilizes port 80, FTP utilizes ports 20 as well as 21, Telnet employs port 23, etc. A variety of popular internet applications interact on these ports. Z39.50's 210 authentic recognized network IP channel number.

### 3.6 INFRASTRUCTURE

Infrastructure security can be attained by following means:

#### **3.6.1 Securing the Hardware:**



Library professionals are concerned about system's security because the activities of a library software are also an organ of the system. When considering software security, it is important to take a holistic view because we care about the data security of the library software. Especially, hardware security dealing with data in hardware devices. These software computer faces hardware attacks like side-channel attack, and fault attack. So, library professionals should secure it and be vigilant.

#### **3.6.2** Software security:

Always in library software librarian's first concern is, providing service to their users and secondary concern is software security. Software security maintenance is a challenging work because it is the weakest link in the security chain. Operating systems are huge attack prone platforms. Some software development does not take into account for software security from beginning to end of software design. Sometime software security failure reason is lack of awareness about threats and how to protect software against them, and lack of knowledge about software issues and how to solve security loopholes.

# 3.7 LIBRARY SOFTWARE DATA SECURITY CHALLENGES

Many challenges are being faced in establishing and accessing library collections. Researchers have identified following security challenges.

#### 3.7.1 System vulnerability:

There may be some security flaws in system operation and in some server system software. The intruders may utilize these vulnerabilities to attack the system if they are not rectified timely. A security or system vulnerability is a flow in a designed system or software which an intruder can exploit to compromise the availability, confidentiality or integrity of a system.

#### 3.7.2 Virus:

As per Norton (Symantec employee, 2018), a computer virus is identical to a flu virus in basic mode of operation. It is programmed for spreading from one host to another and has the mastery in replicating itself. Like the flu virus, computer virus also cannot spread without a host. Technically, virus is a malicious program or code designed to alter the way a system works and is programmed to spread from one system to another. It operates by attaching itself to a legitimate program or application and after that it harms the computer or system by destroying or corrupting data in the Library software.

#### 3.7.3 Leak of the password:

The leak of password for a user can provide attacker with full access to one's account. In this manner an attacker would be able to obtain information that he may not be able to get in legal manner.



#### **3.7.4 Malicious attacks:**

Malicious attack can be normally categorised into two groups: Active attack and Passive attack. In Active attack, attackers make the system invalid or un-integral by using all possible methods to crack the desired information. example - Wanacry ransomware. In Passive attack, attackers silently steal the desired information without affecting normal functioning of the system. These attacks are great threat to security of network hosting the Digital Library.

# 3.8 DATA PROTECTION TECHNOLOGY

In a library software, complete data set is not of the similar importance. For instance, financial data can be of Confidential, Restricted nature and according to their assigned classification they require different level of treatments.

#### 3.8.1 Restriction on Access:

Restricted access is one of the basic solution for data protection against unauthorised access. User authentication using user ID and password are commonly used methods for restricted access Further additional level of security can be added by encrypting the sensitive data while its transmission over the wired or wireless medium. Insights of the effectiveness of applied security measures can be obtained from the comprehensive activity logs.

#### 3.8.2 System Protection:

Physical protection of the system i.e. library servers along with its stored data is also essential as they may be lost, damaged, corrupted or theft if left unattended. Cable locks may act as first line of defence for the physical security of the system. Passwords may provide additional cover against unauthorized user access to the system. Data backup must be assured at regular intervals.

#### 3.8.3 Network Protection:

According to State of Cybercrime 2017 report expense on security will increase more than \$1 trillion from 2017 to 2021, attacks on networks may touch 3.5 million by 2021 and loss due to ransomware exceeded to about \$5 billion in 2017. Protection against these attacks can be achieved by deploying effective measures like firewalls, proxy servers etc. Attack on networks may also arise due to trojan horse, malware or by execution of malicious codes. But in present scenarios effective tools are available for protecting against such attacks. Only thing to be kept in mind is that these software tools should be updated with latest virus signatures, definitions or patches.

# **3.9 APPROPRIATE PROCEDURES**



In managing and maintaining Library software proper laid down procedures and guidelines must be strictly enforced for avoiding any intrusion on the data. During disposal of hardware or software linked to permanent data storage of library systems must be removed, reformatted or destroyed under proper supervision of authorized library staff. Further, it must be ensured that the library staffs should not bring or connect personal digital belongings to the servers. This can reduce chances of virus attacks directly on server.

#### **IN-TEXT QUESTIONS**

6. Computer Virus is

a) Bug

c) Alien

- b) Micro-organism
  - d) Malicious code
- 7. Library Software Data Security Challenges is a system vulnerability. True/False
- 8. Data Protection Technology\_\_\_\_\_\_
  a)Restriction on access
  b) System Protection
  c) Network Protection
  d) All the above
- 9. \_\_\_\_\_\_security flaws in system operation and in some server system software.
- 10. The leak of password for a user can provide attacker with full access to one's account. True/False

# 3.10 SUMMARY

Software security is of the utmost importance in present digital environment. Library staffs must be made well informed about their collective digital responsibility with the help of regular awareness programs, staff trainings and periodic reminders, such that necessity of data security is neither overlooked nor forgotten. Every library staff should be vigilant and aware of their responsibilities, their restrictions and roles on Library software.

# 3.11 GLOSSARY

**Library Software:** Software which is specifically designed specially for performing some Library tasks in a digital environment.

**Data security:** It is a mechanism to protect digital data from digital theft, unauthorised access or getting corrupted by any external program throughout its life cycle.

# 3.12 ANSWERS TO IN-TEXT QUESTIONS

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1. Information Communication Technology	6. d)
2. True	7. True
3. True	8. d)
4. password protection	9. System vulnerability
5. Library Software Network Security	10. True

### 3.13 SELF-ASSESSMENT QUESTIONS

- 1. Narrate the present status of Library Software Security.
- 2. Explain the need and challenges in Library Software Security.
- 3. Library Software a boon or bane. Explain your views with justifications.
- 4. Write a note on Virus and Malicious attacks on Library Software.

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# **LESSON 4**

# VIRTUAL LIBRARY

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# STRUCTURE

- 4.1 Learning Objectives
- 4.2 Introduction
- 4.3 Virtual Library Services offered
  - 4.3.1 Record Keeping
  - 4.3.2 Acquisition
  - 4.3.3 Cataloguing
  - 4.3.4 Ciculation
  - 4.3.5 Web OPAC
- 4.4 Features and advantages
- 4.5 Purpose of Virtual Library
  - 4.5.1 Online Public Access Catalogue (OPAC) Services
  - 4.5.2 Information Services
  - 4.5.3 Document Delivery & Inter-Library Loan (ILL) Services
  - Work methodology of Virtual Library
    - 4.6.1 Selection of contents
    - 4.6.2 Validation of contents
    - 4.6.3 Up-to-date
    - 4.6.4 Evaluation procedure
- 4.7 Future Scenario
  - 4.7.1 WorldCat
  - 4.7.2 Open Library Project
- 4.8 Summary

4.6

- 4.9 Glossary
- 4.10 Answers to In-text Questions
- 4.11 Self-Assessment Questions
- 4.12 References
- 4.13 Suggested Readings

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### 4.1 LEARNING OBJECTIVES

- To introduce the concept of Virtual Library
- To examine the purpose of Virtual Library
- To Need of Virtual Library in present Digital era
- To identify technology behind Virtual Library

# 4.2 INTRODUCTION

Virtual Library is a library in a virtual or in a networked world. It may be called a superset of Digital Library. Virtual Library not only provides information electronically but also brings the traditional library to their users electronically. This has become possible due to the technical advancements in the field of internet and web technologies. The present society is flooded with information at the fingertips of the Users. But there is a dearth of authentic and reliable information on the internet. This gap, in right information to the right user and at the right time can be filled by a trained Library & Information Science professional. The concept of Virtual Library has brought the services of traditional Library at the fingertips of its Patrons. Gapen(1993) defined it as, a concept of remotely accessing the digital contents, services and other information resources, by bringing collections of both print and digital materials that are current and frequently used are put on an electronic network to provide access to library Users from world wide web. Virtual Library has provided a creative way of reaching its technology savvy users. This has transformed the conventional focus of Library staff related to selection, accession and dissemination of electronic resources.

The Open Access movement and the world wide web have led physical libraries to the direction of virtual libraries. The user-friendly search engines and the availability of open information and the environment where information consumers can also participate in producing information are the catalysts for the change. The library in the past talked about through its stand-alone public access catalogue and allowed access to the contents only in its possession. The virtual library has now rivalled the popular search engines and other online platforms as a storehouse for publicly verified information and knowledge. The Virtual Library employs Z39.50 meta search engines in order to provide access to the contents of other libraries. Z39.50 recognises common resource description standards that are maintained in other libraries as well. The virtual library needs to embrace other standards from museums, scholarly communities, and metadata standards in order to access the resources of other platforms seamlessly.

The 'take it or leave it' attitude of the formal library system has been replaced by the 'instant satisfaction' mode of the virtual library. By the very nomenclature, a virtual library



has to compete with Amazon or Google when it comes to satisfying users. If something is not available, the virtual library must arrange approximate or proximate resources for the users.

The following are some of the tasks that a virtual library must do to act as a virtual library.

- Enrich and link the catalogue with services and data;
- Use federated book, journal, and journal article discovery and delivery;
- Link the user to full-text whenever possible;
- Provide a variety of unmediated, quick delivery options for items that cannot be delivered immediately.
- Disseminate library metadata and links to course Web pages and portals.
- Use e-commerce functions to serve people who are not library members.

# 4.3 VIRTUAL LIBRARY SERVICES OFFERED

Some of the services offered by Virtual Library are as follows:

#### 4.3.1 Record Keeping:

Traditional record keeping operations can be implemented with digital contents too, such as adding and deleting e-books, newspapers, periodicals, CDs, and so on, could be managed precisely in Virtual Library.

#### 4.3.2 Acquisition:

Like web-based library management software, Virtual Library too manages budgets, vendors, orders, etc. Stock taking has become very easy.

#### 4.3.3 Cataloguing:

Metadata and cataloguing are both maintained by modern systems. Dublin Core, RDA, and MARC formats.

#### 4.3.4 Ciculation:

To ensure seamless and effective operations in the distribution of documents and the maintenance of serials, contemporary technologies such as barcodes, RFID, and biometrics are used.

#### 4.3.5 Web OPAC:

A standard search interface for remote access of contents.



# 4.4 FEATURES AND ADVANTAGES

Features of Virtual Library are numerous, some of them are as follows:

- Integration of all user information into its database.
- Organize the data systematically for better retrieval of required content.
- Any internet information can be easily monitored.
- It can generate various types of reports as required by Library staff.
- Easy Online information management
- Library 2.0 facilities, interactive interface for Patrons
- Facilities for multiple users and multiple languages on a single platform
- It facilitates easy export and import of data
- A cutting-edge, integrated library management system
- Simple to keep records
- It enables rapid book entry into its database.

#### **IN-TEXT QUESTIONS**

- - (c) Computer (d) Both b & c
- 2. Virtual Library has.....
  a)Electronic resources
  b) Card catalogue
  c) Library Building
  d) None of the above
- 3. Library 2.0 facilities, interactive interface for Patrons. True / False
- 4. \_\_\_\_\_\_ is a standard search interface for remote access of contents
- 5. RLG stands for RedLightGreen. True/ False

# 4.5 PURPOSE OF VIRTUAL LIBRARY

Prime purpose of Virtual Library is to provide intellectual access to information in any digital format. It's evident from the name that this brings traditional library services to its users

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virtually through the electronic network. It enables the following services at the Users finger tips virtually:

#### 4.5.1 Online Public Access Catalogue (OPAC) Services:

Catalogue of a Library resource is the most vital discovery tool in the Library. Until recently, it was confined to the catalogue cards, put together in a catalogue card cabinet. With the advent of Personal Computers and networking technologies these card catalogues came out of their shackles and reached to its users. Modern catalogues are not just pieces of texts but contain lots of additional multimedia metadata of the Library resource. Nowadays catalogue is accessible to the Public or User online through networking technologies and Internet. OPAC enables whole new ways of discovering a library resource like for instance a Patron can search by author, title, keywords, class number or by combining these fields using logical operators (AND, OR etc). Through OPAC, a library user not only finds a desired resource but also gets information whether it is available in the library or not, put 'hold' on resources etc. Remote OPAC is accessed through web browsers and it is also known as Web OPAC.

#### 4.5.2 Information Services:

Modern Information Communication Technologies (ICT) has led to the remarkable changes in delivery of Information Services in a Library. This accelerates the penetration of Virtual Libraries into the User's information requirements with the help of following:

- **Reference Service**: Electronic Tools like emails, FAQs, Web Portal, Chat rooms, Virtual reference desk, ask-a-librarian etc services have evaded and replaced past techniques such as post, telephone or in-person reference enquiries.
- **Bibliographic Service**: Preparation of state-of-art reports, user's reading lists, biographies, literature reviews etc. can be achieved at lightning speed and of high quality in a cost effective way. Electronic databases provide advanced retrieval functions using multiple criteria like author, title, keyword, class number, year of publication, language and many more with wide range of styles and display formats.
- **Current Awareness Service:** Current Awareness (CAS) is one of the significant tools for keeping the patrons abreast to latest trends in their areas of interest. Virtual Library is able to collect desired information by running predefined scripts at regular intervals over the targeted databases.

#### 4.5.3 Document Delivery & Inter-Library Loan (ILL) Services:

Present deluge of information in various forms and formats, it's not possible for libraries to have each and every resource what its users need. This crisis can be more efficiently tackled by Virtual Libraries than the traditional Libraries using Document Delivery Services. Virtual Libraries can partner with other Libraries to share resources over a network either freely or using some authentication mechanism. British Library Document



Supply Service offers document delivery services for its clients. RedLightGreen (RLG) Union catalogue has around 130 million records from around 160 part libraries in USA. In India, organizations like DELNET, INFLIBNET have Union catalogues of their member libraries.

# 4.6 WORK METHODOLOGY OF VIRTUAL LIBRARY

Some procedure is required to make a Virtual Library successful. This includes

#### 4.6.1 Selection of contents:

Library experts (more specifically domain experts), due to their long experience on a particular domain or subject and ability to know the psychological needs of the users, they are most capable person to identify the available contents of any institution and select those for Virtual Library.

#### 4.6.2 Validation of contents:

After selecting the Content, the domain experts are required to evaluate the contents and give the suggestions where to add, delete and which part of the content is required and which is not..

#### 4.6.3 Up-to-date:

The main aim is to always keep the Virtual Library up-to-date with current information otherwise the user can become unwilling to use the Library.

#### 4.6.4 Evaluation procedure:

Some statistical techniques have been developed to quantify how much Virtual Library contents are sufficient to the user. This measure helps to know which links, contents are more searched and which are not. With this measurement, institution can modify its Virtual Library.

# 4.7 FUTURE SCENARIO

The evolution of Semantic Web from Syntactic Web has made data on the web machine processable. Despite all these progress made, one of the biggest challenge towards the use of semantics is the lack of background knowledge (Giunchiglia and Dutta, 2012). Capturing this background knowledge is a tough problem to deal with due to the nature of knowledge. Knowledge doesn't have one uniform description. Everyone has different perception of a particular knowledge. And here we are trying to capture this multidimensional knowledge, which is vast in terms of size, continuum and dynamic in



nature and has diverse sources. Moreover, we want that it should be of high quality and contextually relevant.

For encountering this difficulty Giunchiglia and Dutta (2012) has proposed and adapted the faceted approach, well-established methodology used in the field of Library science for knowledge organisation in Libraries and came up with DERA, a new faceted knowledge representation approach. This provides the solution for the development of Descriptive Ontologies, which allows scaling to the ever growing knowledge. So, DERA methodology can be applied in building ontologies for domains, as evident from the papers on the subject (Giunchiglia et al. 2012).

But developing ontologies from scratch is an extremely time-consuming, costly, error prone task and it is therefore fundamental to reuse existing resources. This can be achieved by connecting or linking related concepts or entities from various datasets available as a giant network of interconnected resources, the Linked Open Data Cloud (Linked Data Connect Distributed Data across the Web, 2014). This enables different applications to interoperate and share their data. However for integrating datasets, purpose should be taken into account and make explicit the semantics. Typically it can be achieved by mapping between their terms/concepts. We all understand the importance of data many a times and being a library and information science professional, our job is to make best use of raw data and to make it information. In this dynamic web environment role of the libraries are also changing. The bibliographic data painstakingly created by libraries are highly-structured and of high quality. If we want to make our data visible, reusable and discoverable in present scenario, we have to make it machine processable. This can be attained by using Semantic Web techniques with Linked Data principles.

Semantic means 'meaning' and Web means several documents, connected with each other via hyperlinks. These documents are web pages containing data, understandable and processable by humans. Whereas, Semantic Web means the meaningful web where data present in the web pages are also processable by machines. In this way machines would be able to interpret and understand the meaning of data in a web page and will present the user with needful information. As explained "The Semantic Web is not a separate Web but an extension of the current one, in which information is given well-defined meaning, better enabling computers and people to work in cooperation". So briefly, we can say that, the Semantic Web enables us to express data as well as rules for reasoning about the data. Linked data is just addition of one more facet to the Semantic Web i.e. publishing and connecting data with related data. So, we don't have to search for related concepts rather machine would provide it for us. This publishing of structured data on the Web is based on set of guiding principles, to interlink data making a Web of Documents to a Web of Data. In the following sub-sections, we will have the various aspects of Linked Data since its evolution to its working principles. The growth and development of the Linked Data can be traced way back with the invention of Web. Initially Web has the HTML pages with mainly


made up of ASCII and images. It was syntactic in nature with human clickable hyperlinks which humans have to understand and then click to navigate from one page to other. This was popularly known as Web of documents. After this came the Semantic Web or Web 3.0, where data becomes machine processable. Now, machines can understand the data and able to understand Jaguar an animal and a car. Adding one more facet to Semantic Web i.e. connecting related data, gave birth to Linked Data. Thus this forms the Web of Documents to Web of Data. This can be represented in the form of provided figure 1 (Getting the Essence of the Semantic Web, 2012):



### Figure 1: Stages of WWW evolution

The rationale behind the Linked Data is the need for enhancing re-usability, findability and visibility of our data. In order to achieve this several approaches were adopted prime among them are Microformats and Web APIs. But they have some shortcoming like Microformats were meant to represent data about small set of various entities. Further, Web APIs were with vendor locked interfaces and most doesn't have global unique identifiers for entities, so we cannot set hyperlinks between entities of different Web APIs. Web APIs thus Slice the Web into separate data silos making data sets isolated, unconnected but with Linked data related concepts can be joined, moreover machines would be able to do the processing.

There are several use cases of these modern technologies to provide relevant and easy data retrieval in Virtual Library Platforms.

### 4.7.1 WorldCat – OCLC:

OCLC WorldCat uses Linked Data to make its catalog records available through search engines like Google. This has been done by mapping its records with the schema developed by Schema.org and launched by Google, Bing, Yahoo to create and support a common set of schemas for structured data mark-up on web pages.

### 4.7.2 Open Library Project:

It has a target to prepare "One web page for every book" by creating a URI for each book on its platform. It is also exploring Linked Data techniques to link related data about



each book. So, Library patrons will get hold of all related information of the desired book at one place.

### **IN-TEXT QUESTIONS**

- 6. OPAC is used for preserving books. True / False
- 7. Virtual Library is a library in a virtual or in a networked world. True / False
- 8. \_\_\_\_\_ of a Library resource is the most vital discovery tool in the Library
- 9. FAQs, Web Portal, Chat rooms, Virtual reference desk, ask-a-librarian etc. are examples of \_\_\_\_\_\_
- 10. Current Awareness (CAS) is one of the significant tools for keeping the patrons abreast to latest trends in their areas of interest. True / False

### 4.8 SUMMARY

A Virtual Library is a collection of resources available on computer server and provides interface for User access over a computer or via a computer network. Its more than mere collection of electronic resources such as databases, full text digital materials in multimedia formats and catalogues in the form of OPAC. It also facilitates user assistance services like reference, inter-library loan, SDI, etc. Sometimes it is also referred synonymously as electronic library or digital library.

### 1.7 GLOSSARY

**Virtual Library:** It not only provides information electronically but also brings the traditional library to their users electronically.

Semantic Web: Semantic means 'meaning' and Web means several documents, connected with each other via hyperlinks.

ANGWEDS TO IN TEVT OUESTIONS

1. d)	6. False	
2. a)	7. True	
3. True	8. Catalogue	
4. Web OPAC	9. Reference service	
5. True	10. True	
1.9 SELF-ASSESSMENT QUESTIONS		
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UNIT - II: Integrated Library Automation and Networking Software

- 1. Describe the concept of Virtual Library
- 2. Write a note on evolution of Lib 1.0, 2.0 and 3.0
- 3. Differentiate between Traditional Library and Virtual Library

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### **UNIT – III: MULTIMEDIA AND INSTITUTIONAL REPOSITORIES**

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### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 What is multimedia
- 1.4 Components of Multimedia
  - 1.4.1 Text 1.4.2 Image 1.4.3 Animation 1.4.4 Sound 1.4.5 Videos
- 1.5 Hardware Components of Multimedia
  - 1.5.1 Processor (CPU)
  - 1.5.2 RAM and ROM
    - 1.5.2.1 Memory and Storage Devices
  - 1.5.3 Scanner
  - 1.5.4 Digitizer
  - 1.5.5 Magnetic Ink Card Reader (MICR)
  - 1.5.6 OCR (optical character recognition)
  - 1.5.7 Bar Code Readers
  - 1.5.8 Digital Camera
  - 1.5.9 Screen Projector

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- 1.6 Multimedia Software
  - 1.6.1 Photo Editor
  - 1.6.2 Video Editor
  - 1.6.3 Animation Tools
  - 1.6.4 Simulation Tools
- 1.7 Application of Multimedia in Libraries
  - 1.7.1 Digital Kiosk
- minorestly of Delhi 1.7.2 Webinar, Webcast and Web Conferencing
  - 1.7.3 Multimedia Resource Collection
- 1.7.4 Electronic Library
- 1.7 Advantages of Multimedia in Library
- **In-Text Questions**
- 1.8 Summary
- 1.9 Glossary
- 1.10 Answers to in-text Questions
- 1.11 Self-assessment questions
- 1.12 References
- 1.13 Suggested Readings

### **LEARNING OBJECTIVES** 1.1

After reading this lesson, the learner will be able to

- 1. Learn what multimedia and its overview
- 2. Know the various components of multimedia
- 3. Understand hardware and software of multimedia
- 4. Know the advantages of multimedia in libraries
- 5. Familiar with the application of multimedia in library



### **1.2INTRODUCTION:**

Multimedia has become a boom to this ever-changing world and libraries is no more exception, with the pathway of time, a plethora of tools and technologies emerged and applied in libraries and multimedia is one of them. We are well aware that multimedia is widely used in education, from preschool to doctorate. In the year 1940 Dr.Vannevar Bush integrated various forms and he designed a mechanical device named Memex, for storing, organizing and retrieving information in different forms. The proliferation of applications related to multimedia is not surprising. What, though, is multimedia? How does it relate to the computers and communications? Let's see to respond to Multimedia is? It is an agglomeration of various form as text, data, images, hypertexts which are converted forms of digital media via computer.

### **1.3 WHAT IS MULTIMEDIA?**

term "multimedia" has a variety of meanings:

Bob Goldstein, a musician and artist (after known as "Bobb Goldsteinn") coined the term "multimedia" to promote the launch of his "Lightworks at L'Oursin" exhibition in Southampton, Long Island, in July 1966. [1] Dick Higgins, an American artist, had two years prior presented a brand-new method of creating work that he called "intermedia,"

Multimedia means: Audio, video, and animation are all forms of multimedia that can be used to display computer data (i.e., text, graphics drawings, images, animations, virtual reality, and augmented realities).

A multimedia application is one that makes use of a variety of media sources, such as text, graphics, images, sound/audio, animation, and/or video.

**Definition:** The term "multimedia" is frequently used in combination with the information and technology, Produce videos (information on demand), or hypermedia. In a computer could be thought as text, graphics, photos, video, and audio. Interactivity is an important component of multimedia. It offers users' enriched interactive information. 'media'. Multi means "many," as in many. A sort of medium called multimedia makes it simple to move information from one place to another.

The presentation of text, images, audio, and video along with links and other tools enables the user to engage in computer-based navigation, creation, and communication.

The term "multimedia" refers to the digitally expressed, stored, transmitted, and processed integration of text, drawings, still and moving images (videos), graphics, audio, animation, and any other media.

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### **1.4 COMPONENTS OF MULTIMEDIA:**

Text, graphics, sound, video, and animation are the five significant elements of multimedia. They are elaborated with below:

### 1.4.1 Text:

Text is the fundamental component of multimedia and the most prevalent means of conveying information to others.

### **1.4.2Image:**

Images are an essential element in multimedia. These image graphics are created in two ways by the computer: as bitmap or raster images and as vector images.

### **1.4.3Animation:**

Animation is the process of constantly showing still images to create the illusion of continuous motion. In animation, the item on the screen is a vector image.

### **1.4.4 Sound**

Sound is a significant form of communication in all languages and is the most important element of multimedia, providing the music, special effects.

### 1.4.5Videos

Video or video clips that may be incorporated directly into the applications and are playable without issue.



(Fig.1 Source: www.conceptdraw.com)

### **1.5HARDWARE COMPONENTS OF MULTIMEDIA**

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### Various componets of multimedia



Multimedia programmes may now be developed and viewed on computers nowadays. The following is a list of the numerous types of hardware that are necessary for multimedia apps to run.

### 1.5.1 Processor (CPU):

The heart of any multimedia computer is its processor. Today Core i5 or higher processor is recommended for a multimedia computer.



### 1.5.2 RAM and ROM:

is used to store programmes and data used in real-time by the CPU. The data stored in the random access memory can be read, written, and deleted an unlimited number of times. RAM is a physical component that stores the currently used data. It is an unstable memory.

### **1.5.2.1.1 Memory and Storage Devices:**

This kind of memory is also called external memory or non-volatile memory. It works less quickly than main memory. These are used to permanently store data or information. These memories are not directly accessed by the CPU. Instead, they are accessed through input-output routines. The information in secondary memories is moved to main memory before the CPU can use it. For example, disc, CD-ROM, DVD, etc.



### 1.5.3 Scanner:

A scanner is a type of input device that works more like a copier. It is used when some information is on paper and needs to be moved to the computer's hard drive so it can be

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changed further. Images from the source are taken by the scanner and turned into digital files that can be stored on the disc. You can change these pictures before you print them.



(Scanner)

### **1.5.4 Digitizer:**

A digitizer is an input device that turns analogue information into digital data. Digitizer can turn a signal from a TV camera into a series of numbers that can be stored in a computer. The computer can use them to make a picture of whatever was in front of the camera. Digitizer is also called a Tablet or Graphics Tablet because it turns graphic and pictorial data into binary inputs. With a graphic tablet as a digitizer, you can do fine work with drawing and image editing apps.



### 1.5.5 Magnetic Ink Card Reader (MICR):

Magnetic ink character recognition (MICR) is a technology that is mostly used to find and process checks. A check's MICR is the string of characters at the bottom left of the check. It has three groups of numbers: the bank routing number, the account number, and the check number.



### **1.5.6 OCR (optical character recognition):**

OCR, which stands for "optical character recognition," is a way to tell the difference between printed or handwritten text characters in digital images of physical documents, like a

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scanned paper document. The most basic part of OCR is looking at the words on a document and turning them into code that can be used to process data. OCR is sometimes called "text recognition" as well.



### 1.5.7 Bar Code Readers:

A barcode reader, also called a barcode scanner, is an optical scanner that can read printed barcodes, decode the information in the barcode, and send the information to a computer.



(barcode Reader/Sanner)

### **1.5.8 Digital Camera:**

A digital camera is a device for inputting photos that are then saved in digital form. The digital camera as well as digital vedio camera is utilised for different applications, such as contributing photographs to a multimedia presentation or for personal usage.



### **1.5.9 Screen Projector:**

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Projectors or simply projector is output devices used to simultaneously display information from a computer on a large screen to a group of people.

### **1.6MULTIMEDIA SOFTWARE:**

Multimedia software now is a big category that includes everything from editing videos to making websites. There are many different kinds of multimedia software, but they all have one thing in common: they all use the computer to make and change graphics, sounds, animations, text, and other media.

### **1.6.1 Photo Editor:**

Image or Photo editors are like photo editing software because they can also be used to improve images. Image enhancers, on the other hand, tend to change and manipulate images more than edit them. There are various software tools or software i.e. Photoshop, Affinity Photo, Luminar NEO, Luminar AI, inPixio, Pixlr X, CorelPaintShop Pro.

### 1.6.2 Video Editor:

Video editing is one of the most widespread uses for multimedia software; in fact, non-linear editing software has transformed filmmaking by allowing the removal or addition of scenes at any moment. The popular Video editing software such as Adobe Premiere Pro or Final Cut Pro, PowerDirector, HitFilm Express, Blender, DaVinci Resolve VideoProc Vlogger,VideoPad are likely the most common sort of multimedia software. These programmes enable you to edit video footage on your computer by slicing tinto clips, rearranging them in any order, and adding titles and other effects. Lokking after to the yutube generation many adriod apps or mac are very popular for vedio editing i.e. Filmr, Quik, FilmoraGo, KineMaster, VivaVideo, WeVideo, VideoShow etc.

### **1.6.3 Animation Tools:**

The process of changing static pictures to moving is called animation. When stationary images are rapidly presented on media such as film or video, the illusion of motion is created. The tools and software are 3ds Max (Autodesk), After Effects (Adobe). Maya, Moho etc.

### **1.6.4 Simulation Tools:**

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Simulation is an essential tool because it allows for the evaluation of various designs, plans, and/or policies without the need to conduct costly, time-consuming, or otherwise impracticable experiments on a real system. That is, it enables you to inquire about a system without conducting experiments on the system itself (and hence incur the costs of field tests, prototypes, etc. There are various applications and tools like ANALOGIC,MATLAB,SIMSCALE, SIMUL8 etc.

### **1.7APPLICATION OF MULTIMEDIA IN LIBRARIES:**

The use of multimedia is becoming widespread in libraries, information centres, and archives. This can take the form of multimedia kiosks, user orientation programmes, multimedia-based reference collections, heritage collections in the form of multimedia resources, and other similar applications. Various libraries have housed multimedia collection with the creation of audio-visual and other types of multimedia resources. Librarians are preparing presentations, audio vediuals to during the orentations to make their service effective. presentation's overall effectiveness so the multimedia resources have always been an essential component of library collections.

The usages of multimedia technologies in library can briefly be discussed in the following:

### 1.7.1 Digital Kiosk:

Kiosk is a free-standing computers with touch screens most probably used at airports and other public places to provide directions, schedules, etc (Rowley,1996).

In library, kiosks are playing important role in valous settings. A library kiosk displays announcements, reading lists, user comments and ideas, and other library operations like information search, OPAC serach etc. A library kiosk graphically displays the library's collection, catalogue, archives, services, and locations, as well as the floor layouts.

### **1.7.2 Webinar, Webcast and Web Conferencing:**

A webinar is a live event that viewers can access online in real-time (or a simulatedlive, pre-recorded event). In addition, webinars are frequently training seminars or online talks for demand generation, users engagement. Webinar's are two-way presentation by using interactive elements including shared screens, question-and-answer sessions, and subject discussions. In most cases, webinar participants prefer a live question-and-answer sessions.

### 1.7.3 Multimedia Resource Collection:

Libraries are preserving various types of multimedia to server the users. Libraryies house multimedia databases, maultimedia catalogues, Macromedia showcase, CD-ROMs,



Flopy disk, Movable Hard Disk, Audio and video collections, Image collections in nerwork tools, Anumationvedio collections, simulation software collections etc.

### **1.7.4 Electronic Library:**

Now, information management and retrivalsytem in libraries has now changed its form and mode of service giving multimedia services. Digital library or Electronic libray are basically offer various multimedia services and this electronic or digital libraries are decentralized and support interoperatbility between tools, system and users. Digital library may include e-books, scanned images, data, Audio vidual materials. Digital libraries now are hosted online. Various project of digital libraries are initiated in the word. In 1995, the first DL project was launched by University of illions followed by standford university, University of California, British library, UK named ELNOR. Digital library arefucting as access pont of all digital resource management and retiveal of information.

In India, various digial library program or initiatives are launched e.g.

- National Science Digital Library, NISCAIR
- Digital Library of DESIDOC
- National Digital Library of India (NDLI), Kharagpur

### **1.7 ADVANTAGES OF MULTIMEDIA IN LIBRARY:**

- 1. Use of multimedia makes library service easy, fast and effective
- 2. It improves learning process effective and efficient
- 3. Multimedia tools and software are easy and user-friendly
- 4. Its improved library resource sharing and networking
- 5. Multimedia system gives its user freedom to search for information and data
- 6. The New multimedia system changed the form of library, introducing AR (Augmented reality), VR (Vurtual reality)

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### **IN-TEXT QUESTIONS:**

- 1. Multimedia Contain?
  - A. Text
  - B. Audio
  - C. Video
  - D. All of the Above

2. \_\_\_\_Coin the term Multimedia?

3. A device that converts data into information and processes called?

- A. Processor
- B. Computer
- C. Hard disk
- D. Floppy Disk

4. Which device that turns analog information to digital data?

- A. MICR
- B. Digitizer
- C. Barcode Reader
- D. QR Coder
- 5. Which one the following in not a multimedia software?
  - A. Linux
  - B. Photo Editor
  - C. Video Editor
  - D. Simulation software

### **1.8SUMMARY**

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Multimedia made significant changes in library and information system. With the digital transformation and looking after the current development of multimedia technologies which are changing their form and nature from CD-DVDs to Electronic Multimedia Library or Digital Library. From presentation to video-conferencing in live-stream or on-demand broadcast over the Internet. The creation of multimedia provides an opportunity to interact with professionals in the fields of library and information science, Because the twenty-first-century librarians are experts in managing multimedia digital libraries,

### **1.9 GLOSSARY**

Animation: Animation is the process of constantly showing still images to create the illusion of continuous motion. In animation, the item on the screen is a vector image.

**Image:**Images are an essential element in multimedia. These image graphics are created in two ways by the computer: as bitmap or raster images and as vector images.

**Kiosk:** Kiosk is a free-standing computers with touch screens most probably used at airports and other public places to provide directions,

**OCR:** OCR, which stands for "optical character recognition," is a way to tell the difference between printed or handwritten text characters in digital images of physical documents, like a scanned paper document.

**Processor:** The heart of any multimedia computer is its processor. Today Core i5 or higher processor is recommended for a multimedia computer.

Scanner: A scanner is a type of input device that works more like a copier

**Sound**Sound is a significant form of communication in all languages and is the most important element of multimedia, providing the music, special effects.

**Text:** Text is the fundamental component of multimedia and the most prevalent means of conveying information to others.

VideosVideo or video clips that may be incorporated directly into the applications and are playable without issue.

# 1.10 ANSWERS TO IN-TEXT QUESTIONS 1. A. Text 2. Bobb Goldsteinn 3. B. Computer 4. B. Digitizer 5. A. Linux . <



### 1.11 SELF-ASSESSMENT QUESTIONS

- 1. Define multimedia and allobarate history and its development.
- 2. Give applications of multimedia in libraries.
- 3. What are the hardware requirement for multimedia.
- 4. What is an electronic or digital library?
- 5. What are the animations tools?

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### LESSON 1

## IMAGE CREATION USING PHOTOSHOP AND CORELDRAW

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### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Photoshop
  - 1.3.1 Functioning of Photoshop
  - 1.2.2 Features of Photoshop
  - 1.3.3 Opening Adobe Photoshop
  - 1.3.4 Creating and Duplicating an Image with the help of Photoshop
- 1.4 CoralDraw
  - 1.4.1 Features of CorelDraw
  - 1.4.2 Working with CorelDraw
  - 1.4.3 Opening CorelDraw
  - 1.4.4 Opening Pdf Files on CorelDRAW
- 1.5 Types of Free Image Creation Tools
- 1.6 Application of Image Creating Tools in Libraries
- 1.7 Summary
- 1.8 Glossary
- 1.9 Answers to In-text Questions
- 1.10 Self-Assessment Questions
- 1.11 References
- 1.12 Suggested Readings



### 1.1 LEARNING OBJECTIVES

After going through this chapter, you will be able to:

- Understand various Image Creating Softwares
- Use of various tools in CorelDraw and Photoshop
- Various features of Photoshop and CorelDraw
- Types of Free Image Creation Tools

### **1.2 INTRODUCTION**

There are number of software programs available in the market for editing, modifying and creating picture or photographs. These softwares are available to fulfill the need and requirements of the graphic designers and professional photographers. They are available for beginners, freelancers and for professionals dealing with editing and vector drawing. Today different type and size brands need graphic design software that brings out stunning designs to speak to the target audience. Those starting a blog or want to create stunning photos for an e- Commerce site, one must select best graphic design software to take your marketing efforts to the next level. To fulfill this purpose, various programs are available such as Canva, Adobe Photoshop, lucidpress, Inkscape, Gravit Designer, Adobe illustrator CC, Pixlr, krita, Vectr etc. but CorelDraw and Photoshop are very popular among these.

CorelDraw and Photoshops both are image editing programs. CorelDraw was developed by Corel Corporation which is a vector-based program that creates artwork using mathematical equations whereas the Photoshop was developed by Adobe Systems which is pixel-based program uses vector-based graphics. CorelDraw converts image to form vectored files which is generally used by Web or graphics designers or UX designers whereas Photoshops are mostly used by graphic designers and professional photographers alike. Figure 1.1 provides the detail of various image creating software programs available in the market.



**Fig.1.1**: Image creating softwares

The above mentioned figure provides the details of differ image creating softwares such as Photoshop, canva, CorelDraw lucid press, pixlr, Inkscape format etc. these are design to accomplish the task of professionals like graphic designers.

### **1.3 PHOTOSHOP**

Photoshop is the image creation, graphic design and photo editing software brought out in the market by Adobe. Though, the program was developed in 1987 by Thomas and John Knoll who were brothers but it was taken over by Adobe System in 1988. It has default file extension as .psd stands for Photoshop Documents. The use of photoshop provides you gorgeous images, rich graphics and incredible art. It gives the facility to mix up colours, mash up photos, graphic, effects, changes someone's expression and add effects. A desirable look can be given to a photo with the help of Photoshop. It also provides the facility to paint, doodle, dabble with digital brushes, bloom and get smudgy with oils. It provide image editing feature for pixel-based images, raster graphic and vector graphics. As far as the latest version of photoshop is concerned, it has been recently introduced as Desktop version in the month of April 2022 named as 23.3.1 while Adobe released the cloud version in October in 2021.



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### **1.3.1 Functioning of Photoshop**

There are number of stack-holders of photoshop such as photographers, web designers, graphic designers, memes makers to edit their images or for creating high-quality images. It is basically standard image manipulation software that provides sophisticated tools to complete the task. It is a common parlance to say that an image has been 'Photoshoped' or 'Shopped' means it has been manipulated or edited. The photoshop uses layer based editing system for raster image creating and altering with multiple overlays that support transparency. The mentioned layer works as masks or filters, changing underlying colors. Some effects of shadows can also be added to the layers. The beginners can also use Photoshop as well with many helpful tutorials on the market that train users in how to use Photoshop's various features.

### **1.3.2 Features of Photoshop**

The photoshop is an ideal software program for creating graphics and layout for newspapers, magazines, website design, logos, posters and other digital arts. It has different features such as of brash, effects, fonts and pen tools. The photoshop provides the facility of saving the file in features format such as jpeg, png and gif etc.

- (i) Among the popular tools in Photoshop programs brushes provide the various effects such as paining, retouching and erasing images.
- (ii) There is a tool available for coping pixels called Clone Stamp that allows us to copy pixels and pasting them in author area which is useful in repairing damaged or corrupt images.
- (iii) For making the pictures Blur in an image, blur is also used to make it less distrinct. It is also helpful in reducing the appearances of wrinkles and other imperfections.

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- (iv) For making the pictures less distinct, Blur is used. It blurs the pixels in an image. This can be used to create a soft, dreamy look or reduce the appearance of wrinkles and other imperfections.
- (v) Sharpen does the opposite of Blur, making pixels more distinct. It can be useful for making an image look more transparent or creating a more dramatic effect.
- (vi) Dodge and Burn are used to lighten or darken areas of an image. These are commonly used in photo retouching to make subjects appear more defined.
- (vii) The sponge tool is useful for correcting colors that are too light or too dark. The Sponge tool can either absorb or release color from an image.

The new edition has also enhanced administrative capabilities, including automation tools, to reduce the need for repetitive tasks. The updated version adds an object selection tool, keyboard shortcuts, a properties panel, paints and brushes, and background image removal options in addition to support for various cameras and lenses. The new version now includes quicker text layer rearrangement and additional typographic capabilities. It also gives users the chance to look up recent changes to their preferred cloud-based Photoshop saving methods.

### 1.3.3 Opening Adobe Photoshop

There are many a ways of opening Photoshop program. Just switch on the computer program, after opening the same click on the icon available on the desktop and another is opening the step by step. For opening the program we have to select the start button and select all program, and the next step is to click on Adobe Photoshop program. Figure 1.2 provides the steps of opening Photoshop software program.



Fig. 1.2: steps of opening Photoshop

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### **1.3.4** Creating and Duplicating an Image with the help of Photoshop

There are various steps of creating and duplicating the images with the help of the photoshop. They have been discussed step by step.

- Select/choose file as 'New' (i)
- (ii) Type the name of the image in the dialogue box and set the height and width by choosing the preset from the size menu. Further, to match the width, height, resolution, color mode and bit depth of new image opening, select file name from the botton section of document type menu.
- (iii) Select the background content option
- (iv) Once after finishing, we can save the settings as preset just by selecting Save preset or Click ok to 'open new file'.

### **Duplicate an Image**

You can duplicate an entire image into available memory without saving to disk.

- (i) Open the image you want to duplicate.
- (ii) Choose Image > Duplicate.
- Enter a name for the duplicated image. (iii)
- (iv) If you want to duplicate the image and merge the layers, select Duplicate Merged Layers Only. To preserve the layers, make sure this option is deselected.
- (v) Click OK.



Fig. 1.3: Screenshot of Photoshop Program

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### 1.4 CORALDRAW

It is a Vector graphics editor developed by Corel Corporation which was released with its first version in January 1989. Its current version is also known as Corel graphics suite released for Mac OS and Windows on 8th March 2022 which includes the bitmapimage editor Corel photo paint as other graphics related programs. The new version also includes more non-destructive photo editing and filters, combined photo editing features with presets, new templates, a new multipage took and more multiple format exports. The program is available in various languages such as English, German, Italian, French, Spanish and Japanese etc.

The program creates artwork using mathematical equation. It converts the image to form vectored files for creating logos, business cards, barcodes, pamphlets, banner etc. This is mostly used by web or graphics designers or UX designers.

### 1.4.1 Features of CorelDraw

The main benefit of the program is robust feature set, customizations and reliability. CorelDraw not only matches the user's workflow but also increases the productivity. It has also been noticed that the colour accuracy and flexibility required for professional output can be had with the help of CorelDraw graphic suit 2017. Designers can also make the memorable logos, eye catching marketing materials and viral signs and social media graphics. The CorelDraw provides the features such as liveSketch tool, multi monitoring, touch friendly interface, custom node shapes, powerful stylish enhancements, healing clone tools, Corel font manager and enhanced vector previews, handles and nodes. It has some other features which have been described below:

### (i) Create Anything and Everything

Diverse designers, industries, and businesses from all over the world by are using CorelDRAW Graphics Suite for everything from manufacturing and engineering to sign making and marketing.

### (ii) Apparel and Textiles

CorelDRAW Graphics Suite includes all the tools that we need to create and export designs for the fashion industry, whether we work in the screen printing, embroidery, direct-to-garment printing, or clothing industries.

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### (iii) Signage and Large-Format Printing

Thanks to a potent colour management engine and pre-press capabilities, professionals in the sign and print industry rely on CorelDRAW to develop artwork for a variety of print outputs.

### (iv) Blueprints, Maps, and Schematics

With specialised, precise tools for producing elaborate diagrams, schematics, and other images, CorelDRAW is a well-known brand in engineering, manufacturing, and construction industries.

### (v) Illustration and Fine Art

Illustrators and artists alike can combine their classic art practices with CorelDRAW's vector-illustration technology to create beautiful, sophisticated works of art.

### (vi) Tools for Productivity and Creativity

From stunning artwork to impactful web graphics and stand-out print, express your creative vision with tools that empower you to deliver pro results you'll be proud of.

### (vii) Collaboration Tools

Connect with clients and colleagues on designs like never before. Share your concepts with your reviewers in the Cloud, inviting them to view, annotate, and comment directly on your CorelDRAW design files using CorelDRAW.app. Making design changes couldn't be easier, with feedback from one or many contributors, all in one place-your working file.

### (viii) User Improvements

Because of the valuable input, Corel has made enhancements to Find & Replace, Align and Distribute, shadow effects, and more in CorelDRAW. The most-loved Corel PHOTO-PAINT features - from masks, effects and lenses, to Replace Color - also got much better now a days.

### (ix) Colors, Fills, and Transparencies

Easily apply color to fills and outlines using color swatches, or generate colors based on color harmonies. Change the transparency of an object and fill objects with patterns, gradients, mesh fills, and more.

### (x) Non-Destructive Editing

This type of edit bitmaps and vectors knowing won't harm the original image or object. Enjoy many non-destructive features such as the Block Shadow tool, Symmetry Drawing mode, the Impact tool, Add Perspective, and Non-Destructive Effects in CorelDRAW and Corel PHOTO-PAINT.



### (xi) Styles and Style Sets

It control every elements in the documents with a handy objects docker, that allows to hide, rename, search for objects, and change their stacking order. Use of the Object Properties docker to manage object formatting, fills, and more.

### (xii) Workspace Customization

The workspace customization is also one of the important features where it seamlessly import CorelDRAW and Corel PHOTO-PAINT workspaces were created in previous versions, or use predefined workspaces to keep industry-specific tools organized and accessible.

### 1.4.2 Working with CorelDraw

CorelDraw is one of the most popular and powerful graphics programs and gives designers a most rewarding and enjoyable work experience. It is built and designed to meet the day-today demands of working designers. CorelDraw software is available in the market and once loaded onto the computer, one can get started with the designing work. The figure 1.4 provides the screenshot of CorelDRAW program.



Fig. 1.4: Screenshot of CorelDRAW Program

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### 1.4.3 Opening CorelDraw

To open the CorelDraw software certain steps are followed. They have been discussed one by one. First of all, Switch on the computer and take the following steps:

- (i) Go to Start and select Programs from the list.
- (ii) Find the Corel section and select CorelDraw.
- (iii) Choose Open Graphic for old design. New Graphic creates a new, one page document. Template allows access to professionally created templates from the library. Corel Tutor gives a brief overview of how to use the program.
- (iv) 'What's New?' shows improvements over the earlier Version. Designer.com can connects to a web site where we can find many helpful areas

### 1.4.4 Opening Pdf Files on CorelDRAW

Pdf stand for Portable Document Format. It contains image, font and other elements in a single file. The layout of this document permits portability of documents in a different platforms and applications. This type of documents can be encrypted and protected by password. It allows the sharing of documents in an easier way.



There are variety of image creating tools available to help us to quickly navigate the type of image we are willing to create. These tools are available from premium to free, from desktop software to mobile apps. These are image design tools, infographic makers, logo makers, quote makers, collage makers, cover page photo maker, profile picture makers, screenshot tools, image resizing tools and GIF makers. The figure 1.2 depicts the image creation tools.

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### (i) **Image Design Tools**

There are several tools available for different purposes, image designing tools are one of them. These tools are canava, PicMoney, stencil and Befunky etc. These tools are helpful in creating images, build resume, designing cover pages and creating social media images. The Befunky is the tool which gives us freedom not to register which is a big plus for a lot of people. It also have the facility to make collage.

### (ii) Logo Makers

Now a days, every organization requires a logo and the same is seen by the target audience. There are some of the logo creation tools i.e. LogoGarden, LogoTypeMaker, Ucraft and Logaster etc. There are some of the free and paid logo creating options available. LogoGarden is quick and easy option for creating logos. Further, the Logotype maker is a site for small companies and startups for creating their logos. Similarly, Ucraft is an editor but it also provides the facility of logo editor. Logaster can create multiple versions of product design or logos for free.

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### (iii) Quote Maker

This one is not very popular tool but they are great for social media. These sites will take a quote and turn it into a beautiful image that can be shared on social media. There are some of the tools available in the form of Recite, Quozio and Quotescover. The site has a ton of different design themes which will easily make your quote look great. In the similar direction, quozio is another tool for creating and sharing a quote design. The QuotesCover is a great for turning our fantastic quote into social media cover photos and the same feature is available in facebook also.

### (iv) Screenshot Tolls

Despite the availability of the features of screenshot in the computes and laptops, there are variety of image editing tools available to fulfill the quick and effective requirement of image editing but there is no doubt they are having some of the features which in-built programs do not offers. Jing is one of them which helps us in capturing both screenshot and screen videos. It also helps in shaping and providing desired colors to the text/image.

The programs get connected and start editing, resizing and enhancing screenshot images. Further, another program available is known as skitch which offers feature like Jing. This program is dedicated to content creators looking for simple tools on the go.

### (v) **Profile Picture Maker**

It has become very necessary to have a stunning profile picture these days as the visitor look at the profile visual very often. So, it becomes important to create one great image for the profile picture. There are variety of tools available such as profile Picture makers, mypictr and, timeline slicer. These tools are very helpful in for creating great pictures for facebook, twitter, LinkedIn and pinterest whereas mypictr helps in resizing the picture so that it could be fit in the profile perfectly. It is also a simple tool to edit, save and upload our profile image. In the similar direction, timeline slicer is for resizing and timeline slicing and also allows users to scale pictures for ads.

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### Comparison of Best Graphic Design Tools

Tool Name	Main Features	Usability/Reliability
Canva	<ul> <li>Thousands of pre-built templates</li> <li>Chart maker</li> <li>PDF Editor</li> <li>Highly customizable</li> </ul>	Conveniently create a variety graphics for images and videos that are ideal for digital and social media marketing.
Lucidpress	<ul> <li>Online Platform.</li> <li>Allows for storage of brand assets.</li> <li>Automate branding data such as telephone numbers, mail addresses, etc.</li> <li>Quick import and export to online storage sites such as Dropbox.</li> </ul>	we can easily access the brand assets and manipulate them using any browser. Allows for the use of YouTube video.
Adobe Photoshop	<ul> <li>Very high image manipulation features.</li> <li>Allows creation of 3D-like images.</li> <li>High-Quality border selection to cut of unwanted elements in a picture.</li> </ul>	The tool is quite powerful but has a steep learning curve. It is reliable when you want high-quality image creation and manipulation.
CorelDraw	<ul><li>Best suited for vector art creation.</li><li>Basic image manipulation features.</li></ul>	All those who want extreme illustrations (vector) find this tool very useful.
Inkscape	<ul> <li>Flexible drawing tools</li> <li>Broad file format compatibility</li> <li>Powerful text tool</li> <li>Bezier and spiral curves</li> </ul>	Excellent tool for vector graphic creation and manipulation.
Adobe Illustrator CC	<ul> <li>Create illustrations using basic elements.</li> <li>Great manipulation of SVG vector images.</li> </ul>	This is an ideal tool for vector graphics artists. Comes with a host of templates to start from.

Fig 1.7: Comparison of Best Graphic Design Tools

Source: https://www.softwaretestinghelp.com/graphic-design-software-tools/

### 1.6 APPLICATION OF IMAGE CREATING TOOLS IN LIBRARIES

Now we are aware that there are several image creating programs are available in the form of CorelDraw and Photoshop, Canva, Lucidpress, pixlr, Inkscape format. These programs are basically useful in image creation, graphic design and photo editing. The updated editions of the programs also includes more non-destructive photo editing, filters, combined photo editing features, new templates, new multipage tools and more multiple-format exports. Further, when we check the use of these image creating tools in the libraries we find that the libraries are the storehouse of knowledge. They preserve the collection such as brochures, newsletters, magazines, newspapers and books. All these items are prepared with the help of Photoshop and CorelDraw. Library is also a place where we can store the things that we do in the Photoshop. Now the libraries are organising several information literacy programs, knowledge sharing sessions, Author talk, training and workshopts etc.



before organising these events, libraries are doing lot of advertisements with the help of brouchers or banners. These items are being prepared by trained professionals in CorelDrawor Photoshops being used in the libraries.

### 1.7 SUMMARY

The Image Creating Softwares provides the simplicity and flexibility for the users. There are several programs available but the CorelDraw and Photoshops are among the popular one. CorelDraw and Photoshops both are image editing programs. CorelDraw was developed by Corel Corporation which is a vector-based program that creates artwork using mathematical equations whereas the Photoshop was developed by Adobe Systems which is pixel-based program uses vector-based graphics. CorelDraw converts image to form vectored files which is generally used by Web or graphics designers or UX designers whereas Photoshops are mostly used by graphic designers and professional photographers alike.

There are number of stack-holders of photoshop such as photographers, web designers, graphic designers, memes makers to edit their images or for creating high-quality images. It is basically standard image manipulation software that provides sophisticated tools to complete the task. The new edition of the program has also enhanced administrative capabilities, including automation tools, to reduce the need for repetitive tasks. The updated version adds an object selection tool, keyboard shortcuts, a properties panel, paints and brushes, and background image removal options in addition to support for various cameras and lenses. The new version now includes quicker text layer rearrangement and additional typographic capabilities. It also gives users, the chance to look up recent changes to their preferred cloud-based Photoshop saving methods.

Further, the new version of CorelDRAW creates artwork using mathematical equation. It converts the image to form vectored files for creating logos, business cards, barcodes, pamphlets, banner etc. This is mostly used by web or graphics designers or UX designers. The main benefit of the program is robust feature set, customizations and reliability. CorelDraw not only matches the user's workflow but also increases the productivity. It has also been noticed that the colour accuracy and flexibility required for professional output can be had with the help of CorelDraw graphic suit 2017. Designers can also make the memorable logos, eye catching marketing materials and viral signs and social media graphics. These features inclues creating anything and everything, apparel and Textiles, signage and large format printing, blueprints, maps, and schematics and tools for productivity and creativity. There are variety of image creating tools available to help us to quickly navigate the type of image we are willing to create. These tools are available from premium to free, from desktop software to mobile apps. These are image design tools, infographic makers, logo makers, quote makers, collage makers, cover page photo maker, profile picture makers, screenshot tools, image resizing tools and GIF makers.

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Now we are aware that there are several image creating programs are available in the form of CorelDraw and Photoshop, Canva, Lucidpress, pixlr, Inkscape format. These programs are basically useful in image creation, graphic design and photo editing. The updated editions of the programs also includes more non-destructive photo editing, filters, combined photo editing features, new templates, new multipage tools and more multiple-format exports. Further, when we check the use of these image creating tools in the libraries we find that the libraries are the storehouse of knowledge. They preserve the collection such as brochures, newsletters, magazines, newspapers and books. All these items are prepared with the help of Photoshop and CorelDraw. Library is also a place where we can store the things that we do in the Photoshop. Now the libraries are organising several information literacy programs, knowledge sharing sessions, Author talk, training and workshopts etc. before organising these events, libraries are doing lot of advertisements with the help of brouchers or banners. These items are being prepared by trained professionals in CorelDrawor Photoshops which are being used in the libraries.

Above all, it has been seen that the programs such as ColelDraw and Photoshop both offers the facility of image creating softwares and also fulfilling today's requirment.

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Name of the Course

(iv) 8<sup>th</sup> January 2022

### **GLOSSARY** 1.8

Image Creating Softwares:	Canva, Adobe Photoshop, lucidpress, Inkscape, Gravit Designer, Adobe illustrator CC, Pixlr, krita, Vectr etc. but CorelDraw and Photoshop are very popular among stockholders
CorelDraw :	CorelDraw was developed by Corel Corporation which is a vector-based program that creates artwork using mathematical equations
Photoshop :	Photoshop was developed by Adobe Systems which is pixel- based program uses vector-based graphics

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### Name of the Course

### **1.9 ANSWERS TO IN-TEXT QUESTIONS**

1. Window

2.1998

- 4. Adobe Systems
- 5. 8<sup>th</sup> March 2022

3. Corel Corporation

### 1.10 SELF-ASSESSMENT QUESTIONS

- 1. Discuss some image creating programs? Mention their features ?
- 2. Discuss the various features available in CorelDraw?
- 3. Discuss the various features available in Photoshop?

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### LESSON 1

### INSTITUTIONAL REPOSITORIES: GREENSTONE DIGITAL LIBRARY, DSPACE AND E-PRINTS

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niversity

### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Need of Institutional Repositories
- 1.4 Purpose of Institutional Repositories
- 1.5 Advantages of Institutional Repositories
- 1.6 Types of Institutional Repositories
- 1.7 Institutional Repository Softwares
  - 1.7.1 Open Source Softwares
  - 1.7.2 Proprietary Software
- 1.8 Publishing Options
- 1.9 Hosting Services
- 1.10 Functional Requirements of Institutional Repository Softwares
- 1.11 Status of Institutional Repositories in India
- 1.12 Summary
- 1.13 Glossary
- 1.14 Answers to In-text Questions
- 1.15 Self-Assessment Questions
- 1.16 References
- 1.17 Suggested Readings

### **1.1 LEARNING OBJECTIVES**

After reading this chapter, you will be able to:

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- About Institutional Repositories
- Need and Purpose of Institutional Repositories
- Advantages of Institutional Repositories
- Types of Institutional Repositories
- Different publishing and Hosting services
- Status of Institutional Repositories in India

# **1.2 INTRODUCTION**

The institutional repositories are the prevailing system that consents institutions to store and preserve their digital documents and permit interaction and collaboration among patrons in the organizations. It is a digital Archive of the institution through which the intellectual output, publications by Institution members and necessary documents are preserved and are made accessible for future use. Oxford English Dictionary defines the repository as the 'Chamber' in which things may be deposited. Similarly, Wikipedia defines it as a place where data is mined or stored. The term Institutional Repository (IR) simply means organized and managed. When we look at the academic Institutions point of view, it is the intellectual output produced by faculty, students and staff in an institution. Institutional Repositories (IR) are a means to manage and preserve effectively an institution's knowledge base and intellectual assets resulting in the content of institutional repositories expanding beyond e-prints to include e-learning materials, which are generally not preserved elsewhere. It needs to be ensured that content within the repositories should have authenticity, reliability and easy accessibility.

According to Barton and Walker, "Institutional repositories designed to manage, host, preserve and enable distribution of the scholarly output of an institution". Further, Mark ware defines it as web-based database of scholarly material meant for long-term preservation of digital material.

Libraries are the great support in the transmission of cultural heritage from one generation to another. They are performing lead role in shaping institutional repositories all over the world. The concept of IR suggest maximum Library influence over the full cycle of scholarly communication on campus, from research through publication, collection and preservation. Institutional Repository can be considered as digital library. It functions as collecting,



classifying, cataloguing, curating, preserving and providing access to digital content. It allows researcher, faculty and curious minds to self-archive their research output for impact of research, usage and wider visibility of research.

Seeing the changing demand of the users, libraries have to step out to provide effective customer services in the fast changing world by using the tools and technologies, Institutional Repositories are one of them in such initiatives. The below mentioned figure 1.1 shows the growth of the directory of open access repositories from December 2005 to August 2022.



**Fig.** 1.1 Growth of Directory of Open Access Repositories **Source:** https://v2.sherpa.ac.uk/view/repository\_visualisations/1.html

# **1.3 NEED OF INSTITUTIONAL REPOSITORIES**

Institutional Repositories are the need of the hour today may it be Research or Academic Libraries. The building of an institutional repository for academic library is needed because of the following changes and drawbacks.

- (i) Uncertainty over handling the preservation archiving of digital scholarly research materials.
- (ii) Due to technological shift (changes)



- (iii) Significant increase in the overall volume of research.
- (iv) Increasing demands to wider access knowledge objects from anytime and anywhere access.

### **1.4 PURPOSE OF INSTITUTIONAL REPOSITORIES**

The use and popularities of Institutional Repositories have grown gradually. It has become the need of hour. The main purpose of creating repositories are to manage, preserve and maintain the digital assets, intellectual outputs and histories of academic institutions. It also helps in creating global visibility for an institution's scholarly output. The best thing about these repositories are that they provide one stop shop for Institutional resources and also provide open access to the institution's research output. It further, provides selfarchiving of institutional scholarly research outputs.

# 1.5 ADVANTAGES OF INSTITUTIONAL REPOSITORIES

The repositories are becoming very helpful in fulfilling the users timely demand for archived resources. Institutional Repositories offers many advantages for Institutions. The Velmurugan, C. in his research Paper "Institutional Repositories: a powerful tool for accessing Information for Educationalists" in 2010 given some of the advantages. They have been listed below:

- (i) It is a faster and effective communication channel as it reduces the publication delay
- (ii) It increases the citation to the publications
- (iii) It strengthen research especially in the Indian Context
- (iv) It provide wider access and visibility to the research output
- (v) This is a new and innovative channel of Scholarly Communication
- (vi) It preserves the institution's heritage
- (vii) It is a boon for In-house literature visibility

## **1.6 TYPES OF INSTITUTIONAL REPOSITORIES**

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There are variety of Institutional Repositories such as Subject related repositories, research repositories, National repositories and repositories connected to Institutions. These Institutional repositories offers opportunities for the faculty members, research scholars and inquisitive minds. They have been discussed below:

### (i) Subject Related Repository

These repositories focuses on particular segment, usually set up by community members further adopted by wider community. Spontaneous self-archiving is prevalent as the repository is of intrinsic value to scholars. Subject based repositories are thematically well-defined and alert services whose usage statistics are meaningful for community users.

### (ii) Research Repositories

Research repositories are majority of time sponsored/set up by research funding's. The main focus of these repositories remains the high quality output. This is because its content is peer reviewed multiple times and the production of the results is well funded. They are different from the subject repositories but its content are tested and can be used for research purposes.

### (iii) National repository System

These require coordination more for a federated system and less for unified system. They serve scholarly communication in the national language and supports public policy e.g. in generation of open education resources for higher education and entrancing public access to knowledge.

## (iv) Institutional Repository

These types of repositories are based on Institutional Output. Whatsoever, it is important for the institutions and can be archived in theses repositories. Generally, these kinds of repositories are available with libraries. These repositories plays a vital role in regional development. It allows firms, public bodies and civil society organizations to understand immediately what kind of expertise is available locally.



### **1.7 INSTITUTIONAL REPOSITORY SOFTWARE (IRS)**

The shrinking budget and physical spaces in libraries are compelling them to go for an alternatives. Institutional repositories are one of them in fulfilling the information requirements of the users. These Institutional repositories have not only reduced the problems of space but also they are providing scholarly content in no cost. Now the libraries are using digital library software or institutional repository softwares to conserve and preserve their institution intellectual output in the form of research papers, faculty contribution etc. These IRs are available in the form of Proprietary and Open Source. Proprietary softwares are non-free softwares having the vendor lock-in and do not share the Source Code, these softwarescan not be customized as per our requirement without vendor support whereas, under open source license so many digital library softwares are available especially CDS-Invenio, DoKS, DSpace, Eprints, FEDORA, Greenstone, MyCoRe, etc. Each of these software has its own advantages and disadvantages. DSpace and EPrints are the most popular software having (39%) and (11%) installations across world for building digital as per the statistics from Registry of Open Access Repositories repositories (ROAR)/Directory of Open Access Repositories (DOAR). Good thing about Digital Library/ Institutional repository software is that they support unique identification number for every digital document. It also supports authorization and authentication policies.



Fig 1.2: Reputed Institutional repository software

# 1.7.1 Open Source Software (OSS)

OSS is a free, Flexible, expandable and downloadablesoftwares. Software which usually requires some level of expertise to implement and maintain. The source codes for open source software are controlled and managed by a central body, it is purely open for any changes and modifications. DSpace, EPrints, Fedora, Greenstone are some of the widely known OSS, which have been discussed below

# (i) DSpace

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It offers one of the best solutions for the institution to archive their intellectual outputs. It preserves and easily manages all types of digital contents including text, images, videos, audios and data sets etc. The software has (39%) installations across the Globe. It is free and easy to install "out of the box" and completely customizable to fit the needs of any organization. DSpace preserves and enables easy and open access to all types of digital content including text, images, moving images, mpegs and data sets. With an ever-growing community of developers, committed to continuously expanding and improving the software, each DSpace installation benefits from the next. It provides tools for management of digital assets, and is commonly used for building institutional repositories. It was basically designed to manage, host, preserve and enable distribution of the scholarly output of MIT's faculty. In India, many institutions have taken steps to use DSpace for building digital repositories/institutional repositories. DSpace has more number of features over EPrints hence is heavily used across world. Prominent features of DSpace is, it supports unique identification number for every digital document that is added into DSpace repository. It also provides digital preservation support, has excellent work-flow management, has access control privacy and management, support authentication and authorization policies at all levels. The software is frequently updated and customized due to the source code could be edited, modified, changed according to the need and requirement the latest version of the software. The latest edition of DSpace is 5.0 which can be downloaded from the files area in SourceForge. The DSpace community uses JIRA, a feature and issue tracking web application, to track, prioritize and guide its work. In addition to the DSpace platform work, JIRA also allows the community to watch specific issues, receive updates when there are changes, and vote on an issue's importance. The current version can easily adopt the previous versions of Dspace. Now the file downloads tracked in Google Analytics and Enhancements to DOI support. It further provides the metadata too.

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Fig 1.3: Screenshot of Dspae Repository Source: https://www.fiverr.com/

### (ii) **EPrints**

The basic purpose of designing Eprint by University of Southampton was to manage open Access Archives. It facilitates the repository platform for high visibility, high quality institutional open access collection. It gives links to SHERPA/ROMEO database and repositories polices. The first version of EPrints was released, it became the first and one of the most widely used free open access, institutional repository software for archiving preprints and post-prints of faculty members. It has become popular software around the globe as the process of installation is very easy. Eprintfulfills the needs of academics and researchers aimed at dissemination and reporting. EPrints version 3 was officially released on 24th January 2007 and was described by its developers as a major leap forward in functionality, giving more control and flexibility to repository managers, depositors, researchers and technical administrators. EPrints addresses high metadata quality support by making data entry easier and range of import facility to import objects from other services or data sources 3.0.3 version was released on 5th December 2007. Current version of EPrints is 3.0.5 which was released during April 2008. It has a feature of fetching/Import of data from



different repositories. It supports the web 2.0, RSS, Email Alert like features. It can also integrate the reports, Author CVs and Bibliographic listings. Further, it is tightly-managed, quality-controlled code framework and flexible plugin architecture for developing extensions. The figure 1.4 provides the screenshot of Eprint repository software.

eprints repository software					
Home	About	Browse			
Login   Crea	ate Account				Search
		Welcome to eprints			
Velco	ome to eprint	<ol> <li><u>Click here to start customising this repository</u>.</li> </ol>			
			🔊 Atom	🔊 RSS 1.0	🔊 RSS 2.0
Latest Add	ditions				
View item	s added to th	e repository in the past week.			

### **Fig 1.4: Screenshot of Eprint Repository software Source:** https://subratiitk.wordpress.com/install-eprints-on-ubuntu/

# (iii) FEDORA

Development of the Fedora operating system started in 1997 at Cornell University as a DAR PA and NSF funded research project. Fedora was created as collabrativly by Cornell University and the University of Virginia with financing from an Andrew W. Mellon Founda tion grant. The programme is adaptable enough

to support a wide range of digital documents with various functionalities, including digital as set management, institutional repositories, digital archives, content management systems, aca demic publishing companies, digital libraries, etc.Fedora digital object repository management system is based on the Flexible Extensible Digital Object and Repository

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Architecture (Fedora). It is an open source digital content repository service, which provides a flexible tool for managing and delivering complex digital objects. Fedora provides interfaces for creation, ingest, management, and dissemination of contents stored within a repository.

Fedora 1.0 was released in May 2003, with future releases following approximately every quarter with added functionality and corrected bugs discovered by users and the Fedora development team. In June 2004. It enables the storage, access and management of all kinds of digital content and offer information and services for communities such as scholars, artists, educators, Web innovators, publishers, scientists, librarians, archivists, publishers, records managers, museum curators or anyone who presents, accesses, or preserves digital content, and software developers who work on open source Web and enterprise content technologies. The system is designed in such a way that full featured institutional repositories and other interoperable web based digital libraries can be built. Figure 1.5 presents the screenshot of Fedora Institutional Repository software

NVERSITY VIRCINIA CORN LIBRARY	Fedora Digital Ol Default Disseminator - Item	Fedora Digital Object Default Disseminator - Item Index View			
Object Identifier (PID): demo:99					
Item ID	Item Description	MIME Type			
DS3	Architectural Drawing Pavilion III (high res)	image/jpeg			
DS1	Architectural Drawing Pavilion III (low res)	image/jpeg			
DS2	Architectural Drawing Pavilion III (med res)	image/jpeg			
		[			
DC	DC Record for Pavillion III Architectural image object	text/xmi			

**Fig 1.5:** Screenshot of Fedora IR Software **Source:**https://www.semanticscholar.org/paper/

It has web-based Administrator in the form of low level object editing and can easily store, manage and maintained all types of content and its metadata.

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### (iv) **GREENSTONE**

Greenstone is software for building and distributing digital library collections. It provides a new way of organizing information and publishing it on the Internet or on CD-ROM. Greenstone is produced by the New Zealand Digital Library Project at the University of Waikato, and developed and distributed in cooperation with UNESCO and the Human Info NGO in Belgium. It is open-source, multilingual software, issued under the terms of the GNU General Public License. The aim of the Greenstone software is to empower users, particularly in universities, libraries, and other public service institutions, to build their own digital libraries. A project on Source Forge was created in October 2005 for version 3 of Greenstone. In 2010, Greenstone version 2.83 was included, along with the Koha Integrated Library System, in an Ubuntu Live-CD.

Digital libraries are radically reforming how information is disseminated and acquired in UNESCO's partner communities and institutions in the fields of education, science and culture around the world, and particularly in developing countries. We hope that this software will encourage the effective deployment of digital libraries to share information and place it in the public domain. The complete Greenstone interface, and all documentation, is available in *English, French, Spanish, Russian and Kazakh*. Greenstone may be used to create large, searchable collections of digital documents. In addition to command line tools for digital collection building, Greenstone has a graphical Greenstone Librarians Interface (GLI) used to build collections and assign metadata. Through user selected plugins, Greenstone can import digital documents in formats including text, html, jpg, tiff, MP3, PDF, video, and Word, among others. The text, PDF, HTML and similar documents are converted into Greenstone Archive Format (GAF) which is an XML equivalent format.

The interface can be presented in multiple languages. Currently, the interface is available in Arabic, Chinese, Dutch, English, French, German, Maori, Portuguese, and Spanish. Collections can contain text, pictures, audio, and video also uses advanced compression techniques. Collections can be updated and new ones brought on-line at any time, without bringing the system down. Collections can be distributed amongst different computers. Figure 1.6 presents the screenshot of Greenstone Institutional Repository softwares

Name of the Course
Creenstone Librarian Interface v2,74 Mode: Librarian Collection: Images   File   Edit   Download   Cather   Cather   Collection   Collection
Show Files     All Files       No action requested     Stop       No action requested     Image: Stop

**Fig 1.6**: Screenshot of Greenstone IR Software **Source**: https://www.linuxlinks.com/greenstone/

# 1.7.2 Commercial / Proprietary Software

Commercial and Proprietary softwares are based on vendor lock-in. they generally requires payments for consultation, subscription and software upgradation. In case, we want to make certain changes on any part of the software, we have to contact the vendor for it as the source code is available with software providing vendor. Some of the known Commercial/Proprietary software have been discussed below:

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# (i) CONTENT DM

The software is user friendly which build, showcase and preserve the Institutional collection. Now, it has been upgraded and can be used at the miniature devices such as Smart phones and tables. The software can be integrated with WorldCat which is helpful in maximizing the visibility of the resources archived in the repository. It also secure and monitor our digital assets archived in cloud based preservation system archive for safety purposes (http://www.contentdm.com/).

## (ii) DIGI TOOL

It is a digital asset management system that allows libraries/institutions to create, manage, and preserve online accessible repository material. It has six modules i.e. Resource Discovery, management, Approver, Collection management, deposit and Web-ingest. It support both Google like search and Advance search. It is a powerful, complex, and relatively mature and out of box Institutional Repository platform. This is also called a enterprise solution developed for the management of digital contents in academic environments (http://www.exlibris.group.com/category/Digitooloverview/).

## (iii) VITAL

It was developed by VTLS based fedora architecture which is based on the open source platform in the Year 2004. The main objective of this software is to manage digital assets. The second version of the same software came in to existence in 2005 by Australian Research Repositories. Later, seeing the popularity and its feature it was acquired by Innovative Interfaces in 2014. Some of the well-known feature includes metadata conversion, digtisation of content and customization of web-interfaces etc. (http://www.vtis.com/products/vital).



# (iv) SIRSIDYNIX PORTFOLIO

The popularity of this software can be considered with its 23000 installations across the Globe. It is scalable, robust and offers the complete solution for archival material along with Optical Character Recognition technology and open archiving capabilities. It also give support in the form of training consulting and support staff in the industry. It is a digital asset management software introduced by sirsiDynix(http://www.sirsidynix.com).

## (v) ARCHIVALWARE

Archivalware facilitates the single system to catalogue, search, store, discover and display. It has the capabilities to search multiple repositories at national and International level. It also has the capability to support more than 200 data formats. Further, it also facilitates user defined automated search notifications. It provides solution for organising contents. This combined with the OAI-PMH protocols and Dublin coremetadata scheme enables the harvesting of the contents openly (http://www.ptfs.com/).



Figure 1.3Most Popular repositories at globe level

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# **1.8 PUBLISHING OPTIONS**

It entails maintaining online material and ensuring global accessibility of the content. Full-text content should be able to be published on the platform. It should also have a system for making the contents available around-the-clock and for keeping them safe for a long time, preferably in an open format. Additionally, the platform ought to offer downloadable content and procedures for cutting-edge offline or online workflows including submission management, editing workflow, peer review, etc. When beginning to publish content online, there are a variety of hosting options to take into account, according to OASIS. Following are the most common hosting options:

### (i) Self-Hosting

Among the several hosting options available, self-hosting is popular one. It refers to downloading, installing and managing any software on one's own web server. The control and modifications of the software remains within the control of the owner.

### (ii) Institutional Hosting

Institutional Hosting is also considered as one of the popular publishing option. The repository's managers need not to rely upon the third party. The house data centre can take the responsibility of the maintenance, regular back up and preservation practices of the Institutional repository software.

### (iii) Commercial Hosting

These services completely monitor the entire system of institutional repository. The IR managers should have full control over the workflow of the software e.g. review, editing, publishing and sharing the contents. Usually, open source IR software offers registered service providers on their own to its users.'

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# **1.9 HOSTING SERVICES**

Hosting services are the important aspect in maintaining the Institutional Repositories. The well-known services includes: digital common, Eprint services, Dspace hosting and Dspace direct. They have been discussed one by one.

### (i) **Digital Common**

It is a hosted commercial, institutional repository software that enables institutes to collect, preserve and showcase their scholarly articles. It also offers setup, training, support, documentation, upgrades and hosting to the subscriber (http://digital commons/ Bepress.com/).

### (ii) EPrints Services

It provides host services based on Eprint software and extends its support and consultancy for sites that have their own Eprints repositories. They also provide support in integration of the IR with the external environment (www.eprints.org/services/).

### (iii) **DSpace Hosting**

Dspace hosting also offers the hosting services similar to Digital commons. It includes many registered hosting service providers from all over the world (www.dspace.org/service providers).

### (iv) **DSpace Direct**

It is a hosted repository solution for managing, accessing, archiving and preserving in low cost institutions. D-space direct permits users to easily manage any type of content and made them searchable over internet (http://dspacedirect.org/).

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# 1.10 FUNCTIONAL REQUIRMENTS FOR INSTITUTIONAL REPOSITORIES

An Institutional Repository can provide effective customer services in case it has been using standard hardware, standard software and fulfilling the users/staff requirements. These are some the main tools used to develop an institutional Repository.

### (i) Hardware

Hardware is a physical entity. While selecting a software, to give attention to the hardware of computer system is also necessary. They can be a simple desktop computer workstation or a file server.

### (ii) Software

There are many open source software packages available for running an institutional repository (i.e. D-Space, E-Prints, Fedora, Greenstone, Archimedeetc). Some commercial softwares are Berkeley Electronic Press and Simple DL.

### (iii) Staff Requirement

Under the functional requirement, the role of staff is very important. The developments in ICTs has smartened the library professionals in taking leadership roles in planning and building institutional repositories, as well as fulfilling their role as experts in collecting, describing, preserving and providing. However, staff's requirements vary according to the institution's ambitions for repository.

Some of the main jobs involved in an institutional repository are formulating content policies, advocacy of software and hardware using, user training and a liaison with a wide range of institutional departments and external contacts, technical implementation, customisation and management of repository software, manage metadata fields and quality and creates usage reports while tracking the preservation issues.



## 1.11 STATUS OF INSTITUTIONAL REPOSITORIES IN INDIA

The popularity of Institutional Repositories are increasing day by day due to escalating prices of Information Resources and space crunch. Among the several Institutional Repositories such as Dspace, Eprint, Fedora, Greenstone, Content dm, Digi Tool, VITAL, DXLS, Archivalware, CDS-Invenio etc. United States (US) stands first in the number of Institutional repositories whereas India falls at the 16<sup>th</sup> rank. If we see popularity wise, we find Dspace have the maximum number of Installations with (39%) followed by Eprint with (11%). When we check the same content wise, we find journals Articles are given most priority followed by Theses and Dissertation followed Books, Chapters, Conferences and Workshops for archiving in the repositories.

Institutional Repositories plays a vital role in facilitating better preservation, scholarly output, dissemination of scholarly communication, scholarly communication activities and in reducing the journal monopoly. It acts as a single interface and access point of an institution's intellectual capital. Now days, IR has grown up as a trend for the libraries to organize the scholarly contents and speed up research progress. It's role is also important, as it gives major opportunities to the scholars to share not only peer reviewed articles but also several unpublished raw data which can be called as grey literature, easily lost knowledge, which are most difficult to find and preserve over a long period. Thus, the role of institutional repository is significant as it allows perpetual access to the cumulative collections of the scholarly work.

The popularity and need for Institutional Repositories have increased over the years. India has reached at the 16<sup>th</sup> Rank as per the data held in the Directory of Open access Repositories. Surprisingly, it has left behind some of the developed countries of the world in context of data held in the repositories. In India, some institutions have established open access institutional repositories that disseminate research outputs of respective institutions. Sometimes these are self-archived. Another band of digital repositories also exist in India that stores and provides access to subject specific collection of documents. These repositories accept scholarly publications from any professional or researcher who belong to the respective subject. Librarian's Digital Library (LDL) of Documentation Research and



Training Centre, Bangalore is an example of subject specific repository for the library and information professionals. The figure 1.4 shows the availability of data in OpenDOAR.



**Fig 1.4:** Availability of Data in World Repositories (Open Doar) **Source**: https://v2.sherpa.ac.uk/view/repository\_visualisations/1.html

### **Registry of Open Access Repository (ROAR)**

It is an open access repository registry. By disseminating timely information regarding the expansion and condition of repositories around the Globe, ROAR seeks to advance the growth of open access. It offers details and data on repositories, such as how many records there are, how many are freely available in full text, software, etc. A member of the Eprints.org network is ROAR. As it gives users of the ROAR service a picture of repository use around the world and growth data of the same, ROAR encourages registering all IRs into it. From ROAR, a list of 80 IRs was obtained.

### **Directory of Open Access Repositories (DOAR)**

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DOAR is a reliable listing of academic open access repositories. It includes details about repositories, various forms of content, applications, etc. The worldwide IR details are compiled and recorded therein. A list of Indian IRs are made by compiling the Uniform Resource Locator (URL) and the pertinent information. A total of 64 IRs were obtained in this way. The list includes more than 1200 OA repositories.



# 1.12 SUMMARY

Institutional Repositories are the digital store-house of knowledge. It is considered that the content within the repositories should have authenticity, reliability and easy accessibility. Seeing the changing demand of the users, libraries have to step out to provide effective customer services in the fast changing world by using the tools and technologies Institutional Repositories are one of them in such initiatives. The mentioned figure 1.1 shows



the growth of the directory of open access repositories from December 2005 to August 2022. The chapter discusses in details the need, purpose, advantages and types of Institutional Repositories. These repository softwares are available as open source and proprietary. The well know open source repository softwares are Dspace, Eprint, Fedora and Greenstone whereas the proprietary sofwares are Content dm, VITAL, Digi Tool and Archivalware. It has different publishing options such as self-hostings, Institutional hostings and commercial hostings. Further, the hosting services includes digital commons, Eprint services, Dspacehostings, Dspace direct. United States (US) stands first in the Institutional repository whereas India falls at the 16<sup>th</sup> Rank. If we see popularity wise, we find Dspace have the maximum number of Installations with (39%) followed by Eprint with (11%). When we check the same content wise, we find Journals Articles are given most priority followed by Theses and Dissertation followed Books, Chapters, Conferences and Workshops for archiving in the repositories.

# 1.13 GLOSSARY

- **IR:** Institutional Repositories (IR) are a means to manage and preserve effectively an institution's knowledge base and intellectual assets resulting in the content of institutional repositories expanding beyond e-prints to include e-learning materials.
- **IRS:** These Institutional repositories have not only reduced the problems of space but also they are providing scholarly content in no cost. Now the libraries are using digital library software or institutional repository softwares to conserve and preserve their institution intellectual output in the form of research papers, Faculty contribution etc.
- **OSIRS** Open Source Institutional Repository Softwares are free, Flexible, expandable and downloadable softwares meant for Archives. The source codes for open source software are controlled and managed by a central body. Examples of such softwares are DSpace, EPrints, Fedora, Greenstone.

# 1.14 ANSWERS TO IN-TEXT QUESTIONS

1. Greenstone	4. University of Southampton
2. Digi Tool	5. 21th January 2007
3. 1997	

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# 1.15 SELF-ASSESSMENT QUESTIONS

- 1. Describe Institutional Repository? Discuss open source Institutional Repository Softwares ?
- 2. Define Institutional Repository? Mention the need, purpose, types of Institutional Repositories?
- 3. Discuss the functional requirements and Publishing options available for Institutional Repositories?
- 4. Describe the status of Institutional Repositories in India ?
- 5. Discuss the need and purpose of Institutional Repositories ?
- 6. What are the different Open Source Institutional Repository softwares available and also discuss such Any One ?
- 7. What are the advantages of using Institutional Repository Softwares ?
- 8. What are the different Commercial Institutional Repository softwares available and also discuss such Any One ?

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# **LESSON 1**

# **Types of Networks**

3

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Universit

# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Network and its Components
  - 1.3.1 Message
  - 1.3.2 Sender
  - 1.3.3 Receiver
  - 1.3.4 Transmission Medium
  - 1.3.5 Protocol
- 1.4 Data Representation
  - 1.4.1 Text
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  - 1.5.1 Simplex
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- 1.6 Network Topology
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  - 1.6.5 Hybrid
- 1.7 Categories of Network
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  - 1.7.2 Wide Area Network

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# UNIT – IV: Introduction of Networks

**O** 



- 1.8 Inter-Network
- 1.9 Summary
- 1.10 Glossary
- 1.11 Answers to In-text Questions
- 1.12 Self-Assessment Questions
- 1.13 References
- 1.14 Suggested Readings

# **1.1 LEARNING OBJECTIVES**

- To introduce the concept of Networks
- To learn Types of Networks and its Components
- To identify Network Categories and its Topology
- To know the concepts of LAN Standards and InterNetwork

# **1.2 INTRODUCTION**

We exchange information when we talk to one another. Local or remote sharing are both possible. Local communication takes place face-to-face between people, whereas remote communication happens across space. The word "telecommunication" refers to longdistance communication, which encompasses telephone, telegraphy, and television (tele is Greek for "far").

Information delivered in any format that is accepted by the people that are creating and consuming the data is referred to as data.

Communication of data is the movement of data among the two instruments using either a wired medium or any other technology for example wirless medium.

The instruments which are communicating with each other are able to do this with the combination of hardware and software programs. There are four factors which decides the quality of communication of data among instruments. These are as follows:

- Delivery: Data delivery to the proper location must be ensured by the system. The designated device or user must get the data, and only that device or user.
- Accuracy: The data must be accurately sent by the system. Data that has been tampered with during transmission and is not restored is useless.
- Timeliness: Data must be delivered by the system promptly. Late data delivery is meaningless. When it comes to video and audio, timely delivery entails sending the data as soon as it is created, in the same order, and without any noticeable delays. Real-time transmission is the term for this type of distribution.

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• Jitter: Jitter means the changes in the time of receiving packets. Its a discreate gap in receiving of multimedia packets. For example, it will result in irregular video, if multimedia packets are sent at each 10D milliseconds and if among these some arrives at 10D milliseconds and some arrives at 11D milliseconds

Networks are the means to send and receive data and information from one place to another or from one device to other.

# **1.3 NETWORK AND ITS COMPONENTS**

A group of objects (commonly referred to as nodes) connected by communication links is referred to as a network. A computer, printer, or any other device that can send and/or receive data produced by other nodes on the network qualifies as a node. The majority of networks employ distributed processing, which divides a task across several computers. Separate computers, typically a personal computer or workstation, manage a portion of a process rather than a single massive system handling all of it. There are 5 components in a network:



### 1.3.2 Sender:

Sender is the instrument which sends the multimedia message.

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#### **Receiver:** 1.3.3

Receiver is the instrument in the data communication system which receives the multimedia messages.

#### 1.3.4 **Transmission Medium:**

Transmission medium is the way by which messages are sent from sender to receiver. It can be a physical medium or a wireless one.

### 1.3.5 Protocol:

Exchange of multimedia information among the sender & receiver is taken care by a set of rules known as a protocol. Two instruments may be connected but may be not capable of communication with each other in absence of a protocol, just like a Library staff knowing only Hindi cannot understand a Library user speaking only Bengali.

### **IN-TEXT QUESTIONS**

- 1. List the key qualities that determine how well a data communications system performs.
- 2. Describe the term "jitter".
- 3. Identify which of the following is not a components in a network: a) Protocol b) Sender d) Books
  - c) Receiver
- 4. Sender sends the message to \_
- 5. is set of rules.

### **DATA REPRESENTATION** 1.4

Today, information is available in a variety of multimedia formats. Some of them are described as below:

#### 1.4.1 Text

In transmission of data text is bits in a series or a pattern of bits (Zeros or Ones). Several pattern of bit sets are in place to portray symbols in text. Technique of representing symbols is know as coding and several such sets are called codes. For example in Unicode 32 bits represent character or symbol of any language on the earth. Among this, initial 127 characters are known as Core Latin comprised of ASCII invented in USA.

### 1.4.2 Numbers

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Numbers are also expressed using patterns of Bits. To perform arithmatic calculations easier, instead of expressing in ASCII code these are converted to binary.

### 1.4.3 Images

Images are also visualised using patterns of Bits. Each tiny dot in a image is created using pixels and full image is a web of these pixels in a matrix form. Size of pixels affects the resolution of an image. More the pixels, better will be the resolution of the image created.

In a picture each pixels are separated singly and provided a pattern of bit. Using a Ibit pattern, an image or a checkerboard can be represented using white and black dots.

To represent a grey scale in a image if its neither full black or full white pixels by expanding the pattern of bits. For example patterns of 2 Bits can be used to create 4 levels of grayscales. 00 can display black pixel, 11 for white and 01, 10 for light grey pixels.

RGB (Red, Green and Blue) technology is used to represent color images by several permutation and combination of these 3 primary colors.Further 3 more colors yellow, cyan and magenta is mixed to create additional colors. This technique is known as YCM.

### 1.4.4 Audio

Audio is different from the previously discussed data patterns. Any sound or music is known as audio. It is a series of patterns not a discreate one.

### 1.4.5 Video

Video is a movie or a picture with illusion of motion by combining several discreate pictures. A video can be changed to a analogue or digital signal.

### **IN-TEXT QUESTIONS**

- 6. Text is expressed as a bit pattern. True / False
- 7. The first 127 characters of Unicode, generally known as
- 8. An image is made up of a matrix of pixels, or "picture elements," where each pixel is a
  - a) bits

b) unicoded) signal

- c) tiny dots9. In RGB, R stands for \_
- 10. A picture or movie that has been recorded or aired is referred to as

# 1.5 DATA FLOW

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Communication of Data among two entities can be of three types, such as simplex, half-duplex, or full-duplex.

### 1.5.1 Simplex

In Simplex mode of communication the data flows in a single direction similar to the one traffic on a road. The 2 instruments in a Simplex communication either can send or receive data. Example of this communication can be keyboards or a normal display.



### Fig 1.5.1: Simplex mode

### 1.5.2 Half Duplex

Each station can send and receive in half-duplex mode, but not simultaneously. Both devices can only receive when one is broadcasting, and vice versa. The half-duplex form is comparable to a one-lane route with two-way traffic. Vehicles heading the other way must pause while those driving in one way are moving. In a half-duplex transmission, whichever of the two devices is sending at the moment consumes the entire bandwidth of a channel. Half-duplex systems are what walkie-talkies and CB (citizens band) radios use.

When communication cannot take place in both ways at once and the channel's full capacity can be utilised in either direction, half-duplex mode is used.

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### Fig 1.5.2: Half-duplex mode

## 1.5.3 Full Duplex

Full-duplex mode, often known as duplex, allows both stations to send and receive at the same time. Similar to Full duplex mode is like a road with traffic flow in both directions. There are two feasible ways for this sharing to happen: either the connection requires two seperate physical medium, first for sending and the other for receiving or the signals moving in physical medium in both directions. The telephone network is a typical illustration of full-duplex communication. Both parties can speak and listen to each other while using a telephone line to communicate. When constant communication in both directions is needed, the full-duplex mode is employed. But the channel's capacity needs to be split between the two directions.





# 1.6 NETWORK TOPOLOGY

The physical and logical configuration of a network's nodes and links is known as its topology. Devices like switches, routers, and software with switch and router functionality are typically included in nodes. A graph is a common way to represent network topologies. A link connects two or more devices, and a topology is formed by two or more links. The geometric depiction of a network's topology shows how all of the links and connecting elements (often referred to as nodes) relate to one another. Some of the possible topologies are: Bus, Ring, Mesh, Star and Hybrid.

### 1.6.1 Mesh Topology

Each instruments in a mesh topology are connected to other instruments dedicately. Dedicated, link means it send and receives the data among themselves exclusively using links.



Fig 1.6.1: Mesh Topology

Compared to other network topologies, a mesh has a number of benefits. Firstly, commited connections make sure it can withstand its own load of data, thus avoiding any possible congestion in traffic which may happen if connections are used by other instruments.

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A mesh topology is also reliable. The system is not rendered unusable if just one link breaks. The benefit of security or privacy comes in third. The only person who sees a message when it is sent through a dedicated line is the intended receiver. Physical restrictions keep other users from accessing messages.

Finally, fault isolation and fault identification are made simple by point-to-point connectivity. Traffic can be rerouted to avoid links that might have issues. This feature allows the network controller to locate the fault precisely and assists in determining its source and fix.

The main drawbacks of a mesh are linked to the number of required cabling and I/O ports. Designing, installing and trouble-shooting is a difficult task in a mesh toplogy because each nodes need to be linked to other nodes in a network. Secondly, the volume of wire is also a challenging to manage in available physical space. Lastly, it will be a expensive affair to connect each devices in the network.

A mesh topology, due to these reasons are deployed in finite scenarios like mainstay linking the core devices of a hybrid network which can withstand several topologies.

The interconnection of telephone regional offices, where each regional office must be linked to every other field office, is a real-world example of a mesh topology.

### 1.6.2 Star Topology

In a Star topology, each instrument is connected to the hub, which is a central controller in the network topology for star. There is no direct connection between the devices. A star topology does not provide direct traffic between devices, in contrast to a mesh topology. For communicating an information to another node on a star topology, first a node has to send the information to the central controller then after receiving, it transmits the information to desired node in a star topology.



Fig 1.6.2: Star Topology

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The tariff for implementing the Star topology is less than mesh topology. Each node in this topology needs single connection and single input-output port to link to several other nodes. It is also simple to install and adjust due to this aspect. The hub and that device only need to be connected for additions, moves, and deletions, thus much less wiring needs to be housed.

Robustness is one of the benefits. Only one link is impacted if it fails. The other links are still live. This element also makes fault isolation and fault identification simple.

The hub can be used to track link issues and avoid broken links as long as it is operational.

The vulnerability of this topology is its dependance on the central point hub, if the hub is falied then full system will stop functioning.

This topology rquires much less cables as compared to the mesh topology, only it needs to be connected to central hub. Because of this, a star topology frequently requires more cabling than some other designs (such as ring or bus).

Local-area networks (LANs) use the star topology. High-speed LANs frequently use a star architecture with a central hub.

## **1.6.3** Bus Topology

The topology of a bus is multipoint. The backbone of a network is made up of a single, lengthy connection that connects every device.

Drop lines and taps are used to connect nodes to the bus cable. A connection between the gadget and the main cable is known as a drop line. A tap is a connector that makes a connection with the metallic core of a cable by either splicing into the main cable or cutting through the cable's wrapping.



### Fig 1.6.3: Bus Topology

Some of the energy of a signal is converted into heat as it moves along the backbone. As a result, as it moves farther and farther, it gets weaker and weaker. Because of this, there are restrictions on the quantity of taps and the spacing between them that a bus can sustain. A

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bus topology has the benefit of being simple to implement. The most effective route for laying backbone cable can be chosen, and drop lines of various lengths can be used to connect it to the nodes. This topology rquires much fewer wires as compared to the star or mesh topology in this way. For example, five network devices in the same premises in a star topology needs five sets of cable to connect them to the central node. This redundancy is removed in a bus. Only the backbone wire traverses the entire construction. Each drop line simply needs to extend as far as the spine's closest point.

The inability to quickly reconnect and the isolation of faults are drawbacks. Typically, a bus is built to be installed as efficiently as possible. Therefore, adding more devices may be challenging. Quality reduction may result from signal reflection at the taps. Degradation can be reduced by controlling the proximity and reducing the volume of instruments linked to a provided extent of a wire. The backbone might consequently need to be changed or replaced in order to accommodate additional devices. Additionally, even communication between equipment on the same side of the issue is halted by a failure or break in the bus cable. Noise is produced in both directions as a result of the damaged area reflecting signals back to the start of origin.

Bus topologies are the first among the making of LANs. Bus topologies can be used in Ethernet LANs, but they are less common today.

### 1.6.4 Ring Topology

In a ring topology, every instrument has separate dedicated connectivity with other two instruments on left and right directions. From one device to the next, along the ring, a signal is transmitted in a single direction until it reaches its target. Each component of the ring contains a repeater. A device's repeater regenerates the bits and sends them on when it receives a signal meant for another device.



Fig 1.6.4: Ring Topology

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Installing and rearranging a ring is not that difficult. Only the devices that are right next to one other are connected (either physically or logically). Adding or removing a device simply requires two connections to be changed. Fault rectification is easier but it has disadvantage in extent of the cable and volume of instruments that can be connected in a ring.

The network data flow in single direction is a bottleneck and a damage in the ring may lead to full breakdown of the network. The use of a dual ring or a switch that can close off the break will address this vulnerability.

When IBM released its local-area network Token Ring, ring topologies were common. Today, this topology is less common due to the demand for faster LANs.

### 1.6.5 Hybrid Topology

In a hybrid topology, the prime controller will be a star topology and each arm connecting to several nodes.



Today, local-area networks and wide-area networks are the two main types of networks that are commonly mentioned. A network's size determines which category it belongs in. A WAN can be global, but a LAN typically covers an area of less than 2 metres. Middle-sized networks, which often cover tens of miles, are known as metropolitan area networks.

### 1.7.1 Local Area Network (LAN)



A local area network (LAN), is a network that links the nodes to the instruments in a individual building or office. A LAN can be as basic as two PCs and a printer in someone's home office, or it might stretch throughout an entire corporation and include audio and video peripherals, depending on the demands of an organisation and the sort of technology utilised. LAN size is currently restricted to a few kilometres.

Resources can be exchanged between workstations or personal computers thanks to local area networks (LANs). Hardware, software, or data are examples of the resources that can be shared. A typical LAN example is a workgroup of task-related computers, such as engineering terminals or financial Computers, that are connected in many company situations. One of the computers might get a large capacity disc drive and end up serving clients as a server. On this central server, software can be kept and used as needed by the entire team. In this example, licencing constraints on the number of consumers per copy of software or restrictions on the number of users licenced to access the operating system may dictate the size of the LAN.

### **1.7.2** Wide Area Network (WAN)

A WAN allows long range multimedia transmissions. The end systems are connected by the switched WAN, which is often a router (an internetworking connecting device) that is connected to another LAN or WAN. A home computer or a small LAN is typically connected to an Internet service provider via a line that is leased from a provider (ISP). Access to the Internet is frequently provided using this kind of WAN.

## **1.8 INTER-NETWORK**

These days, it is quite uncommon to see a LAN, MAN, or LAN operating independently; they are all interconnected. An internetwork or internet is created when two or more networks are linked together.

Consider the situation when a company has two locations, one in the Delhi and one on the Kolkata. The freshly opened Delhi office has a star topology LAN, while the long-standing Kolkata office has a bus topology LAN. The company's owner, who resides somewhere in the middle, must manage the business from her residence. A switched WAN (run by a service provider like a telecom company) has been leased to connect these three entities (two LANs and the president's PC) as a backbone WAN. But three point-to-point WANs are required to link the LANs to this switched WAN. These point-to-point WANs can be either a cable modern connection or a high-speed DSL line provided by a telephone company or cable TV provider.

# 1.9 SUMMARY

A network along with its five key components like Sender, message, transmission medium, protocol and receiver enables communication among the machines.

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Further we also learnt about the variety of formats (multimedia) of data representation used in data trasmission. This flow of data happens in any of three ways such as simplex, halfduplex, or full-duplex.

There are various physical and logical configuration of a network's nodes and links known as network topologies. Based on requiremnts these are used one of them or combinations of them. LAN and WAN are the two main types of networks that are commonly mentioned. A WAN can be global, but a LAN typically covers an area of less than 2 metres. Now a days, it is quite uncommon to see a LAN, MAN, or LAN operating independently; they are all interconnected.

# 1.10 GLOSSARY

**Network:** A group of objects (commonly referred to as nodes) connected by communication links is referred to as a network.

**Simplex mode:** The two devices connected by a link can each send, but the other can only receive.

Half Duplex mode: The two devices can only receive when one is broadcasting, and vice versa.

Full-duplex mode: It allows both devices to send and receive at the same time.

Network Topology: The physical and logical configuration of a network's nodes and links.

# 1.11 ANSWERS TO IN-TEXT QUESTIONS

1. Delivery, Accuracy, Timeliness and Jitter	9. Red		
2. The variance in packet arrival times	10. Video		
3. d) Books			
4. Receiver			
5. Protocol			
6. True			
7. Basic Latin			
8. c) tiny dots			
1.12 SELF-ASSESSMENT QUESTIONS			

- 1. Discussion various types of network topology with their advantages and disadvantage.
- 2. What are the three different modes of Data communication among two devices.

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- 3. "Information is available in a variety of formats, including text, characters, numbers, photos, audio, and video". Explain each of these.
- 4. Explain five components of Data Communication in a Network.

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# LESSON 2

# WIRELESS NETWORKING AND EMERGING NETWORKING TECHNOLOGIES

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Universit

## STRUCTURE

- 2.1 Learning Objectives
- 2.2 Introduction
- 2.3 Wireless Networks
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  - 2.3.2 Microwave
  - 2.3.3 Infrared
- 2.4 Types of Wireless Networks
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# 2.1 LEARNING OBJECTIVES

- To learn about Wireless Networking
- To explore broad groups of wireless transmission
- To understand various types of wireless networks

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• To know about Bluetooth technology

## 2.2 INTRODUCTION

Electromagnetic waves are transported through unguided media without the use of a physical conductor. Wireless communication is a common name for this kind of communication. Signals are typically broadcast via open space, making them accessible to anyone with a device that can pick them up.

Unguided signals can move from their source to their destination in a number of methods, including line-of-sight, sky, and ground propagation. Radio waves hug the earth during ground propagation as they pass through the lowest layer of the atmosphere. From the transmitting antenna, these low-frequency signals radiate in all directions and follow the inclination of the earth. The stronger the signal, larger the distance and it is dependent on signal power. In sky propagation, higher-frequency radio waves radiate upward into the ionosphere (the layer of atmosphere where particles exist as ions) where they are reflected back to earth. This type of transmission allows for greater distances with lower output power. In line-or-sight propagation, very high-frequency signals are transmitted in straight lines directly from antenna to antenna. Antennas must be directional, facing each other, and either tall enough or close enough together not to be affected by the curvature of the earth. Line-of-sight propagation is ticky because radio transmissions cannot be completely focused.

## 2.3 WIRELESS NETWORKS

Wireless networks are computer networks that are not wired together. The majority of the times, radio waves are used for communication between network nodes. They enable network connections for devices as they are moving throughout the network's coverage area.

Wireless networks require wireless transmission of data in the form of signals. There are three broad groups of wireless transmission: radio waves, microwaves, and infrared waves.

#### 2.3.1 Radio waves:

While there isn't a definite line that separates radio waves from microwaves, electromagnetic waves with frequencies around 3 kHz and 1 GHz are typically referred to as radio waves, while those with frequencies around 1 and 300 GHz are referred to as microwaves. However, a better classification criterion is the way the waves behave rather than their frequency.

Radio waves spread out in all directions when they are sent by an antenna. Thus, it is not necessary to align the transmitting and receiving antennas. Any receiving antenna can pick up the waves that a sending antenna sends. Additionally, the all around characteristic has a drawback.



#### 2.3.2 Microwave:

Microwaves are electromagnetic waves with frequency between 1 and 300 GHz.

Microwaves have only one direction. Microwave waves can be precisely focussed when they are transmitted by an antenna. Thus, it is necessary to align the sending and receiving antennas. Unambiguously, the unidirectional attribute offers benefits. An antenna pair can be oriented without affecting another antenna pair that is also aligned.

#### 2.3.3 Infrared:

For short-range communication, infrared radiation with frequencies ranging from 300 GHz to 400 THz can be employed. Infrared waves cannot pass through walls because of their high frequency. This beneficial feature prevents system interference; a short-range connectivity in one room cannot be impacted by another system in the adjacent room. We don't obstruct our neighbours' usage of their infrared remote controls when we use ours. The same quality, meanwhile, renders infrared signals worthless for long-distance communication. Additionally, since the sunrays contain infrared radiation that may interfere with communication, we are unable to use infrared waves outside of a building.

#### **IN-TEXT QUESTIONS**

- 1. \_\_\_\_\_\_ are transported through unguided media without the use of a physical conductor.
- 2. There are three broad groups of wireless transmission radio waves, \_\_\_\_\_, and infrared waves
- 3. Microwaves are electromagnetic waves with frequency between 1 and 300 GHz. True/False
- 4. Microwaves have only \_\_\_\_\_direction.
- 5. Infrared waves cannot pass through walls because of their

# 2.4 TYPES OF WIRELESS NETWORKS

Based on the distance and area wireless networks serve, this is of mainly three types as described:

#### 2.4.1 Wireless LANs

It uses wireless distribution techniques to link two or more network devices.

#### 2.4.2 Wireless MANs

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Interconnects two or more wireless LANs that are dispersed around a city.

#### 2.4.3 Wireless WANs

Joins together vast areas made up of LANs, MANs, and personal networks.

## 2.5 BENEFITS OF WIRELESS NETWORKS

- Due to the lack of wires and cords, it offers uncluttered desks.
- Since the devices are not required to be connected to one another, it enhances the movement of network devices linked to the system.
- Since there is no need to lay out wires, connecting network components from anywhere within the network's scope or a Wi-Fi hotspot becomes easy.
- Wireless network design and installation are simpler.
- Since products don't need to be linked to the existing configuration, they can be readily connected to it. As a result, wireless networks are very scalable.
- Very few or no wires are needed for wireless networks. As a result, it lowers hardware and installation expenses.

# 2.6 EMERGING NETWORKING TECHNOLOGIES

One of the technologies with the quickest growth is wireless communication. There is an increasing need everywhere for devices to connect without cords. University campuses, Library buildings, and other public spaces all have wireless LANs.

IEEE 802.11 wireless LANs, often known as wireless Ethernet, and Bluetooth, a technology for tiny wireless LANs, are the two promising wireless LAN technologies. While both protocols require a number of levels to function, we primarily focus on the physical and data link layers.

## 2.6.1 Wireless LAN

The IEEE 802.11 standard contains the standards for a wireless LAN. A WLAN is a sort of Local Area Network (LAN) that communicates and transmits data using high frequency **radio waves** as opposed to wires. It is a versatile data transmission technology that can be used in place of or as an addition to a wired LAN.

#### Advantages of WLAN

- Productivity Gains It offers "untethered" network and Internet connectivity.
- Fast and easy network setup installing devices does not require the use of cables.
- Deployment Versatility They enable transient setup and removal and can be deployed in locations where wires cannot.
- Reduced installation expenses WLAN reduces installation cost

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• Scalability - It is easy to expand and reconfigure the WLAN than the wired network.

#### Application of Radio waves in Libraries

Wirless technology like Radio Frequency Identification (RFID) makes the life easier of Library staffs, Patrons and saves money of the Parent organisation. An RFID system, in its most basic form, consists of two components: a reader & a tag. The reader retrieves the information present in the RFID tag and transmits it to desired system for further processing.

Inside the RFID Tag there is a microchip which stores the information feed into the chip and an antenna for transmitting the information. This tag is protected in the form of stickers and is pasted on Library documents.

These tags used in Libraries are passive tags which doesnot have any power source. The power required to operate them is obtained from the RFID Reader.

A Library which is equipped with RFID system for automation normally has RFID readers at the circulation desk or Self checkout kiosks and in the security gate placed near the Library entrance or Exit point. These RFID gates or the Reader searches for the RFID Tag and whenever a tag arrives into its signal range it responds with the stored information on the tag. If the Library Patron is checking out Reader sends the received information from the Tags to the Library management software.

RFID technology also helps in this way in stock verification of the Library, in this case Library staff uses hand-held reader to communicate with the RFID Tags.

#### 2.6.2 Bluetooth

Bluetooth is a wireless LAN solution created to link various types of devices, including phones, laptops, computers, cameras, printers, and more. A Bluetooth LAN is an ad hoc network, meaning that it forms on its own as the devices, also known as gadgets, locate one another and establish a network known as a piconet. If one of the devices supports it, a Bluetooth LAN can potentially be linked to the Internet. By definition, a Bluetooth LAN cannot be very big. There is chaos if several devices attempt to connect.

The uses of Bluetooth technology are numerous. The computer can communicate with peripheral devices using this technique. Using this technology, security devices for libraries can link various sensors to the main security controller. At a conference, participants can sync their laptop computers.

The Ericsson Company first developed Bluetooth as a project. It bears the name of Harald Blaatand, the Danish king who united Norway and Denmark (940–981). The English translation of Blaatand is Bluetooth.



The IEEE 802.15 standard defines a protocol, and Bluetooth innovation is the application of that protocol today. A wireless personal-area network (PAN) that can operate in a space the size of a room or a hallway is described by the standard.

#### **Application of Bluetooth in Libraries**

Beacons, also known as Bluetooth low power vivinity detecting devices, are a kind of devices that may send information and alert other Bluetooth devices to their existence.

Although the sector is expected to grow as this technology is used more frequently, one of the most widely accessible versions is Apple's iBeacon technology.

The only purpose of a beacon is to continuously send a little amount of data. According to the related programme that the Library Patron has installed, when devices are close to this broadcast, it causes them to take certain activities.

Beacons were utilised by the Boston Athenaeum, an autonomous subscription library in Boston, to direct Library users to more resources in a exhibit. Contrarily, the Orange County Library System in Orlando gives Library users the option to sign up for customised event notifications depending on the locations in the library they frequently visit. The library is able to "educate usersrelated to their interests" thanks to BluuBeam, a beacon-based mobile app startup that works with libraries. Another library-specific app being developed by Capira Technologies interface with an institution's information management system (ILS) and send users personalised updates as they travel through the library, such as reminders to pick up or renew things.

## **IN-TEXT QUESTIONS**

- 6. IEEE 802.11 wireless LANs, often known as \_
- 7. The different types of Wireless Networks are Wireless
- 8. "Wireless network design and installation are simpler". True or False
- 9. PAN stands for \_\_\_\_\_
- 10. "The Ericsson Company first developed Bluetooth as a project." True or False

# 2.7 SUMMARY

Line-of-sight, sky, and ground propagation all play a role in the transmission of wireless data. Radio waves, microwave waves, and infrared waves are all examples of wireless waves. Microwaves have a single direction, but radio waves are omnidirectional.

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# UNIT – IV: Introduction of Networks



Satellite, wireless LAN, and cellular telephone communications all employ microwaves. Short-range connections, such those between a Computer and an external devices, employ infrared wavelengths. It can be utilised for domestic LANs as well. IEEE 802.11 wireless LANs, often known as wireless Ethernet, and Bluetooth, a technology for tiny wireless LANs, are the two promising wireless LAN technologies. A particular fraction of devices (referred to as gadgets) can be connected using Bluetooth, a wireless LAN technique.

# 2.8 GLOSSARY

Wireless networks: These are computer networks that are not wired together.

Radio Waves: Waves between 3 kHz and 1 GHz are typically referred to as radio waves.

Microwaves: These are electromagnetic waves with frequency between 1 and 300 GHz.

# 2.9 ANSWERS TO IN-TEXT QUESTIONS

1. Electromagnetic waves	6. wireless Ethernet
2. microwaves	7. LAN, MAN, WAN
3. True	8. True
4. one	9. personal-area network
5. high frequency	10. True

# 2.10 SELF-ASSESSMENT QUESTIONS

- 1. Write a brief note on Wireless communication.
- 2. Explain Wireless networks and its types.
- 3. Discuss broad groups of wireless network transmission.
- 4. What are the benefits of Wireless networks over wired network?
- 5. "Bluetooth technology". Discuss some of its implementations in Libraries.

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# **UNIT-IV**

# INTRODUCTION OF NETWORKS: ISDN, DSL AND ATM

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# STRUCTURE

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- 1.2 Introduction
- 1.3 Digital Subscriber Line (DSL)
  - 1.3.1 ADSL
  - 1.3.2 ADSL Lite
  - 1.3.3 HDSL
  - 1.3.4 SDSL
  - 1.3.5 VDSL
- 1.4 Intergrated Services Didital Network (ISDN)
  - 1.4.1 Hardware needed for ISDN
- 1.5 Asynchronous Transfer Mode (ATM)
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- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

# 1.1 LEARNING OBJECTIVES

After going through this unit, you should be able to know:

- The Digital Subscriber Line (DSL)
- Understand the Intergrated Services Didital Network (ISDN)

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- Functions of Asynchronous Transfer Mode (ATM)
- Understanding of ADSL, HDSL, and VDSL
- Detail Description of accomplishing communications over phone lines in digital form

## **1.2 INTRODUCTION**

Telephone companies created DSL as a new technology to offer higher-speed Internet access after older modems reached their maximum data rate. One of the most promising technologies for supporting high-speed digital communication over the current local loops is digital subscriber line (DSL). The user can conduct digital conversations over phone lines thanks to the ISDN line. The advantages of ISDN include speedy dial-up, rates that are four times faster than those of V.34 modems, the capacity to load and download huge files quickly and easily, and the usage of several PPP connections at once for voice, fax, video, and data transmission. The most well-known end-to-end networking option is probably asynchronous transfer mode (ATM) networks.

The DSL and its different variants are presented in section 1.3. Section 1.4 goes into great detail about the ISDN. In section 1.5, an illustration of the ATM's operation is shown.

# **1.3 DIGITAL SUBSCRIBER LINE (DSL)**

Voice communication was the original purpose for which telephone networks were developed. The dial-up modem was developed as a result of the necessity to transmit digital data. High-speed downloading and uploading became necessary with the development of the Internet since the modem was simply too sluggish. The digital subscriber line is a new technology that the telephone companies have implemented (DSL). Despite the fact that dial-up modems are still widely used throughout the world, DSL offers substantially faster access to the Internet via the telephone network.

Telephone companies created DSL as a new technology to offer higher-speed Internet access after older modems reached their maximum data rate. One of the most promising technologies for supporting high-speed digital communication over the current local loops is digital subscriber line (DSL). A group of technologies known as DSL are distinguished by the first letter in their names (ADSL, VDSL, HDSL, and SDSL). It's common to refer to the set as xDSL, where x might stand in for A, V, H, or S.

#### 1.3.1 ADSL:

Asymmetric DSL is the first technology in the group (ADSL). Similar to a 56K modem, ADSL offers a faster downstream bit rate than an upstream bit rate (from the residence to the Internet) (from the resident to the Internet). It is called asymmetric for this reason. The inventors of ADSL purposely divided the local loop's available bandwidth



unevenly for residential customers, unlike the asymmetry in 56K modems. Business customers who require a lot of bandwidth in both ways cannot use the service.

It is not appropriate for usage by enterprises; ADSL is an asymmetric communication technology intended for residential consumers.

#### **Using Existing Local Loops**

It's noteworthy to note that ADSL makes use of the current local loops. But how does ADSL manage to transmit data at a rate that was never possible with conventional modems? The twisted-pair local loop can handle bandwidths of up to 1.1 MHz, but a filter installed at the telephone company's end office, where each local loop ends, limits the bandwidth to 4 kHz (sufficient for voice communication). However, removing the filter makes the entire 1.1 MHz open for speech and data communications.

#### **Adaptive Technology**

It's noteworthy to note that ADSL makes use of the current local loops. But how does ADSL manage to transmit data at a rate that was never possible with conventional modems? The twisted-pair local loop can handle bandwidths of up to 1.1 MHz, but a filter installed at the telephone company's end office, where each local loop ends, limits the bandwidth to 4 kHz (sufficient for voice communication). However, removing the filter makes the entire 1.1 MHz open for speech and data communications.

#### **Discrete Multitone Technique**

The discrete multitone technique (DMT), which combines QAM and FDM, is the modulation method that has become the industry standard for ADSL. The way a system divides its bandwidth is not predetermined. The way that each system divides its bandwidth is up to it. Normally, 256 channels are created using the 1.104 MHz of available bandwidth.

#### **Customer Site: ADSL Modem**

A splitter that divides voice and data traffic is connected to the local loop. The downstream and upstream channels are created by the ADSL modem, which also modulates and demodulates the data using DMT. Keep in mind that the splitter must be installed on the customer's property, typically by a telephone company employee. The voice connection can utilise the home's existing telephone cabling, but a professional installation is required for the data line. All of this raises the cost of the ADSL line. We'll see that Universal ADSL is an alternate technology (or ADSL Lite).

#### **Telephone Company Site: DSLAM**

On the telephone company's property, things are different. A digital subscriber line access multiplexer (DSLAM), which performs identical tasks, is installed in place of an ADSL modem. It also packetizes the data before sending it over the Internet (ISP server).



#### 1.3.2 ADSL Lite:

Most subscribers would be discouraged by the cost and practicality of installing splitters at the premises' edges and installing additional data line wiring. For these subscribers, a new variant of ADSL technology known as ADSL Lite (also known as Universal ADSL or Splitterless ADSL) is offered. With the use of this technology, an ASDL Lite modem can be directly inserted into a phone jack and linked to a computer. The telephone company handles the dividing. 256 DMT carriers with an 8-bit modulation are used in ADSL Lite. (as opposed to 15-bit). However, due to the possibility of mistakes from the spoken signal mixing with them, some of the carriers might not be available. It can deliver upstream data at 512 kbps and downstream data at a maximum of 1.5 Mbps.

As a replacement for the T-line, the high-bit-rate digital subscriber line (HDSL) was created (1.544 Mbps). Alternate Mark Inversion (AMI) encoding, which is used by the T-lline, is highly prone to attenuation at high frequencies. As a result, a T-l line can only be 3200 feet long (1 km). A repeater is required for larger distances, which results in higher prices.

The 2B1Q encoding used by HDSL is less prone to attenuation. Without repeaters, a data rate of 1.544 Mbps (sometimes up to 2 Mbps) can be reached up to a distance of 12,000 ft (3.86 km). Full-duplex transmission is made possible by HDSL using two twisted pairs, one pair in each direction.

1.3.4 SDSL:

The HDSL is available in one twisted-pair form as the symmetric digital subscriber line (SDSL). It offers symmetric full-duplex communication with up to 768 kbps in each direction. The symmetric connectivity offered by SDSL makes it a viable substitute for ADSL. With a downstream bit rate that is significantly higher than the upstream bit rate, ADSL offers asymmetric communication. Although the majority of residential users can benefit from this service, it is not appropriate for enterprises that send and receive huge amounts of data back and forth.

#### 1.3.5 VDSL:

Coaxial, fiber-optic, or twisted-pair cable is used for short distances in the alternative method known as very high-bit-rate digital subscriber line (VDSL), which is comparable to ADSL. DMT is the modulating method. For upstream communication at ranges of three thousand to ten thousand feet, it offers a variety of bit rates (25 to 55 Mbps). The typical downstream speed is 3.2 Mbps.

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### **IN-TEXT QUESTIONS**

- 1. Technologies such as DSL and cable modem are called narrowband technologies (True/False)
- 2. The least common type of DSL in use today is Asymmetric DSL (True/False)

# 1.4 ISDN

Intergrated Services Digital Network is referred to as ISDN. The user can conduct digital conversations over phone lines thanks to the ISDN line. The advantages of ISDN include speedy dial-up, rates that are four times faster than those of V.34 modems, the capacity to load and download huge files quickly and easily, and the usage of several PPP connections at once for voice, fax, video, and data transmission. Data transmission speeds are at 128 Kbps when two data transmission lines are used in the system! Lack of hardware and compression standards is one of the issues with ISDN. Data transfer, which might vary in speed from 56 Kbps to 128 Kbps, is another issue.

The process of acquiring a line could be a little challenging due to the large variety of hardware models, applications, and goals that digital ISDN communication can serve. Nearly no one gets only one B channel, which functions somewhat like a phone line. The pricing actually substantially favour what is known as an ISDN BRI (Basic Rate ISDN). Two B channels and one D channel make up a BRI. Depending on the gear you have or what you want to achieve, your other B may be a voice, a circuit, or both. Voice conversations typically use voice B's (ie. regular phone calls). High speed data typically uses CircuitB's (ie. Internet access). To call your ISDN line, dial the D channel (dial tone and dial up.)

The term "Primary Rate Interface" refers to another ISDN line (PRI). This operates over the same physical interface as T1 inside of North America and Japan and consists of 24 channels, which are often split into 23 B channels and 1 D channel. The PRI is based on the E1 interface and features 31 user channels, which are typically split into 30 B channels and 1 D channel outside of these locations. It is frequently employed for connections between a PBX (private branch exchange, a telephone exchange run by a telephone company's client) and a CO (telephone company's central office) or IXC (inter exchange carrier, a long distance telephone company).

#### How it is possible to get 128Kbps. (NT-1)

Under some conditions, connecting two circuits B simultaneously to two more circuits B will result in data speeds of 128Kbps. ISDN requires a unique piece of equipment called an NT-1, with NT standing for Network Terminator, unlike your standard phone line.

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The NT-1 is a consumer product sold in the United States and typically comes in two varieties: internal and external. Small devices called ExternalNT-1s attach to the wall socket using a thicker phone line. They often have many jacks and cost between \$200 and \$300. The benefit of externals is that adding more devices to your ISDN lines is simple. This is equivalent to using a single phone line to share two phones across the house. The NT-1 is pre-built in the majority of ISDN devices for convenience and some financial savings. For these reasons, manufacturers typically suggest ISDN routers and modems with integrated NT-1s. However, you must make this decision in advance if you intend to grow. Fortunately, internal or external NT-1s are now available as an option on the majority of ISDN equipment brands, typically costing \$100 more.

There are several different types of external NT-1s available if you decide to buy one. Inquire about your alternatives and pricing with the salesman. NT-1s are interchangeable between items made by some hardware manufacturers and those who don't. In general, if all you need is high-speed Internet access and will connect is a single computer or network, you buy an internal NT-1.

#### How a Network Terminator is used.

An NT1 (network termination 1) device at the customer's location terminates the U-loop. The NT1 drives a S/T-bus, which typically has four wires but occasionally may have six or eight. When the regular power fails, the extra lines are utilised to supply electricity to run the telephones in these optional situations. Alternatively, "phantom" power could come from the conventional four lines. Outside of North America, emergency mode operation only supplies energy for fundamental voice service in the event of a local power outage. The NT1 can receive up to 1.2W from the central office when it is operating in emergency mode. There is no provision for emergency mode functioning in North America.

# More about BRI's. The length of wiring makes a big difference.

Two 64K bearer ("B") channels and one delta ("D") channel make up a Basic Rate Interface (BRI). The D channel is utilised for signalling and/or X.25 packet networking, whereas the B channels are used for audio or data. This kind is the one that is most likely to be offered to residential customers. Two conductors connect the CO (central office) of the telephone company to the customer's location in an ISDN BRI U-Loop. It may extend as far as 5.5 kilometres (18000 ft). Due to the U loop's length and the noisy environment it functions in, the equipment on both sides of the loop needs to be properly built.

# S/T Bus connections and Long Distance carriers.

The letters used in the ISDN standards to denote two reference points, S and T, gave rise to the name of the S/T bus. The connection between the NT1 device and customer-supplied equipment is referred to as Point T. Terminals may connect to NT1 directly at point T, or a PBX may be present (private branch exchange, i.e. a customer-owned telephone exchange). Point S describes the link between the PBX and the terminal when a PBX is present. Be aware that "terminal" in ISDN nomenclature refers to any type of end-user ISDN equipment,



including dataterminals, phones, FAX machines, etc. When they have the right interface hardware and software, phones and fax machines can be connected to the BRI.

# T Bus (Passive Bus) Information.

In this setup, the T bus functions as a multipoint bus. Because there are no repeaters on the connection connecting the NT1 and the devices, it is occasionally referred to as the passive bus. The same cable and connectors as those used in 10 base T Ethernet can be used to deploy it (Networks). The S/T bus can support up to 8 devices. It is a bus, not a star, therefore the bus can be constructed using splitters and T connections. The one to eight devices that are connected to the two B channels are managed by the D channel. No more than one device can simultaneously attach to a given B channel.

## Why a NT-1.

The main purpose of the NT in this arrangement is to give many devices access to the two B channels offered by the ISDNBRI. For instance, you might connect an ISDN computer interface, an ISDN fax machine, and an ISDN phone to the BRI. Each device has the ability to listen for calls, but it can only join a B channel when it discovers a message asking for a service it can offer.

Residental ISDN Connection



**Fig 1.1:** ISDN (*Source:* Tanenbaum, A. S. (1996). Computer networks. Upper Saddle River, N.J: Prentice Hall PTR)

#### The NT1 also performs other functions.

The communication protocol used by the NT1 and the other devices is a crucial component of the channel sharing scheme, which is only partially implemented by the NT1. The NT1 also performs other tasks, such as converting the bit encoding technique used on the U loop—the line between it and the phone company—to the encoding used on the lines



between it and the devices. In contrast to the NT to telephone company encoding, which was created to facilitate transmission over long distances with no sharing, the device to NT encoding was created to permit channel sharing.

#### **Termianl Adapters**

These channels can be converted to fit current terminal equipment standards like RS-232 and V.35 using equipment called as a Terminal Adapter (TA). Typically, this equipment is housed in a similar manner to modems, either as standalone devices or as interface cards that connect to various types of communications equipment like computers (such as routers or PBXs). TAs replace the modem; they do not interact with it.

In some circumstances, it may not be necessary to simulate or interface to existing terminal equipment because such equipment is already in place and has a synchronous interface. In such circumstances, high-speed synchronous connections to the B channels can be provided by independent devices or computer interfaces without switching to an asynchronous standard.

## Bridges.

Using the ISDN channel to carry the data, a bridge between local area networks can be implemented using another popular type of equipment. These gadgets frequently offer options like demand dialling and/or data compression.

#### 1.4.1 Hardware Needed for ISDN

An ISDN digital modem is the simplest way to connect a computer to the ISDN network. These devices employ the digital ISDN network to provide substantially better speeds and greater reliability than analogue modems, while still supporting typical modem interfaces such the AT command set and RS-232 serial connector. Most ISDN Digital Modems offer ISDN speed and dependability in a reasonably priced, easily installed (External), and operated device. It can support a regular phone or fax machine in addition to 64-Kbps data transmission over the ISDN line because it also features an analogue voice port in addition to an ISDN port. A 14.4 analogue modem option may be available, offering backward compatibility with non-ISDN services. Both the ANSI V.120 standard for asynchronous point-to-point communications (common computer transmission) and async-sync Point-to-Point Protocol (PPP) conversion for Internet access are supported by ISDN digital modems. If your terminal is going to communicate with networked devices or networks, you require this feature. For each call, a built-in feature automatically chooses the appropriate protocol. For a modem to increase speeds up to 115 kbps or 128 kbps, two B channels must be combined.



#### **IN-TEXT QUESTIONS**

- 4. ATM can be used for \_\_\_\_\_\_
  a) local area network b) wide area network
  c) campus area network d) networks covering any range
- 5. Information bearing channels in ISDN are called \_\_\_\_\_
  - a) D channels b) Data channels
  - c) B channels d) Voice channel

#### 1.5 ATM

Our attention has been on the Internet and its protocols up to this point. However, numerous other currently used packet-switching technologies can potentially offer complete networking solutions. The most well-known of these alternatives to the Internet are those known as Asynchronous Transfer Mode (ATM) networks. The advent of ATM began in the early 1990s. Talking about ATM is helpful for two reasons. First, it offers a fascinating contrast to the Internet, and by examining how it differs from the Internet, we may learn more about it. Second, ATM is frequently utilised as a link-layer technology in the Internet's backbone.

#### 1.5.1 Goal of ATM

In the middle of the 1980s, the first ATM standards were created. For those who are too young to recall, there were basically two sorts of networks at this time: telephone networks, which were (and still are) used to convey real-time voice, and data networks, which were used to move text files, facilitate remote login, and deliver email. Additionally, specialised private networks for video conferencing were accessible. There was an Internet at the time, but few people considered using it to carry phone calls, and nobody had ever heard of the World Wide Web. It only made sense to create a networking system that could transfer real-time audio and video in addition to text, email, and image data. It was accomplished through ATM. ATM standards for broadband integrated services have been created by two standards organisations, the ATM Forum and the International Telecommunications Union.

Digital Networks (BISDNs). In order for ATM to provide a complete networking solution for distributed applications, the ATM standards mandate packet switching with virtual circuits, or virtual channels as they are known in the ATM lexicon. Major corporations made large investments in ATM research and development at the same time that the ATM standards were being developed. These investments have produced a wide range of high-performing ATM technology, such as ATM switches with terabit switching rates. Both telephone networks and the backbones of the Internet have aggressively adopted ATM technology in recent years.



ATM has been implemented within networks, but it hasn't been able to spread out to desktop computers and workstations. And whether ATM will ever have a substantial presence at the desktop is now up for debate. In fact, the Internet and its TCP/IP protocols were already operating and making substantial progress during the late 1980s and early 1990s, when ATM was being developed in standards committees and research labs.

All of the most widely used operating systems include the TCP/IP protocol suite. Businesses started using the Internet for electronic commerce (e-commerce). Access to the Internet for homes became quite affordable. For TCP/IP networks, many excellent desktop applications were created, such as the World Wide Web, Internet phone, and interactive streaming video. New Internet services and applications are currently being created by thousands of businesses.

In addition, a number of low-cost high-speed LAN technologies—such as 100 Mbps Ethernet and, more recently, Gigabit Ethernet—were created throughout the 1990s, reducing the necessity for ATM use in high-speed LAN applications. Nearly all networking application solutions in the world today interface directly with TCP/IP. However, ATM switches have been used in Internet backbone networks, where the demand for high-speed traffic delivery is most pressing, because they can switch packets at extremely fast rates.

#### **1.5.2 Characteristics of ATM**

In later sections, we'll go into more information about ATM. For the time being, these are a few of its main traits:

From the transport layer all the way down to the physical layer, the ATM standard defines a whole set of communication protocols.

53-byte fixed-length packets are used in packet switching. Cells refers to these packets in ATM terminology. 48 bytes of "payload" and 5 bytes of header make up each cell. High-speed switching has been made possible by the constant length cells and straightforward headers.

Virtual circuits are used by ATM (VCs). Virtual channels are the technical term for virtual circuits in ATM. The virtual channel identifier (VCI), often known as the virtual channel number, is a field in the ATM header.

Link-by-link retransmissions are not offered by ATM. A switch will use errorcorrecting codes to try and fix any errors it finds in an ATM cell. If it is unable to fix the problem, it drops the cell and does not request that the previous switch retransmit it.

End-to-end congestion control is offered by ATM. In other words, during periods of congestion, the switches do not directly control the transmission of ATM cells. To help a sending end device control its transmission rate when the network is busy, the network switches themselves do offer feedback.

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Almost any physical layer can be crossed by ATM. It frequently utilises the SONET protocol and operates at 155.52 Mbps, 622 Mbps, and greater speeds over fibre optics.

1.5.2 ATM Layers

As shown in Figure 1.2, the ATM protocol stack consists of three layers: the ATM adaptation layer (AAL), the ATM Layer, and the ATM Physical Layer:

ATM Adaptation Layer (AAL)	
ATM Layer	
ATM Physical Layer	

• Fig 1.2: The three ATM layers (*Source:* Kurose, J. F., & Ross, K. W. (2001). Computer networking: A top-down approach featuring the Internet. Boston: Addison-Wesley)

Voltages, bit timings, and framing on the physical medium are all dealt with by the ATM Physical Layer. The foundation of the ATM standard is the ATM Layer. It specifies the ATM cell's structure. The transport layer of the Internet protocol stack is comparable to the ATM Adaptation Layer. AALs for ATM come in a wide variety of forms to support a wide range of services.

At the moment, ATM is frequently utilised as a link-layer technology within specialised areas of the Internet. TCP/IP and ATM may now communicate with one another thanks to the creation of the unique AAL type AAL5. AAL5 prepares IP datagrams for ATM transport at the IP-to-ATM interface and reassembles ATM cells into IP datagrams at the ATM-to-IP interface. The ATM-using areas of the Internet's protocol stack are depicted in

Application Layer (HTTP, FTP, etc.)	
Transport Layer (TCP or UDP)	
Network Layer (IP)	
AAL5	
ATM Layer	
ATM Physical Layer	

Figure 1.3.

• **Fig 1.3:** Internet-over-ATM protocol stack (*Source:* Kurose, J. F., & Ross, K. W. (2001). Computer networking: A top-down approach featuring the Internet. Boston: Addison-Wesley.)

The three ATM layers have been crammed into the lower two layers of the Internet protocol stack in this design, as you can see. In particular, ATM is "seen" as a link-layer protocol by the Internet's network layer.

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# 1.6 SUMMARY

Although ISDN is a packet-switched network that enables digital speech and data transmission, it is also a circuit-switched telephone network system. This may lead to speech or data quality that is superior to what an analogue phone can deliver. It offers a packet-switched connection that can transfer data at a rate of 64 kilobits per second. It offered upstream and downstream bandwidth at a maximum rate of 128 kbit/s. Channel bonding allowed for a higher data rate. Six to eight 64 kbit/s channels on an ISDN B-channel with three or four BRIs are often bonded.

a method for voice lines to access high-speed networks or the Internet. There are several types, including symmetric DSL (SDSL), very-high-bit-rate DSL, high-bit-rate DSL (HDSL), and asymmetric DSL (ADSL) (VDSL). The term "xDSL" is sometimes used to describe the entire group.

The ATM is an ITU-T (International Telecommunication Union-Telecommunications Standards Section) call relay device that sends all information, including different service kinds like data, video, or audio, in the form of cells, which are discrete packets of a predetermined size. The network is connection-oriented and cells are sent in an asynchronous manner.

# 1.7 GLOSSARY

ATM: Asynchronous Transfer Mode (ATM) networks.

**ISDN:** Intergrated Services Didital Network.

# 1.8 ANSWERS TO IN-TEXT QUESTIONS

- 1. False
- 2. False
- 3.Asynchronous amplitude division multiplexing
- 4. Networks covering any range
- 5. B Channels

# 1.9 SELF-ASSESSMENT QUESTIONS

1. Dail-up modems, ISDN, HFC and ADSL are all used for residential access. For each of these access technologies, provide a range of transmission rates and comment on whether the bandwidth is shared or dedicated.

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2. List and describe ATM service models.

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# **UNIT-IV**

# INTRODUCTION OF NETWORKS: NETWORK SOFTWARE, NETWORK OPERATING SYSTEMS, DOMAIN NAME SYSTEM AND NETWORK MANAGEMENT SYSTEMS

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# STRUCTURE

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# **1.1 LEARNING OBJECTIVES**

After studying this unit, you must be able to understand:

- Network softwares
- Understand the protocol hierarchies
- Functions of connection-oriented and connectionless services
- Understanding of network operating systems
- Detail Description of Domain Name Services and network management

## **1.2 INTRODUCTION**

There must be a set of norms or standards for the proper communication process between two computers, comprising sub-processes like sending, receiving, and comprehending the information. These standards make sure that various products and equipment can talk to one another across any network. This chapter discusses the network software, which comprises of diverse service primitives, protocol hierarchies, and design issues at various layers. In section 1.4, different kinds of operating systems employed in network management are described in detail. Section 1.5 provides information about the Domain Name System, and Section 1.6 shows an illustration of how a network is administered.

## **1.3 NETWORK SOFTWARE**

Initially, the computer networks were created with hardware as the primary consideration and system software as the secondary consideration. However, it is no longer effective. These days, softwares turned out to be more structured. We go into further depth about the software structuring technique in the given section.

#### **1.3.1 Protocol Hierarchies:**

Most networks are divided into layers, stacked one after the other, in order to simplify the complexity of the network design. Different networks have different numbers of layers, their names, contents, and functions. Each layer serves the objective of providing specific services to upper layers by keeping those layers hidden from specifics of how the actual services are executed. This could be considered as each layer functions like a virtual machine, providing specific services to the upper layer. This idea is actually well-known and utilised frequently in computer science, under the terms like data encapsulation used in object-oriented programming. The key principle is to provide the services to the users either through hardware or software, while keeping the internal details hidden from them.

A dialogue is being held between n layer of one machine and the corresponding n layer of different machine. The layer n protocol is the aggregate name for the set of guidelines and practises employed in this exchange. A protocol is essentially an agreement between the people involved in communication about how communication should proceed.



To use an analogy, a lady may decide to extend her hand to a man when they first meet. For instance, on whether she being an American lawyer or European princess, he may choose to shake it or kiss it. Communication will become more difficult, if not impossible, if the protocol is violated.

In Fig. 1-13, a five-layer network is depicted, in which peers are generally entities used in different layers on various machines. Peers could be computer programmes, hardware components, or even actual people. Thus, it is the peers who use the protocols to communicate.

Actually, there is no direct data flow between the corresponding layers of different machines. Instead, until it reaches the bottommost layer, the function of every upper layer is to send data and control information to the lower layer beneath it. However, the actual communication is done at the physical medium, the lowest layer. Virtual communication is depicted in Fig. 1.1 by dotted lines, whereas physical communication is depicted by solid lines.

An interface exists between every pair of neighbouring layers, determining primitive actions and services to be exchanged between layers. Determining clear interfaces between the layers is one of the most crucial factors that network designers take into account when deciding how many levels to include in a network and what each one should accomplish. This necessitates that each layer carries out a particular set of known functions. Additionally, because the new implementation just needs to follow to the interface specifications, it is easier to switch out the implementation of one layer for a completely different one (for example, switching the lines of telephone with satellite channels). As a result, less information needs to be transmitted between layers.



**Fig 1.1:** Layered Protocol Interface (*Source:* Tanenbaum, A. S. (1996). Computer networks. Upper Saddle River, N.J: Prentice Hall PTR)

A network architecture is a collection of layers and protocols. An architecture's specification must include sufficient details to enable implementers to create the software or hardware necessary for each layer's correct adherence to the required protocol. Since these

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are contained inside the machines, neither the implementation's specifics nor the interfaces' specifications are included in the design. If every machine in the network can correctly use every protocol, it is even not required for all of their interfaces to match. A list of protocols, one protocol per layer, used by a particular system is called a protocol stack.





Talking about a technical illustration: about providing the communication to the uppermost layer in the network architecture in Fig. 1.2. A layer 5 application process creates a message, M, and passes it to layer 4 for further transmission to the lower layers. Layer 4 appends the header information to the received message for identification and sends the outcome to Layer 3, who then processes it. The header contains the control information comprising sequence numbers, that allow layer 4 on the destination computer to transmit data in the correct order. Sizes, timings, and other control parameters may also be present in the headers of some layers.

The layer 4 protocol in many networks does not have a size limit on the messages it transmits, although the layer 3 protocol almost always has one. Consequently, the incoming messages must therefore be divided into smaller parts called packets by layer 3, each of which must have a layer 3 header. For example, it divides M into M1 and M2, two separate parts. Layer 3 selects the outgoing line to use and sends the packets to Layer 2 after making this decision. Each component is given a header and a trailer by Layer 2 before being given to Layer 1 for transmission at the physical level. The message is transferred upward, layer by layer, at the receiving device, with the headers being removed along the way. The headers for any layers beneath layer n are not transmitted up to layer n.

Understanding the relationship between virtual and actual communication as well as the distinction between protocols and interfaces is crucial for interpreting Fig. 1.2. For instance, layer 4 peer processes conceptualise their exchange of data as being "horizontal" when utilising the layer 4 protocol. Even if these operations communicate with bottommost layers over the 3/4 interface, SendToOtherSide and GetFromOtherSide routines are probably present for each one.





All network design must take into account the peer process abstraction. It allows for the breakdown of the overwhelming process of designing the entire network into a number of more manageable design issues, particularly the design of the specific layers.

It's important to note that even though Section 1.3 is titled "Network 1.3," the bottom tiers of a protocol hierarchy are usually incorporated in the firmware. Even though complicated protocol techniques are employed, they may be fully or partially embedded in the hardware.

#### **1.3.2** Design Issues for the Layers:

There are various layers in which some major design problems arise in computer networks. We will briefly discuss the most significant ones below.

Each layer needs a way to distinguish between senders and recipients. A way for a process on one system to designate which other processes it wants to communicate with is required since a network typically consists of numerous computers, some of which have many processes. Due to the existence of various destinations, addressing becomes crucial in order to identify a specific destination.

The guidelines for data transfer are the subject of another set of design choices. Data can move in both directions in some systems while only moving in one direction in others. The protocol must also establish the number of logical channels and their relative priorities for the connection. For each connection, generally networks offer two logical channels: for regular traffic and urgent data.

Due to imperfections in physical communication circuits, error control is a crucial concern. There are many known codes for error-detection and error-correction, but the ones being used must be agreed upon by both ends of the connection. The receiver also needs a mechanism to let the sender know the messages that were received exactly as sent and that weren't.

The sequence of messages sent on some communication channels may not be preserved. The protocol must explicitly provide the mechanism for the recipient to permit the reassembling of the fragments of a message in order to deal with a potential loss of sequencing. These pieces can be easily organised by numbering them, but this doesn't address the issue of what to do with those that arrive out of sequence.

Keeping a quick transmitter from overwhelming a slow receiver with data is a problem that arises at every level. It will be explored later how several solutions have been put forth. Some of them entail the recipient giving the sender some sort of direct or indirect feedback regarding the recipient's current circumstance. Some restrict the transmitter to a specified transmission speed. The topic in question is flow control.

The incapacity of all processes to receive messages of any length is another issue that needs to be addressed on many different levels. This characteristic pave the way for systems that disassemble, transmit, and then reassemble communications. In this case, the approach is to combine a number of little messages that are headed in the same direction into a single huge message, which is then broken up at the other end.

#### **1.3.3** Connection Oriented and Connectionless Services:



Both these services are available from levels to the layers above them. These two types will be discussed in this section, along with their distinctions.

The telephone system serves as a paradigm for connection-oriented services. In order to talk to the person, we take our mobile phone, dial that person's contact number, speak with the person, and then hang up. Similar to this, in order to access a connection-oriented service, a user must first create a connection, use it, and then release it. The fundamental characteristic of a connection is that it functions like a tube: at one end, the transmitter pushes bits in, and at the other, the receiver pulls them out. Generally, the order is maintained to ensure that the bits arrive in the same order as they were being sent.

The maximum message size, the required quality of service, and other issues may be negotiated by the sender, recipient, and subnet when a connection is created. Usually, sender offers a suggestion, which the recipient has the option to accept, reject, or counter.

On the other hand, connectionless services are based on the postal service. The full destination address is included in every message (letter), and each one is routed through the system separately from the others. In most cases, the first message sent will be the first one to arrive when two messages are sent to the same recipient. The first one despatched, however, can be postponed such that the second one comes first.

Each service has a level of service that can be used to describe it. In some services there is no loss of data. A trustworthy service typically involves having the recipient confirm each message's receipt so the sender can be certain it was sent. The acknowledgement procedure adds overhead and delays, which are frequently beneficial but occasionally unfavourable.

File transmission is an example scenario where a trustworthy connection-oriented service is acceptable. The file's owner wants to make sure that all of the bits arrive in the correct order. Even if a service is substantially faster, very few file transfer users would choose it over one that occasionally loses a few bits.

Message sequences and byte streams are two minor versions of reliable connectionoriented service. The message boundaries are kept in the first variation. Two 1024-byte messages are never delivered as a single 2048-byte message; instead, they always arrive as two separate 1024-byte messages. In the latter, there is no message and the connection is just a stream of data.

ſ	Service	Example
Connection-	Reliable message stream	Sequence of pages
	Reliable byte stream	Remote login
Connection- less	Unreliable connection	Digitized voice
	Unreliable datagram	Electronic junk mail
	Acknowledged datagram	Registered mail
	Request-reply	Database query

**Fig 1.3:** Different Types of Services (*Source:* Tanenbaum, A. S. (1996). Computer networks. Upper Saddle River, N.J: Prentice Hall PTR)

boundaries. There is no way to determine if 2048 bytes were delivered as a single 2048-byte message, two 1024-byte messages, or 2048 1-byte messages until they reach the recipient. It may be crucial to maintain message boundaries if a phototypesetter receives individual

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messages representing each page of a book across a network. In contrast, all that is required when a user signs onto a remote server is a byte stream from the user's computer to the server. Boundaries between messages are irrelevant.

As was already indicated, some programmes cannot tolerate the transit delays brought on by acknowledgements. Digital voice traffic is one of these applications. It is preferable for phone customers to occasionally hear some background noise than to have to wait around for acknowledgements.

Not all programmes need connections. For instance, electronic garbage is growing more prevalent as electronic mail spreads. The sender of electronic spam is unlikely to want to go to the trouble of establishing and then disabling a connection in order to send a single piece of mail. Furthermore, if it costs more, delivery that is 100 percent trustworthy is not necessary. All that is required is a method for sending a single message with a high chance of success but no assurance that it will. Datagram service is a common name for unreliable connectionless services that are not acknowledged, similar to telegraph services that do not provide the sender with an acknowledgement.

In other circumstances, reliability is crucial yet simplicity of not needing to establish a connection to transmit a single brief message is desirable. These applications can receive the recognised datagram service. It's comparable to sending a registered letter and asking for a return receipt. The sender is totally certain that the letter was delivered to the intended recipient and wasn't misplaced when the receipt is returned.

The request-reply service is yet another service. In this service, a single datagram containing a request and an answer is sent by the sender. For illustration, this would include inquiring the neighbourhood library where Uighur is spoken. In the client-server concept, request-response is frequently used to implement communication: a request is issued by the client and is given respond by the server machine. These different types of services are summarized in Figure 1.3.

#### **IN-TEXT QUESTIONS**

- 1. Which one of the following allows client to update their DNS entry as their IP address change?
  - a) dynamic DNS b) mail transfer agent
  - c) authoritative name server d) none of the mentioned
- 2. DNS database contains \_
  - a) name server records b) hostname-to-address records
  - c) hostname aliases d) all of the mentioned

# **1.4 NETWORK OPERATING SYSTEMS**

Nowadays, software is used on every network to manage its resources. This software, known as a network operating system, operates on a unique, powerful machine (or NOS, for short). One of the most crucial elements of the network is the NOS. The programme that a

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server uses to manage security, data, users, groups, applications, and other networking tasks is known as a networking operating system (NOS).

These are the most widely used network operating systems:

- Microsoft Windows client/ server,
- UNIX and Linux, client/ server
- Mac OS X
- Novell NetWare.

Client/server architecture is the foundation of network operating systems, allowing several clients to share resources through the use of a server. The network layer (layer 3) of the OSI model is operated by network operating systems (NOS), which are built into routers and hardware firewalls.

#### 1.4.1 Client/Server:

Client/server NOS enable these networks to centralise functions and applications on one or more dedicated servers. The server acts as the central node of the system, enabling resource access and ensuring security. This is due to a method offered by the NOS, that several users can concurrently share the same resources, regardless of where a user is physically present.

#### **1.4.2 NOS Characteristics:**

The Controlling computer hardware, the environment in which programmes are executed, and the user interface is the role of an operating system (OS). For a single user or a group of users who share the computer serially rather than concurrently, the OS handles these tasks. More than one user may have accounts created by an administrator, but more than one user cannot use the system at once.

Network operating systems (NOSs), in contrast, split up their functions among a number of connected machines. The native OS of each individual computer is what a NOS is dependent on. Then it has features that let several users access shared resources at once.

To provide concurrent access to common resources, NOS computers assume specialised functions. Specialized software on client systems enables them to ask for shared resources that are managed by server systems in response to a client request. The concept of making data that is held on servers available to client queries is depicted in the figure below.

## **1.4.3 Differences between PCs and a NOS:**

In a NOS environment, PCs serve as clients. The user can access local PC resources by utilising the features of the PC's native operating system. These consist of programmes, documents, and directly associated gadgets like printers. The local user can access nonlocal or distant resources as if they were a part of the local system when a PC becomes a client in a



NOS environment thanks to additional specialised software. By enabling remote services as extensions of the local native operating system, the NOS expands the client PC's reach.

On a PC, many users may have accounts, but only one of those accounts is ever actually used. In contrast, a NOS offers concurrent access to shared resources by several customers and supports multiple user accounts at once. Servers must accommodate multiple users and serve as the central location for shared resources used by numerous clients. Specialized software and extra hardware are needed for servers. The server must have many user accounts and be able to support simultaneous access by several users to network resources.

#### 1.4.4 Multiuser, multitasking, and multiprocessor systems:

To handle multiple concurrent users and offer shared access to network services, resources, and devices, NOS servers must run operating systems with additional functionalities beyond those of client PCs.

An adaptive system is a NOS server. Internally, the OS must be able to run several activities or processes concurrently through the scheduling software integrated in the execution environment. This software divides up the system's resources, such as memory and internal processor time, among various tasks so that they can share them. On a multiuser system, each user is supported internally by a different task or process on the server. As users connect to the system, these internal jobs are produced dynamically and are removed when users disconnect.

#### Characteristics

1. NOSs disperse their operations across a number of computers on the network.

2. It includes features that let several users to access shared resources at once.

3. Specialized software on client systems enables them to ask for shared resources that are managed by server systems in response to a client request.

4. The capability of the client PC is increased by the NOS by permitting remote services as extensions of the local native operating system.

5. NOS permits concurrent access to shared resources by several customers and supports multiple user accounts at once.

6. A NOS server can do multiple tasks. Internally, the OS must be able to run several activities or processes concurrently.

7. Multiprocessing systems are those that have many processors installed. They have the ability to assign each task to a different processor and carry out many tasks concurrently.

8. NOS servers are computer systems with additional memory to handle numerous jobs running simultaneously in memory.



9. To store shared files and supplement the system's internal memory, more disc space is also required on servers.

#### **IN-TEXT QUESTIONS**

- 3. The domain name system is maintained by \_\_\_\_\_a) distributed database system b) a single serverc) a single computer d) none of the mentioned
- 4. Configuration management can be divided into two subsystems: reconfiguration and \_\_\_\_\_\_
  - a) Documentation b) Information
  - c) Servers d) Entity
- 5. Performance management is closely related to \_\_\_\_\_
  - a) Proactive Fault Management b) Fault management
  - c) Reactive Fault Management d) Preventive Fault Management

# **1.5 DOMAIN NAME SYSTEM**

Theoretically, programmes may refer to hosts, mailboxes, and other resources by their IP addresses, but it is hard for people to remember these addresses. If Ameer writes emails to ameer@128.111.24.41, she will also need to change her email address if her ISP or business transfer the mail server to a different computer with a different IP address. ASCII names were developed in order to distinguish machine names from machine addresses. Ameer might have an email address like ameer@art.ucsb.edu in this scenario. To transform ASCII characters into network addresses, however, because the network only understands numerical addresses, is necessary. In the parts that follow, we'll take a closer look at how this mapping is carried out online. The ARPANET's hosts and their IP addresses were listed in the straightforward file called hosts.txt. All the hosts would carry it back from where it was kept every night.

However, everyone realised that this method could not persist indefinitely once thousands of PCs and minicomputers were connected to the internet. The file would first become unmanageably large. The fact that host name disputes would continue unless names were centrally maintained, which is untenable given the load and latency of a huge international network, is even more crucial. To address these issues, the Domain Name System (DNS) was designed. The creation of a distributed database system and a hierarchical domain-based naming structure are the core components of DNS. It can be used for more things outside just translating host names and email addresses to IP addresses. The RFCs 1034 and 1035 define DNS.

In a nutshell, DNS works as follows. When a name has to be mapped to an IP address, application software calls the resolver library operation and provides the name as an input. In Fig. 1.4, we saw a resolver example called gethostbyname. A local DNS server receives a UDP packet from the resolver, which it uses to look up the name and return the IP



address to the resolver, which finally gives it back to the caller. With the IP address at hand, the software can next connect via TCP or transmit UDP packets to the target.



**Fig 1.4:** Different Types of Services (*Source:* Tanenbaum, A. S. (1996). Computer networks. Upper Saddle River, N.J: Prentice Hall PTR)

#### **1.5.1** The Domain Name Space

It is not straightforward to manage a sizable and dynamic set of names. In the postal system, name management is accomplished by mandating that letters include the addressee's nationality, state or province, city, and street address (either tacitly or explicitly). There is no mistake between the Marvin Anderson on Main St. in White Plains, New York, and the Marvin Anderson on Main St. in Austin, Texas, thanks to this type of hierarchical addressing. DNS operates similarly. The Internet is conceptually divided into more than 200 top-level domains, with several hosts covered by each domain. Each domain is divided into subdomains, which are then divided again, and so on. As seen in Fig. 7-1, a tree can be used to represent each of these domains.

The tree's leaves stand in for domains without any subdomains (but do contain machines, of course). A leaf domain may represent a firm and have thousands of hosts, or it may only include a single host. There are two types of top-level domains: generic and country. The initial generic domains included com (for commercial use), edu (for educational institutions), gov (for the federal government of the United States), int (for some international organisations), mil (for the U.S. armed forces), net (for network providers), and org (for profit/nonprofit organizations). Each entry in the country domains corresponds to a nation as defined by ISO 3166.

The tree's leaves represent domains with no child domains. Three other niche top-level domains were also added at the request of certain sectors. These are the museums, cooperatives, and the aerospace industry (museums). Future additions will include other top-level domains.

A second-level domain, such name-of-company.com, is typically simple to obtain. To verify that the intended name is available and not already being used as a trademark by another party, go to the registrar for the relevant top-level domain (in this case, com). If there are no issues, the name is given after the requester pays a nominal annual fee. The path leading up from each domain to the (unnamed) root serves as its name. Periods, which are pronounced "dots," are used to separate the parts. Instead of a UNIX-style name like



/com/sun/eng, the engineering division at Sun Microsystems might be referred to as eng.sun.com. Because of the hierarchical name convention, eng.sun.com does not clash with the Yale English department's prospective usage of eng in eng.yale.edu. White Plains, New York, and Austin, Texas' Marvin Anderson on Main Street. DNS operates similarly.

The Internet is conceptually divided into more than 200 top-level domains, with several hosts covered by each domain. Each domain is divided into subdomains, which are then divided again, and so on. As seen in Fig. 7-1, a tree can be used to represent each of these domains. The tree's leaves stand in for domains without any subdomains (but do contain machines, of course). A leaf domain may represent a firm and have thousands of hosts, or it may only include a single host. Both absolute and relative domain names are possible. In contrast to relative domain names, absolute ones usually conclude with a period (for example, eng.sun.com.). Relative names must be understood in a certain context in order to be uniquely understood. A named domain in both situations refers to a particular node in the tree and every node below it. Edu, edu, and EDU all have the same meaning in domain names because case is irrelevant. Full path names cannot be more than 255 characters, while component names can be up to 63 characters long.

In theory, there are two ways to insert domains into the tree. For instance, cs.yale.edu might just as easily be listed as cs.yale.ct.us under the US nation domain. In reality, however, the majority of American organisations fall under a generic domain, while the majority of organisations outside of the US fall within the domain of their nation. Although there is no law prohibiting registering under two top-level domains, few businesses besides multinationals do it (e.g., sony.com and sony.nl).

. Japan, for instance, mirrors the edu and com domains with the ac.jp and co.jp domains. In the Netherlands, all organisations are listed under the prefix nl without difference. Consequently, each of the following three is a department of computer science at a university:

- 1. cs.yale.edu (Yale University, in the United States)
- 2. *cs.vu.nl* (Vrije Universiteit, in The Netherlands)

#### 3. cs.keio.ac.jp (Keio University, in Japan)

A new domain cannot be created without the domain it will be included in giving its consent. For instance, if a new university is established, let's say the University of Northern South Dakota, it needs to request the unsd.edu domain from the edu domain management. Name conflicts may be avoided and each domain can keep track of all its subdomains in this fashion,

#### **1.6 NETWORK MANAGEMENT SYSTEM**

Monitoring, testing, configuring, and troubleshooting network components to satisfy a set of specifications established by an organisation can be summed up as network management. These requirements include a network that runs smoothly and effectively and



offers users a predetermined level of service. First, in this section, we'll quickly go over a network management system's feature.

In general, managing configuration, faults, performance, and security can be said to be the four major categories into which a network management system's tasks fall.

#### **1.6.1** Configuration Management:

Network management can be summed up as testing, monitoring, and c A big network often consists of hundreds of units that are linked to one another either physically or intellectually. These entities initially have a configuration that may change over time in the network. Users can choose which groups they belong to, desktop PCs can be upgraded to newer versions, and software applications too can be updated to a newer version. The condition of each entity and its relationship to other entities must always be known by the configuration management system. Reconfiguration and documentation are the two subsystems that make up configuration management.

#### 1.6.2 Fault Management:

These days, complex networks can contain hundreds or even thousands of components. For the network to perform successfully, each component must function correctly both on its own and in reference to other components. Fault management is the area of network management that addresses this issue. Reactive and proactive fault management are the two subsystems of a successful system.

#### **Reactive Fault Management**

This system is in charge of finding, identifying, fixing, and documenting errors. It deals with quick fixes for problems. A reactive fault management system starts by pinpointing the precise location of the defect. A system that is experiencing an abnormality is said to have a fault. When a malfunction happens, either the system stops working properly or it produces a lot more errors. An outstanding example of a weakness is a compromised communication route. This error may obstruct communication or result in several mistakes.

#### **Proactive Fault Management**

The goal of proactive fault management is to stop errors before they start. Despite not always being practicable, certain failures can be anticipated and avoided. For instance, it is a good idea to replace a component or portion of a component before the manufacturer's specified lifetime. Another illustration would be if a failure frequently occurs at one specific spot in a network, it would be prudent to cautiously redesign the whole network to stop the fault from occurring in a loop.

#### **1.6.3** Performance Management:

In order to make sure the network is operating as efficiently as possible, Fault management is strongly tied to performance management, which makes an effort to track and manage it. Performance management makes an effort to measure performance using some measurable parameter, such as capacity, throughput, or response time.

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#### **1.6.4 Security Management:**

Security management is in charge of limiting network access according to the predetermined policy.

# 1.7 SUMMARY

Protocols, are the set of rules allowing processes to communicate, make up network software. Protocols might be connection-oriented or connection-less. The majority of networks allow for protocol hierarchies, where each layer serves the layers above it while shielding them from the specifics of the protocols employed at the lower tiers. Typically, either the OSI model or the TCP/IP model serves as the foundation for protocol stacks. The network, transport, and application levels are the same for both, but the remaining layers are different. Multiplexing, flow control, error control, and other design concerns are examples. This book spends a lot of time discussing protocols and their creation. Networks offer their users services. Both connection-oriented and connectionless services are available. One layer of certain networks provides connectionless service, whereas another provides connectionoriented service.

In general, managing configuration, faults, performance, and security are the four major categories used to group together the tasks carried out by a network management system. The Domain Name System is thoroughly explained.

# 1.8 GLOSSARY

**DNS:** Internet domain names are located and turned into Internet Protocol (IP) addresses using the DNS naming database.

**Network Operating System:** A network is a medium via which different independent computers can connect and communicate with one another.

# **1.9** ANSWERS TO IN-TEXT QUESTIONS

1. Dynamic DNS

2. Name server records, hostname-to-

address records, and hostname aliases

3. Distributed database system

- 4. Documentation
- 5. Proactive Fault Management

# 1.10 SELF-ASSESSMENT QUESTIONS

- Explain the Domain Name System (DNS) and domain name space with suitable example.
- Discuss the main difference between connection-oriented and connectionless services. Illustrate your answer with relevant examples

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## **1.11 REFERENCES**

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Univer



# UNIT-IV

# INTRODUCTION OF NETWORKS: OSI NETWORK MODEL AND TCP/IP REFERENCE MODEL

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 The OSI Reference Model
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# 1.1 LEARNING OBJECTIVES

After undergoing this chapter, you should be able to understand:

- The seven tiers of OSI reference model
- Thorough understanding of each layer of the OSI model
- Functionalities of each layer of the OSI model
- Thorough understanding of TCP/IP model and its four tiers
- Complete knowledge of protocols used in each layer
- Resemblance between OSI and TCP/IP

### **1.2 INTRODUCTION**

A set of norms or standards must be developed for the communication process in order to share information from one computer to another computer. These set of norms assist computers to receive and understand the information. The specifications guarantees that various devices and products can interact with one another over any type of network. A network reference model is a collection of these standards. There are several networked models that are currently beingexecuted. However, the OSI and TCP/IP models will be the focus of this unit.



**Fig 1.1:** OSI Reference Model (*Source:* Tanenbaum, A. S. (1996). Computer networks. Upper Saddle River, N.J: Prentice Hall PTR)

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The two most significant models, the OSI reference model and the TCP/IP reference model will be comprehended in detail in the subsequent two sections. Though the protocols linked with the OSI model are no longer widely utilised, the model itself is fairly generic and still applicable. The characteristics addressed at each layer of the OSI reference model are very essential. The TCP/IP paradigm depicts the reverse properties: the model itself isn't very useful, but the protocols of TCP/IP reference architecture are widely utilised. As a result, we shall examine both of them in depth. Additionally, failures can teach you more than successes achieved.

## **1.3 THE OSI REFERENCE MODEL**

The OSI architecture without the physical tier is demonstrated in Fig. 1.1. This architecture is based on an ISO proposal that was prepared as a first draft toward international standardisation of the protocols utilized in the various tiers (Day and Zimmermann, 1983). It was updated in 1995 (Day, 1995). The concept is known as the ISO OSI (Open Systems Interconnection) Reference Architecture because it is concerned with connecting open systems, or systems that may communicate with other systems. We'll refer to it as the OSI Reference model in brief.

The OSI model consists of seven tiers. The main principles used to reach at the seven tiers are described concisely as follows:

1. A tier must be built where distinct abstractions are required.

2. Each layer should have a specific purpose.

3. Each layer's function should be chosen with a view toward developing internationally recognised standards.

4. Layer boundaries should be designed so that information flows as little as possible between interfaces.

5. The number of layers should be extensible so that diverse functionalities are not forced to coexist in the same layer, but small enough that the design does not become cumbersome.

Subsequently, we will go over each and every tier of the architecture in turn starting with the lower layer. It must be taken into account that the OSI model is not a network architecture because it could not identify the specific services and protocols to be employed in each layer. It simply specifies what must be accomplished by each tier. However, ISO has developed standards for all of the levels, which are not included in the reference model. Such standards must be followed and released internationally.

### **1.3.1 The Physical Layer:**

The physical layer is in charge of sending raw bits across a communication link. The design issues are around guaranteeing that when one side sends a one bit, the other side



receives a one bit rather than a zero. Typical questions entail around the volts required to represent a 1 and how many volts needed for representing a 0 bit, a bit lasts for how many nano seconds, whether transmission can occur in a full duplex mode at the same time, how the initial connection is set up and how it is ripped down when both sides have completed communcation, and how many pins the network connector has and what is the purpose of each pin . Mechanics, electric, and temporal connections, as well as the physical transmission channels underlying the physical layer, are the primary design difficulties here.

### **1.3.2 The Data Link Layer:**

The data link tier's primary function is to transform a raw transmission facility into a line that appears to the network layer to be free of undiscovered transmission faults. It achieves this by having the sender segregates the incoming data into data frames (often a few hundreds or a few thousands bytes) and broadcast the frames in sequence. In a dependable service, the receiver responds to each frame with an acknowledgement frame.

Another challenge that instigate in the data link tier and the upper layers is how to limit a speedy transmitter from overwhelming a slow data recipient. A traffic control system is usually necessary to notify the transmitter of the recipient's actual buffer space. Flow control and error control are commonly coupled.

Broadcast networks encounter an extra issue at the data connection layer: managing access to a common channel. This is handled by the medium access control (MAC) sublayer, a sublevel of the data connection layer.

### **1.3.3 The Network Layer:**

The network tier is accountable for the proper operation of the subnet. A significant design challenge is identifying how packets are routed from sender to the receiver. Static tables are fixed for the network and are rarely updated can be used to build routes. Routes can be predetermined at the beginning of every communication, for example, a terminal session such as a remote login machine. Finally, networks can be extremely dynamic, with each new data packet determining a new route to meet the current demands of the network.

If there exist several packets in the subnet simultaneously, they will interfere with each other, causing bottlenecks. Addressing such congestion is likewise the responsibility of the network layer. More broadly, network layer issues include service quality (delay, transit time, jitter, and so on).

Many challenges emerge when a packet is transmitted from one network to another in order to arrive at the target. The addressing method of the other network may vary from that of the first network. Due of the varied packet size, the second one may completely reject it. The protocols may differ, and so forth. It is the sole responsibility of the network layer to resolve all of these challenges so that all heterogeneous ecosystems can be integrated.



Because of the fact that the routing issues in the broadcast networks are typically simpler, the network layer is often weak or nonpersistent.

#### **1.3.4 The Transport Layer:**

The primary function of transport layer is to take data from upper layers, break it up into smaller chunks if necessary, transmit it to the network layer. This ensures that the entire information arrive successfully at the other side. The whole process must be performed efficiently that shields the upper layers to not get affected from the unforeseen events in hardware technology.

The transport layer is responsible for dedicating services to the session layer and, eventually to network users. The common type of transport link is a fault free point-to-point channel that transmits messages or bytes in the sequence as they were sent. Other types of transport services include the carriage of independent messages with no surety of delivery order and the message broadcasting to multiple locations. The type of service is determined when the connection is established. (As a side note, an fault-free channel is impossible to achieve; what people genuinely imply by this term is that the error rate has dropped enough that it can be ignored in practise.)

The transport level is truly an end-to-end layer, connecting the source and destination all the way around. In other terms, a programme on the source machine interacts with a programme on the destination system via header and control messages. Protocols in the lower layers lie between every machine and its closer neighbours, rather than between the utmost sending and receiving machines, which could be segregated by multiple routers. The Figure 1.1 depicts the distinction between chained layers 1 through 3 and end-to-end layers 4 through 7.

### 1.3.5 The Session Layer:

The session layer enables sessions to be established between users on multiple machines. Sessions provide a variety of functions, such as dialogue control (keeping track of who is transmitting), orchestrating tokens (restricting more than one party to perform the same task at the same time), and synchronisation (checkpointing longer transmissions to resume from where they were stopped due to collapse).

### **1.3.6** The Presentation Layer:

The syntax and semantics of the information are dealt by the presentation layer. This is in contrast with the bottom layers, which are closely involved with transferring bits around. The presentation tier permits machines to interact with one another having distinct data formats. The data structures needed will be specified in an abstract manner along with standardised encoding to be utilised "on the wire." These abstract data structures are controlled by the presentation tier, which allows for the construction and exchange of higher-level data structures. For example: financial records.



### **1.3.7** The Application Layer:

A variety of protocols are entailed by the application layer that end users frequently require. The most commonly and widely used protocol is HyperText Transfer Protocol (HTTP) that forms the basis of World Wide Web. Once a request for a web page is sent by the web browser , it sends the URL to the server using HTTP. This in turn fetch the page from the server. Other application protocols are utilised for the transfer of file , electronic mails, and E-news.

### **1.4 THE TCP/IP REFERENCE MODEL**

Now let's move on from the OSI reference model to the model one used in the ARPANET, the forefather of all broad area computer networks, and its descendant, the global Internet. A brief history of the ARPANET will be covered later on. As of now, it is important to mention few key features of it. The ARPANET was a Department of Defense-sponsored research network (U.S. Department of Defense). Eventually, leased telephone lines were used to connect hundreds of colleges and government facilities. With the existence of radio and satellite networks in the later stage , the prevalent protocols struggled to connect with them, necessitating the creation of a entirely new reference model. As a result, one of the primary design goals from the beginning was the ability to connect many networks seamlessly. This concept was dubbed the TCP/IP Reference Model after the release of its two major protocols. It was first stated in (Cerf and Kahn, 1974). A subsequent point of view is offered in (Leiner et al., 1985). The design concept of the model is outlined in (Clark, 1988).

Considering the Department of Defense's apprehension that a number of its valued routers, hosts, and internetwork gateways could be smashed to bits at any time. Another essential need is the network's capability to withstand subnet hardware failure without breaking off ongoing communications. In other words, the DoD expected connections to stay consistent in case of operational state of source and destination machines, despite the fact that several transmission connections or systems may accidently shut off. Furthermore, a versatile architecture was required because applications with varying needs, ranging from file transfer to real-time speech transmission, were envisaged.





**Fig 1.2:** TCP/IP Reference Model (*Source:* Tanenbaum, A. S. (1996). Computer networks. Upper Saddle River, N.J: Prentice Hall PTR)

#### **1.4.1 The Internet Layer:**

Due to the anticipated requirements, a packet switching is most preferable in a connectionless internetwork layer. The Internet layer is the keystone for keeping the entire architecture integrated. The responsibility of the internetwork layer is to permit hosts to disseminate packets in any network so that packets independently move to the destination. If the arriving sequence of the packets is different from the sending sequence then it becomes the responsibility of upper tiers to correct the sequence as desired. Despite the fact that this layer is included in the Internet, the word "internet" refers to its generic sense

The analogy used here is the (snail) mail system. A sequence of foreign letters is fed to the mailbox of one country and fortunately all are arrived at the actual address of the destination country. The foreign letters certainly pass via more than one international postal gateways along the way, but this will be apparent to the consumers. Also, users are unaware of the abstract details that each country required i.e owned postal network stamps, length of envelopes, and delivery rules.

The internet layer specifies the Internet protocol called IP and packet formats. The functionality of internet layer is to transit IP based data packets to the desired destination. The main challenge here is certainly the packet routing, to mitigate data congestion. For these reasons, it is plausible to mention the TCP/IP internet layer and the OSI network layer are functionally equivalent. This relationship is depicted in Figure 1.2.

# **1.4.2** The Transport Layer:

The transport layer lies above the internet layer in the TCP/IP model. The transport layer aims to permit peer to peer entities to interact in a similar fashion as occurs in case of the transport layer of OSI on the sender and receiver hosts. The TCP and UDP are the two end to end protocols specified in this layer. The Transmission Control Protocol (TCP) is a connection oriented and dependable protocol. The TCP ensures the stream of byte to pass from one machine to another machine errorlessly. The incoming stream of bytes is divided



into distinct messages and sends to the internet layer. The TCP process at the receiving end performs the reassembling of the messages to convert it into the output stream. The flow management is also taken taken care by the TCP to avoid the ovelwhelming of fast sender on the slow receiver that cannot be tackled.

The other protocol on the list is the UDP (User Datagram Protocol). The UDP is a connectionless and unreliable protocol. UDP does not concern about the sequencing and flow control as opposed to TCP and intends to provide its own. The UDP is widely used in a client server and request response model for single time communication. UDP is most preferable in applications where spped is more crucial than accuracy. For example: streaming speech or video. The Figure 1.3 depicts the relationship between IP, TCP, and UDP. IP has been applied on many additional networks since the Model gas was invented.



**Fig 1.3:** Protocols and Networks in TCP/IP Model (Source: Tanenbaum, A. S. (1996). Computer networks. Upper Saddle River, N.J: Prentice Hall PTR)

#### **1.4.3 The Application Layer:**

The presentation and session layer is absent in the TCP/IP model. These both layers were not included in the TCP/IP model because of no urgent requirement of it. This viewpoint has been confirmed by the observation in the OSI model: they are of limited utility to most applications.

The application layer is the topmost layer lies above the transport layer. All the top level processes are included in the application layer. As indicated in Fig. 1.3, the earlier ones consists of virtual terminal like TELNET, File Transfer Protocol (FTP), and Electronic Mail (SMTP). The TELNET allows user on one machine to operate and communicate with the remote machine. The File Transfer Protocol shares data from one machine to another efficiently in the form of files. Simple Mail Transfer Protocol is used for sending and receiving mails. In the later stage, many protocols were included in the application layer like Domain Name System (DNS) for the mapping of host addresses to the network addresses.The NNTP is used for transporting usenet news to the news servers and HTTP for fetching webpages from the WWW.

### 1.4.4 The Host-to-Network Layer:





There is a big discrepancy beneath the internet layer. The TCP/IP reference model doesn't explain much about what is happening here, excepting that the hosts must be connected to the network in order to transmit IP packets. This protocol is not specified and varied between host to host and network to network. The TCP/IP model is rarely discussed in books and articles.

### **IN-TEXT QUESTIONS**

- 1. How many layers are there in OSI reference Model?
- 2. Which layer handles the Logical addressing and routing?
- 3. Which layer handles the Flow control and error control?
- 4. Dialog control and synchronization are the function of which layer?
- 5. Encryption and compression are the function of which layer?
- 6. File transfer, and access management are the functions of which layer?

### **1.5 COMPARISON OF OSI AND TCP/IP REFERENCE MODEL**

Both the OSI and TCP/IP reference models share many similarities. Both are built around the idea of a stack of separate protocols. Furthermore, the functioning of the different tiers is essentially comparable. For example, the upper tiers including the transport layer to offer network independent and end to end transport services to the connected process. The transport provider is made up of these layers. Similarly, the layers lie over the transport layer are application oriented for the users of transport services in both the models.

The two models are distinct in its own sense inspite of all underlying similarities. The similarities and differences of both the reference models are discussed in this section. It is vital to understand that we will compare reference models instead of protocol stacks. The protocols itself will be comprehended later on. For the comparison and contrast of the TCP/IP and the OSI model refer an elaborated book (Piscitello and Chapin, 1993).

The OSI model is built around three concepts:

- 1. Services.
- 2. Interfaces
- 3. Protocols

The distinction between the three notions mentioned above recognized the significant contributions of the OSI model. Each layer is intended to offer services to the upper layers lie above it. The services associated with layers defines the performance of each layer rather

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than how the services are accessible to those entities or how the functionality of each layer occur. The services defines the semantics of the layers.

The interface provides a way to access the processes above it. It takes into account the parameters to consider and the expected outcomes. In addition, it is ignorant about the core functionalities of the layers.

Finally, the employed protocols are the important part of the layers business. In order to perform the job , layers can employ the protocols whenever needed. Also, it has the privilege to alter the protocols without impacting the upper level applications.

These notions mesh well with modern concepts of object-oriented programming (OOP). Here, a layer is analogous to an object consists of a number of methods often called by processes externally. The semantics defines the group of services offered by an object in these methods. The expected results and the parameters forms the interface of the object. The protocol is an internal code of an object which is invisible and does not hold any significance outside of the object.

Though, the TCP/IP model does not differentiate well with the services, interfaces, and the protocols, therefore attempts have been made to make it similar to look like OSI model. As an example, the responsibility of the internet layer is to receive and send packets that are IP based.

As a result, the OSI protocols are concealed as compared to those in TCP/IP model and could be modified effortlessly with the evolution in technology. Therefore, with how much ease these alterations can be made are the key reasons for the layered architecture for protocols is the first thing that remains in mind.

The OSI reference model was developed before the relevant protocols were devised. This ordering indicates that the model was not biassed toward a specific set of protocols, which made it highly general. The disadvantage of this ordering is that the designers had little knowledge with the subject and had no idea which functionality to put in which layer.

For an instance, a point-to-point communication is only sustained by the data link tier. Later, on appearance of broadcast networks, the model required the addition of a new sublayer. Once the actual networks started to develop based on the OSI model, it was recognised that the OSI model does not fulfil the specified services on requisite. Hence, the additional convergence layers are built in scion with the model to give a better place for documentation over the differences. The standardised committee initially assumed to have a single network for every country that would be orchestrated by the Govt. based on the protocols of the OSI. But at that time, internetworking among components is not considered. To make an extended story brief, things were not proceed as intended.

The protocols are first released if we talk about the TCP/IP model. Then, the model only illustrates the functioning of prevalent protocols. The protocols were perfectly suited to the model. They were a fantastic fit. But, the biggest challenge is the incompatibility of the model to operate with other protocol stacks. As a result, it was not significant to describe non TCP/IP networks.



Now, shifting from more theoretical point of view to the technical view , one foreseeable difference is in the count of layers in both the models. The OSI model incorporates seven tiers. On the other hand, TCP/IP model has four tiers. Both models are similar in internetwork, transport, and application tiers and the remaining tiers are different.

Other noticeable distinction lies in the connection and connection oriented services. In the OSI paradigm, both connectionless and connection oriented services are permitted. But, only connection oriented services are available in the transport tier as it is perceptible to the users. On the other side, the network tier of the TCP/IP model permits connectionless service but both services are permitted in the transport tier thereby provides an option to the users. This option is particularly crucial for simpler request-response protocols.

#### **1.5.1** A Critique of the OSI Model and Protocols:

The protocols of both the models are neither perfect. Therefore, both the models faced a lot of belittling. We will consider indepth the criticisms based by the OSI and the TCP/IP model in the subsequent sections. We will first initiate with the OSI paradigm and then shift to the TCP/IP.

When the second version of this book was published in 1989, many professionals in the fields expected that the protocols of the OSI model rule over the globe and puts everything in its place. Unfortunately, the things would not occur as expected. Why? The appraisal of some of the teachings may be of some benefit. These lessons can be summed up as follows:

- 1. Bad timing.
- 2. Bad technology.
- 3. Bad implementations.
- 4. Bad politics.

#### **Bad Timing**

Let us begin with the first reason: poor timing. The timing of the establishment of a standard is essential to its success.

The basic OSI protocols appear to have been smashed. By the time the OSI protocols arrived, the competitive TCP/IP protocols were already widely used by research communities in universities. Various companies in the market had already started supplying TCP/IP products with cautious even when the billion dollar investment had not yet reached. At the time when OSI model was arrived, they show rejection to support the revised protocol stack unti forced so there was no initial options. Each firm waits for an another firm to take an initial step first, in such a scenario the OSI was never happened.



#### **Bad Technology**

The other reason behind the failure of the OSI model is the imprecise protocols. The seven tiers were selected based on the political purposes rather than the practical implications are missing. The session and presentation tiers are nearly empty and data connection and network are overflowed.

The OSI paradigm, as well as the underlying definitions of the services and protocols becomes quite complicated.

Aside from being incomprehensible, another issue with OSI is that certain operations, like addressing, flow management, and error control, appear repeatedly in each tier. For example, Saltzer et al. (1984) emphasises on the correction of errors on the higher layers beforehand because repetition in lower layers often becomes superfluous and inefficient.

#### **Bad Implementations**

The increasing intricacy of the model and protocols makes it difficult to perform actual implementations that were troublesome, massive, and steady. One who attempted this was incinerated. Therefore, it didn't take longer time for people to judge the term "OSI" with "inferior quality." Although the entities gets improvised eventually.

Contrastly, the earlier executions of TCP/IP paradigm was added in Berkeley UNIX and it becomes fairly successful. Most frequently people started to use it which results into a big user association. This results in early upgrades with more people joins to form a big community. In this case, the spiral was ascending rather than descending.

#### **Bad Politics**

Due to the untimely executions many academicians and researchers assumed TCP/IP a part of the UNIX system. In 1980s the UNIX system in academics is not like fatherhood then inappropriately considered as motherhood or apple pie.

On the other side, the OSI paradigm was broadly considered as the formation of European Telecom and European associations, and eventually by the US Govt. This was partially correct to some extent, but the notions of the Govt. officials brings the technical inferior standards in the minds of the academicians and developers operating in trenches to built computer networks does not assist much. Some perceives this expansion similar to the IBMs announcement in 1960 that declares PL/I is the forthcoming language. Later, DoD gives statements by correcting that it was actually Ada not PL/I.

# **1.5.2 A Critique of the TCP/IP Reference Model:**

The TCP/IP concept and protocols does not exist without flaws. First, the model fails to distinguish between the ideas of services, protocols, an interfaces. A good software engineering practise necessitates distinguishing between the specification and executions, which OSI paradigm did precisely but TCP/IP did not. As a result, the TCP/IP paradigm does not serves the purpose of a guidebook for building new networks with emerging technology.

Secondly, the TCP/IP paradigm is insufficiently generic to describe protocol stack except the TCP/IP. For instance, portraying the functionality of Bluetooth using the TCP/IP paradigm becomes unfeasible.



Thirdly, the host-to-network tier does not actually constitute the layer in the general sense as it is mentioned on account of layered protocols. The host-to-network tier serves the interface between the network and the data link tier. The compare and contrast between an interfaces and layers is an important part and must not be taken carelessly.

Fourthly, the physical and data link layers are not distinguished (or even mentioned) in the TCP/IP paradigm. These layers are entirely different. The transmitting qualities of copper cables, fibre optic cables, and wireless transmission are all addressed by the physical tier. The functionality of the data link tier is the delimiting of the start and end frames to transmit them from one end to the other end with certain level of fidelity. Both layers should be included as different layers in a realistic paradigm. This is not supported by the TCP/IP paradigm.

Finally, even the TCP and IP protocols were well planned and executed, the rest of the protocols are still temporary. The Adhoc protocols are improvised over time by fresh graduates until they got restless. The protocol executions were freely disseminated, resulting in extensive usage, deeply established, and consequently difficult to alter. Some of them are now an embarrassment. TELNET, for example, was developed for a mechanical Teletype terminal that could output 10 characters per second. It has no concept of graphical user interfaces or mouse. Nonetheless, it is still widely used 25 years later.

#### **IN-TEXT QUESTIONS**

- 7. How many layers are supported by TCP/IP reference model?
- 8. OSI stands for \_\_\_\_\_\_
  a) open system interconnection b) operating system interface
  c) optical service implementation, d) open service Internet
- 9. TCP/IP model does not have \_\_\_\_\_ layer but OSI model have this layer. a) session layer b) transport layer c) application layer d) network layer
- 10. Transmission data rate is determined by \_\_\_\_\_\_\_\_\_\_a) network layer b) physical layer c) data link layer d) transport layer

## 1.6 SUMMARY

This chapter starts with an overview of the OSI reference model. It provides thorough knowlege of the various layers and functionalities of the OSI reference model. The chapter emphasizes on the clear understanding of how the communication occur in a network. In addition, it also discussed the TCP/IP model. The TCP/IP and OSI models were compared, along with their similar and distinguished features.

In a nutshell, inspite of all its shortcomings, the OSI model devoid of the session and presentation levels has proved to be an essential part for understanding computer



networks. The protocols of OSI, on the other hand, have not gained popularity. TCP/IP is the inverse: the model is virtually non-existent, but the protocols are broadly utilised and discussed. Because the computer experts preferred to hold all the cards, hence we will utilize a modified OSI model in this book however will emphasize on TCP/IP and associated protocols, as well as on the latest ones such as 802, SONET, and Bluetooth.

# 1.7 GLOSSARY

Network: A group of computers sharing resources located on or provided by network nodes.

**Protocol:** An established set of rules that determine how data is communcated between different nodes in the same network.

# 1.8 ANSWERS TO IN-TEXT QUESTIONS

- 1.07
- 2. Network layer
- 3. Data link layer
- 4. Session Layer
- 5. Presentation Layer
- 6. Application Layer

- 7. 048. Open system interconnection9. Session Layer
- 10. Physical Layer

# 1.9 SELF-ASSESSMENT QUESTIONS

- 1. Explain the two ways in which the OSI reference model and the TCP/IP reference model are the same. Now list two ways in which they differ.
- 2. Discuss the main difference between OSI and TCP/IP reference models. Illustrate your answer with relevant examples.

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# M-104- INFORMATION AND COMMUNICATION TECHNOLOGY APPLICATIONS IN LIS (THEORY)

# **UNIT V: Emerging Technologies in Libraries**

# **LESSON 9**

# **Expert Systems in Libraries**

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 What is an Expert System?
  - 1.3.1 Applications of an Expert System
- 1.4 Components of an Expert System
- 1.5 Features of an Expert System
- 1.6 Developing an Expert System1.6.1 Stages involved in the development of an Expert System
- 1.7 Application of Expert Systems in Libraries
- 1.8 Summary
- 1.9 Glossary
- 1.10 Answers to In-text Questions
- 1.11 Self-Assessment Questions
- 1.12 References
- 1.13 Suggested Readings

# **1.1 LEARNING OBJECTIVES**

In this lesson, the students will study about the concept of the Expert System, which has evolved from Artificial Intelligence (AI) technology which has introduced a new paradigm for dealing with knowledge and reasoning processes in human experts. After reading this lesson, the students will be able to define and explain the Expert System and its application in Libraries. The students will also study the basic components of an Expert System and the various stages involved in developing an Expert System.

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# **1.2 INTRODUCTION**

Expert systems are computer-based systems that utilize knowledge and reasoning techniques to solve various problems which normally require human intelligence. The knowledge obtained from experts and other primary and secondary sources such as textbooks, journal articles, manuals and databases is entered into the system in a coded form, which is then used by the system's inferencing and logical reasoning processes to offer advice as per the request (Morris, 2011).

# **1.3 WHAT IS AN EXPERT SYSTEM?**

Expert System is linked with Artificial Intelligence. Artificial Intelligence (AI) may be defined as programming a computer to perform activities that, if done by a person who be "thought to require intelligence. Artificial intelligence brings together computer scientist and engineers and psychologists in "various areas of its potential application. A major thrust of AI is to develop artificial intelligence in the development of computer so that it can work like human intelligence such as reasoning, learning, and problem-solving. The fields of Artificial Intelligence include the areas of natural language processing, robotics and expert system.

It is also called knowledge-based information system. It is an area of artificial intelligence (A.I.) that can claim a large responsibility for the current artificial intelligence awareness and also beneficial to the information system in the organization and so it is called an expert system,

An expert system contains knowledge about a particular field to assist human experts or provide information to people who don't have access to an expert in (the particular field. Human experts in any field are frequently in great demand and are therefore remains always" in short supply. The scarcity of expertise is limited to medicine. Whether you are repairing an automobile, drilling an oil well, or a chemical process, there are times when you can access the knowledge, experience and judgment of an expert, which is valuable access in that field.

Expert systems are computer-based systems that simulate human decision-making. They can integrate with information systems to improve their accuracy and performance (Singh et al., 1996).

Sometimes problems are so complex that an expert system is required. An expert system is an artificial intelligence computer program specially designed to assist 'human expertise in an particular domain (area of expertise).

An expert system has the following needs:

(i). New approach to business organization.

(ii). Expertise



(iii). knowledge

(iv). Competence

(v). Smart Automated equipment (Hardware and computer)

Expert system acts as intelligent assistance to human experts as well as assisting people who have not access to experts.

### **1.3.1** Applications of an Expert System

rsity of Delhi Expert system has the following applications in different fields:

- Prediction: In Weather forecasting, Crops estimation. •
- Diagnosis: In Medical Field, Electronics Items.
- Designing: In Circuit designing, budgeting.
- Planning: Automatic programming, Military planning. •
- Debugging: Computer software.
- Replace: Computer automobile.
- Control: Air traffic control, Simple traffic control.
- Troubleshooting: Hardware etc.
- Organizing: Management tools.
- Production: Manufacturing unit.

#### **COMPONENTS OF AN EXPERT SYSTEM** 1.4

There is no standard expert system because various techniques are used to create an expert system. Every expert system differs from the other because they have different programmers for developing an expert system. Also, a different problem occurs during the development of an expert system.

Generally, three components are used in any expert system, which are standard solutions to all problems.

### These components are:

- The Knowledge base
- The Inference Engine
- User Interface

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Fig. 1: Components of Expert System

### 1) Knowledge Base:

The knowledge base in an expert system contains codified knowledge, which is structured differently from book knowledge. Usually, the knowledge base of an expert system contains 'facts' and the relation between them. There are two kinds of facts: public facts and heuristics. Public facts are generally known as published rules (generally available) and agreed knowledge, e.g. cataloguing rules. Heuristics are the human expert's personal (and often unwritten) knowledge (e.g., skills in cataloguing). The major difference between 'conventional' database and expert system database methodology is that a knowledge base of an expert system is more creative (Dubey, 1996).

Early in the history of Artificial Intelligence, many scientists believed that by simulating the process of human reasoning, computer could solve the problem without hearing the access of large amount of specific knowledge. This attempt was unsuccessful. The current approach taken by AI scientists developing an expert system is the; opposite of the initial report. It is now considered vital that if an expert system is to give intelligent advice about a particular domain, it must have too much knowledge from its domain to process the system.

The component of expert system that contains the system knowledge is called, its knowledge. This element of the system is critical in the way that most expert system are constructed by using this component and so they are popular as knowledge based systems.

A knowledge base system contains both declared knowledge (facts about objects, events, and situations) and procedure knowledge (information about course of action).

It is the most important element of an expert system. The major factor in the knowledge base is how the knowledge is represented; it contains both the facts that describe the problem area and knowledge representation techniques that fit these facts; into a logical manner. The knowledge base contains the information and rules that the expert system uses to make decisions.

Depending upon different rules, the expert system will use the different rules, if these rules may apply in different decisions in different situations. For example, If an "expert system



contains 50 rules. Decision 1 may use 8, 12. 42 and 46 rules. Similarly, "For decision 2, we may use rules 1, 7, 22, 32 and 40.

Two systems represent the knowledge base:

(i) Rule-based Systems: These generally consists of certain rules and a database which is continuously updated as the problem is being solved.

Basically rules generate the actions to be taken on the prevailing 'conditions'- If 'condition 1 differs, then the action courses also differentiate. ofDella

For example:

If SMITH is an analyst

THEN he needs a workstation

ELSE he needs another system

(ii) Frame-based Systems: A frame-based system represents knowledge using a network of nodes. Each node represents an attribute and a value associated with each node. A different rule of a set may not be Delinked from each other, but their logical relationships can be easily maintained

#### 2) Inference Engine:

Inference engine stands between the user and the knowledge base. It performs two major tasks: first, it examines existing facts and rules, and adds new facts wherever possible, and secondly, it decides the order in which inferences are to be made. In doing so, the inference engine conducts the conclusion with the user (Dubey, 1996).

The inference engine components of an expert system controls how and when the information in the knowledge base is applied. Simply knowledge does not make you an expert; you also must know how and when to apply appropriate knowledge. The inference engine decides which heuristic search techniques are used and determines how the rules in the knowledge base are applied to the problems. Ineffective and inference engine also runs an expert system by determining which rules in the knowledge base is executing and when and why it will be executed.

## 3) User Interface:

User interface is one of the important components which enables the user in communication with the expert system. Most of the expert systems are interactive and need users to input information about a particular situation before they can offer any advice. Most of the existing user interfaces of expert systems are menu-driven, accepting single words or short phrases from the human user (Dubey, 1996).



The most sophisticated expert system becomes useless if there will be no user for the communication of the expert system. The expert system's component that communicates with the user is known as the user interface. The communication performed by user interface is bidirectional. A user is expected to perform additional function. Note that a user interface must be GUI (graphic user interface) based.

Also user interface creates an environment to answer all the queries by the user. From time to time, all the error messages and the error handling technique be available through the user interface.

### **IN-TEXT QUESTIONS**

- 1. Expert System is linked with Artificial Intelligence. True/False
- 2. The fields of Artificial Intelligence include the areas of natural language processing, \_\_\_\_\_\_and \_\_\_\_\_.
- 3. \_\_\_\_\_are computer-based systems that simulate human decision making.
- 4. The component of the expert system that communicates with user is known as\_\_\_\_\_.
- 5. The \_\_\_\_\_\_ in an expert system contains codified knowledge which is structured in different manner from book knowledge.

# 1.5 FEATURES OF AN EXPERT SYSTEM

Each expert system has its own particular characteristics. There are several features common to many systems. Every feature plays an important role for the development of an Expert System. These features are:

1). The program should be useful. An expert system should be developed to meet a specific need.

2). The program should be in a usable form, i.e. It is usable for the designing of a new system.

3). An expert system may be used by non-experts, who should be able to increase their own expertise by using the system.

4). An expert system should be able to explain the reasoning process such that it creates some conclusion and allows the user for further investigation.



5). An expert should be able to answer questions about the point that may not be clear to users.

6). The programmer should be able to learn new knowledge about the field. It asks you questions of such type that you gain additional information.

7). An expert system is of such type that you should able to revise the knowledge of an expert system easily and correct errors or add new information to the expert system.

# **1.6 DEVELOPING AN EXPERT SYSTEM**

It is very difficult to develop an expert system. Some times, a few months or more than a year time may be required for the development of an expert system.

There are two categories of people required for the designing and the development of an expert system:

inte

- (i) Knowledge engineer
- (ii) Domain Expert

Knowledge engineer and domain expert both work together to design an expert system. In other words, these are the two sides of a coin and goes side by side till goal will achieved. A knowledge engineer is an Artificial Intelligence (AI) specialist and a Domain expert is an individual who has experience in a particular area or domain. A Knowledge engineer must have the good knowledge of a particular computer language.

### **1.6.1** Stages involved in the development of an Expert System

There are mainly five stages to develop an expert system:

- Identification
- Conceptualization
- Formulization
- Implementation
- Testing

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Fig. 2: Stages involved in the Development of Expert System

### I). Identification:

In the identification stage of the development process, the knowledge engineer and Domain expert work together closely to describe the problems the expert system intends to solve. The description may be revised several times before both of them are satisfied with it. Also, additional resources, such as other experts, other knowledge engineers and reference material, are identified in the identification stage.

### 2). Conceptualization:

In the conceptualization stage, the knowledge engineer frequently' creates a diagram of the problem to depict the relationship between the objects and processes in the problem domain graphically. It is often helpful at this stage to decide: the problem into a series of sub-problems and to diagram both the relationships among the pieces of each subprogram and the relationship among the various sub-programs'. During conceptualization, it is sometimes necessary to revise the system.

### **3). Formulization:**

In the formulization stage, the knowledge engineers select the development techniques for the expert system. Also, it selects the tool used to form an expert system. In this stage, Ai researchers are looking for ways to reduce the amount of time.

### 4). Implementation:

During the implementation stage, the formalized concepts are the programs that are compiled and executed into the computer chosen for system development.



#### 5). Testing:

A testing process is used to verify that the system has been constructed correctly. Testing provides an opportunity to identify the weakness in the system's structure and implementation and make the appropriate corrections. In the testing phase, also the knowledge engineer revises the structure, if any problem occurs during implementation. Implementing an expert system is not successful until the system provides valid solutions as valid as those of a human expert.

## 1.7 APPLICATION OF EXPERT SYSTEMS IN LIBRARIES

Expert systems have been used successfully in commerce and the knowledge domain (in finding faults in vehicles and computers), and increasingly they are being employed in service sectors including medical health care. Much research is going on today on Librarian Robots in the area of services. The Librarian robots can be used in large libraries. This robot reduces a lot of common and duplicate activities in different places of the library, especially at the library's repository. For example, this robot can be helpful in shelf-reading activities (Asami, Ko and Nowkarizi, 2021). Today the technology can boast a wide range of application areas in the field of library and information systems, some of which are discussed below:

#### i. Library Administration

Library management and its activities apply to repetitious and time-consuming activities. Hence, many libraries are moving toward automation of their activities to increase efficiency and effectiveness. Library administration deals with several complex problems daily. Some of these includes budgeting, staff, and planning various library activities. During budget constraints, the administrator must determine what items may be reduced or cut and how much quantity. Whether manpower should be reduced or whether subscription of some serials should be cancelled? An expert system could help assist the administrator in making such important management-related decisions. An Expert system may can developed which is composed of the heuristics (rules-of-thumb) that the librarians can use to make such decisions (Morris, 1992).

### ii. Staff Management

An expert system might be useful in the recruitment and selection of new staff or in promotion and placement activities. Using certain specific criteria such as qualifications and experience required for the job, an expert system could be developed to assist in the recruitment and selection process. An expert system could



be developed to determine which staff members should receive appraisals or dismissal (Morris, 1992).

#### iii. Planning

An expert system using information from existing or new patterns and type of material usage could help to plan for remodeling or reforming the new facilities. The system would help the administrator to determine where the circulation desk should be located, where the photocopier should be placed, and which place is best suited for the OPAC terminals so that the users can utilize the terminals more efficiently (Holthoff, 1985).

#### iv. Technical Services

One of the most important areas for developing expert systems in libraries is technical services. There is many research in this area which shows the focus of researchers and the community towards the advancement of Technical services like cataloging, classification and collection development in the libraries (Kemp, 1988).

#### v. Cataloging and Classification

Expert systems have been developed to create MARC record and to apply some of the rules in AACR-2 for cataloging. Roy Chang developed a cataloging expert system based on the rules in AACR-2. He determined its usefulness was limited because the system had no means of interpreting the rules. In this opinion 'cataloguing problems today are too widespread for employing an expert system (Chang, 1990).

Classification is also a difficult area for an expert system: While there are guides to determine classification numbers and subject headings, there are no strict rules available, and the relationship between objects and classes are often ambiguous. Research is progressing in developing systems for assigning subject headings and class numbers (Travis, 1990).

#### vi. Collection Development

There are only two possible responses when one considers new materials for acquisition or old materials for discarding; yes or no. It is easier to develop an expert system with only two possible responses. There has been at least one successful attempt at building an expert system for collection development at Applied Physics Library (Debrower & Jones, 1991).

#### vii. Reference Services

Expert systems would be useful for assisting patrons in locating materials and information. Expert systems may prompt the user for the type of information needed and display materials that may contain it (Kemp, 1988).

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# 1.8 SUMMARY

The usefulness of expert systems in library and information science will depend on the availability and efficiency of the libraries' latest software and hardware facilities. The libraries need to develop, purchase and maintain interactive knowledge-based expert systems to serve their clientele (Singh et al., 1996). The study and analysis of users' information-seeking behavior can prove very beneficial to design expert intelligent systems in libraries. We can use expert and intelligence systems in variuoslibrary activities and information services. These activities may include the provision of information resources, the organization of information from library systems, reference and information services, and circulation activities (Asami, Ko and Nowkarizi, 2021).

### **IN-TEXT QUESTIONS**

- 6. \_\_\_\_\_\_and \_\_\_\_\_both work together to design an expert system.
- 7. A Knowledge Engineer must have good knowledge of a particular computer language. True/False
- 8. Expert systems have been developed to create MARC record and to apply some of the rules in AACR-2 for\_\_\_\_\_.

# 1.9 GLOSSARY

Artificial Intelligence: The theory and development of computer systems able to perform tasks usually requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

**Component:** a part or element of a larger whole, especially a part of a machine or vehicle.

**Domain Expert:** A domain expert is a person with special knowledge or skills in a particular area of endeavor (e.g. an accountant is an expert in the domain of accountancy). The development of accounting software requires knowledge in two different domains: accounting and software.



**Expert System:** A piece of software which uses databases of expert knowledge to offer advice or make decisions in such areas as medical diagnosis.

**Knowledge Engineer:** A knowledge engineer is a professional engaged in the science of building advanced logic into computer systems in order to try to simulate human decision-making and high-level cognitive tasks. A knowledge engineer supplies some or all of the "knowledge" that is eventually built into the technology.

**User Interface:** This means how the user and a computer system interact, in particular, the use of input devices and software.

# 1.10 ANSWERS TO IN-TEXT QUESTIONS

1. '	True
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2. Robotics and Expert system

3. Expert systems

4. User Interface

6. Knowledge Engineer and Domain Expert

8. Cataloguing

7. True

5. Knowledge base

# 1.11 SELF-ASSESSMENT QUESTIONS

- 1. What is an Expert System? Explain in detail.
- 2. What are the Components of an Expert System? Give a detailed description.
- 3. What are the Applications of Expert Systems in Libraries?
- 4. What are the stages involved in the development of an Expert System?
- 5. What is Artificial Intelligence? Elaborate.

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#### M-104 Information and Communication Technology Applications in LIS (Theory)

#### **UNIT V: Emerging Technologies in Libraries**

#### Library Security Technology: RFID, Barcode, Smart Card

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Library Security
- 1.4 Barcode Technology
  - 1.4.1 Types of Barcodes
  - 1.4.2 Barcode Scanner
  - 1.4.3 Use of Barcode in the Library
  - 1.4.4 Benefits and Limitations of Barcode

#### 1.5 RFID System

- 1.5.1 Definition of RFID
- 1.5.2 Components of RFID
- 1.5.3 Current Use of RFID
- 1.5.4 Benefits of RFID Technology
- 1.5.5 Problems with RFID Technology
- 1.5.6 Latest development in RFID
- 1.6 Smart Card
- 1.7 Summary
- 1.8 Glossary
- 1.9 Answers to In-text Questions
- 1.10 Self-Assessment Questions
- 1.11 References
- 1.12 Suggested Readings

### **1.1 LEARNING OBJECTIVES**

This lesson presents a brief overview of Library security technologies, such as RFID, Bar Code, Smart Card, etc. This lesson will teach students about what is RFID technology, RFID components, applications of RFID in Libraries, etc. The lesson also focuses on the use of Bar Code, Smart card applications in libraries for providing efficient library services and security of library collections.

### **1.2 INTRODUCTION**

Library is a "temple of learning" that significantly contributes to societal advancement. Academic libraries' collections include a wide variety of materials, including journals, books, pamphlets, CDs and DVDs, patents, reports, theses, etc. Various factors such as environment, atmospheric hazards, natural disasters, patron and staff behaviour, etc., might damage library collections. Therefore, valuable resources of the libraries need extra care in terms of security. With the help of ICT, various library security technologies and systems are available in the market which can be used in the libraries. At present, the adoption of a preventive security system is the best policy for avoiding any mishappenings in the libraries. The academic libraries must acquire modern electronic security gadgets to control and avoid the physical, environmental and technological risks which inversely effect the smooth running of library services.

Libraries have been early adapter of various ICT applications since the beginning. RFID is providing various advantages to the libraries and many institutions around the world have either implemented or in the process of implementing this technology. So it is high time to learn in details about RFID, Bar Code, Smart Card, etc.

### **1.3 LIBRARY SECURITY**

Since its inception, the library has utilised a variety of security measures. It has both contemporary technological technology and traditional manual systems. Traditional security systems are based on humans, whereas, modern security systems are made by technological support. These systems can help prevent unauthorized removal of collections and makes feasible the monitoring and detection of the users in general reading and reference rooms, as well as shelves area.

Traditional and Electronic Security Systems	Electronic- Modern Security Systems
• Locks & Key system	CCTV cameras
• Installing Grills and Net on Windows	Electronic recording
• Single Door Entry-Exit for Staff &	• RFID system

**Table 1:** Types of Security Systems in Academic Libraries

User	
• Security Guards Employed to Patrol	• 3M exit detection
Security Guards Employed to Patrol	Alarm systems installed
• Fire Extinguisher & Security Equipment	Moisture sensor
• ID Cards and Access Authorization	Moisture sensor
• Signature of Every user	• Fire /smoke sensor
Security Clearance procedure	Biometrics
	Smart Card
	• Air conditioner for Humidity control

### **IN-TEXT QUESTIONS**

- 1. What are the different Types of Security Systems in Academic Libraries list any five
- 2. Difference between traditional and modern Security Systems?

# **1.4 BARCODE TECHNOLOGY**

Barcoding is a computer-aided process of generating codified information, which is subsequently printed on predefined stationery, invariably on a self-adhesive label for several later applications. It is an automatic identification technology. Barcode is a preferred format of dark bars and white spaces. It is structured to contain specific piece of information. It allows real-time data to be collected accurately and rapidly. Combination of barcode technology with computer and application software improves performance, productivity and profitability.

#### **1.4.1** Types of Barcode

Generally there are two types of barcode, which are discussed below:

#### **One-Dimensional (1D) Barcode:**

Barcodes representing data in the widths (lines) and the spacings of parallel lines such as Code128, Code 39, and UPC, are referred to as Linear or 1D (one-dimensional) barcode symbologies.

• Holds less than 85 characters (symbology specific character limit).

- A majority of customers are set up to use Linear barcodes (Linear scanner).
- Creates a wide barcode.
- May be difficult to scan from phone and tablet cameras.



Fig 1: 1D Barcodes

#### **Two-Dimensional (1D) Barcode:**

Two-dimensional (2D) barcodes, such as Data Matrix, PDF417, and QR Code, may have patterns of squares, dots, hexagons and other geometric patterns. While maintaining a fairly small size, these barcode types hold much more data than linear barcodes. 2D barcodes can hold hundreds of characters.

- Encodes/holds hundreds of characters.
- Requires a 2D barcode scanner.
- Creates a smaller barcode than 1D.
- Easily scanned from phone and tablet cameras.



**Fig2: 2 D Barcodes** 

#### 1.4.2 Bar Code Scanner

Barcodes come in various sizes, shapes and forms, and you need a barcode scanner which can scan it all quickly. A bar code scanner comes with fast sensors that can read complex code in less than seconds. A Barcode scanner also known as barcode reader interprets a Barcode by scanning a light source across the Barcode and calculating the intensity of light replicated back by the white spaces. The pattern of replicated light is identified with a photodiode which produces an electronic signal that exactly matches the printed Barcode pattern. This signal is then construed back to the original data by inexpensive electronic circuits.



Fig 3: Barcode Scanner

#### **1.4.3** Use of Barcode in the Library

Barcode technology plays an important role in automating the functions of the library, especially the circulation process. Application of Barcode increases the speed and accuracy in operations. Barcode technology provides a simple and inexpensive method of encoding text information that is easily read by inexpensive electronic readers. Barcoding also allows data to be collected rapidly and with extreme accuracy

#### How does Barcode work?

As we know that a Barcode is a square or rectangular image containing a series of parallel black lines and white spaces. The information is programmed among the length of each shaded line and the space between them

- A scanning device uses a laser to "read" the Barcode by scanning in the unique bar of shaded lines.
- A Barcode scanner reads the lines from left to right.
- A Barcode scanner reads the pattern of black and white bars which turns the information in the binary code (0 or 1).
- The computer reads the information in the binary forms only and the same is displayed on the screen of the monitor.

#### **1.4.4 Benefits and Limitations of Barcode**

The main aim of today's libraries and resource centres in adopting Barcode technology is to improve library procedures by increasing the efficiency of library transactions, reducing workloads of the library staffs, and improving services for library users. Data obtained through Barcode is available rapidly and precisely, Barcode reduces the possibility of human errors, Barcode is inexpensive to design and print and promote better verdict making. Despite the benefits of Barcode in libraries, there are few shortcomings, having Barcode does not guarantee the effectiveness and efficiency of services rendered.

#### **IN-TEXT QUESTIONS**

- 3. Discuss different types of barcodes
- 4. Write down advantages of using bar codes in The libraries
- 5. Barcode provides security of Library Collections? Yes/No

## **1.5 RFID SYSTEM (Radio Frequency Identification Technology)**

Most of the time of the library staff is taken up by the circulation and shelving of the reading material in a library. Most of the libraries around the world are using barcode technology for circulation management due to its low cost. However, the main drawbacks of barcode technology are:

- 1. that it always requires a line-of-sight
- 2. It does not provide security of library collection,

#### 3. It does not help in collection management

Thus, it is becoming very difficult for the libraries to satisfy the increased demands of the users. So the need for a new technology arises, so as to improve the library circulation management, for inventory control and enhanced security of library collections. RFID provides a solution to such a problem, by reducing the amount of time required to perform circulation operations. As the librarians are always known to embrace latest technology, they have started using RFID to provide circulation services in a more effective and efficient manner, for security of library collections and to satisfy the increasing demands of the users.

#### **1.5.1 Definitions of RFID**

- According to Brown, "RFID is an automatic identification technology that put "tags" on objects (documents, people, animals, vehicles, containers, etc.) so they can be identified, tracked and managed automatically utilizing radio frequency equipment and supporting computer systems".
- According to MacMillan Dictionary (online)," RFID is a technology that uses labels that produce radio signals to identify things such as goods, farm animal s and vehicle. RFID has replaced bar codes in some shops."
- According to Automatic Identification and Data Capture (AIDC), "Radio Frequency identification is a technology that uses radio waves to transfer data between a reader and an electronic tag which is attached to a particular object. Typical uses are for object identification and tracking."

#### 1.5.2 Components of RFID System

#### **RFID** Tag

An RFID tag, also referred to as transponder, smart label, smart tag, or radio barcode, is a tiny radio device. The two main components present of an RFID tag are: a small silicon chip or integrated circuit which contains a unique identification number (ID) and an antenna that sends and receives radio waves. The antenna contains a flat, metallic conductive coil and a chip which is less than half a millimetre in size.

#### **Readers and Antenna**

The interrogator or reader is the second component in a basic RFID system. Reader units are technically transceivers (i.e. both a transmitter and a receiver) and their role is to send a query to the tag and also to receive data from it. The RFID reader converts radio waves received from RFID tags and passes it to the middleware software. An RFID tag reader uses antenna for communication with the RFID chip. It can read as well as update information stored in the RFID tag. Hence, an RFID reader does both the tasks of receiving commands from the application software and communication with tags.

Middleware
The Middleware manages the flow of information between the backend and the readers. They extract data from the RFID tags and manage data flow to the backend, as well as they perform the function of basic filtering and reader integration and control. The middleware assist in retrieving data from readers, generating inventory movement notifications, monitoring tag, capturing history and analyzing events read by tag for application tuning and optimization.

#### Server

RFID system may be configured on a server which then acts as a communication gateway among the various components of RFID. It performs the function of receiving information from the readers, checks the information against its own database or exchanges it with the circulation database of the LMS. The server is typically a transaction database so that reports can be created.

#### 1.5.3 Current Use of RFID

RFID systems have been used quite extensively for various types of applications such as tracking, identification, access management, etc. Currently, RFID is being used in different areas, i.e., product distribution chain, manufacturing inventory accounting and control, hospital patient identification, patient treatment and medication recording, library, museum, art gallery item identification, logging, security and control, smart card technology, commodity purchase, travel cards, police investigation evidence tagging and location, mass transport carrier baggage handling, asset management and tracking, motorway tolls, food and pharmaceutical 'best before date' control , pharmaceutical authentication, animal tagging and passports, etc. Some of the applications of RFID are discussed below:

#### **RFID** in Healthcare Sector

In a hospital environment, RFID has been used in tracking equipment, tracking patients and tracking staff. With the use of RFID technology, it is possible to save many lives and prevent harmful situations. RFID technology has been used in managing or storing various resources like blood samples, drugs and patients. All the medical equipment attached with an RFID tag allow locating the equipments dynamically, stopping theft and reducing time to find assets and increasing utilization of the equipments. The number of staff needed to search for lost or misplaced equipment can drop significantly, resulting in significant manpower savings. By using active RFID wrist band tags, the patient can be easily tracked across hospital and their movement can be controlled from unwanted/restricted places. In addition, RFID can track patient admission, discharge and transportation.48 In Pharmaceutical sector, an RFID tag provides logistics benefit to manufacturing units and electronic pedigree in distribution units and also prevents theft. Called the "Nurse Nanny" by some, RFID systems help hospitals control staff cost. In addition, the system can track how much time the staff members are actually spending with their patients.

#### **RFID** in passports

To maximize security in US sea borders and land crossings, US Passport cards are now equipped with RFID chips that store personal information and identification of the travelers in a secure government database. In 2008, the US began implementing the use of RFID-tagged passports. Passport card contains RFID chip that does not reveal any information about the

traveler. With the help of an antenna and RFID readers installed in the vicinity, pertinent information about the traveler such as name, age, nationality, sex, place of birth, date of birth and photograph can easily be detected.

#### **RFID** in supply chain management

In today's retail market, accurate identification and tracking of goods is essential. More than ever before, there is pressure on manufacturers, distributors and retailers to maximize efficiency, minimize cost and provide the best possible value to the end-customer. RFID is being used to manage products through production, distribution and retail. Manufacturers can especially benefit from implementing RFID application in supply chains because they can decrease costs associated with product tracking and inventory management and increase the accuracy and timeliness of inventory data. RFID application in distribution can be used to monitor and manage the movement of the finished products throughout a supply chain. RFID tags can be attached directly to the items and materials or they can be attached to the containers that carry them. RFID application in retail can greatly aid in reducing the cost of keeping accurate inventory data. With fewer people and less time, retailers can keep accurate inventories. Associates can spend more time providing service to customers rather than counting products. RFID applications are also a significant aid in deterring theft in retail environments. Items tagged with RFID devices can trigger alarms when they are removed from the store without being properly deactivated. RFID applications have been successfully deployed for anti-theft purposes for several decades. It also offer solutions when it is impractical to use other technologies or c o manual labor to collect data. Thus, RFID enables the enterprises to achieve improved tracking and visibility of high-value items from the source to the destination, reduced errors in shipping of goods to wrong places, inventory visibility and efficient stocking of goods, improved production planning and smarter recalls and therby reducing counterfeit products.

#### **RFID** in toll payment systems

Toll delay is one of the major contributors of road congestions. Application of RFID in toll payment system proves to be an effective, easier, faster and efficient toll collection solution that eliminates delay in toll payments. RFID system helps in identifying and classifying vehicles through the antenna mounted on toll collection stations. Through the RFID Tags attached to the vehicles, the system is able to determine some of the vehicle's important information such as the vehicle's chassis, plate number, year model, color, body type, owner's name, franchise, late registration date, route and its engine number, etc. The utilization of RFID system secures travelers with less road congestion and traffic delay due to the elimination of toll interruptions.

#### Application of **RFID** in libraries

Barcode technology is one such tool, which is being used to improve the efficiency of libraries all over the world. RFID is an identification technology; it does the same job as barcodes but offers potentially a lot more. While RFID technology is not new, the use of RFID technology in libraries is new. Singapore Public Library is probably the first library to implement the application of RFID technology in 1998. The use of RFID by libraries all over has grown drastically in the last few years. The RFID technology by libraries has made it possible to inventory thousands of items available in their collections in a few days instead of taking months. In addition, it allows users to check out and return library items at any time of the day. Besides keeping collections in better order, speeding up checkouts and eliminating

repetitive strain injuries among librarians, RFID provides a control on theft, non returns of library items and also misfiling of a library's assets. The use of RFID by libraries over the last few years has grown dramatically. A large number of libraries in developed countries have adopted this technology and due to its usefulness and efficiency, libraries in the developing countries like India have also started implementing RFID in libraries.

#### 1.5.4 Benefits of RFID Technology

#### Circulation

The circulation of materials is the primary area in libraries where RFID is used. Rather than the barcode systems commonly in use in libraries RFID has a number of advantages. In case of Barcode the user has to align the barcode with the infrared beam for the reader to read it. The Barcode systems used vary in how precise this presentation must be, and therefore it takes time to align the item for reading. RFID does not require any alignment. Items can be placed in any position across the check out pad and thus issue is relatively quick. RFID has made possible faster check out materials and easy to learn self check-out so that they can perform better even with less staff. Some of the benefits are: queues at circulation desk /counter are reduced and the library can provide the facility of long hours of circulation without any additional staff. The library staffs are freer to provide other users' services with the implementation of RFID system. It saves time of the library staff, as well as that of the user and the number of staff required to manage circulation desk is also reduced.

#### **Collection development**

Collection development is a vital process in creating and building a library qualitatively. Collection development involves the identification, selection, acquisition, and evaluation of library resources for a community of users. Collection development is at the heart of the mission of libraries. It is in being able to meet the needs of individuals with the "right stuff". The various RFID components such as, Self-checkout / Book drop / DLA etc. provide usage statistics/ transaction reports etc. that can be used as a tool for optimal and qualitative selection/acquisition of library materials, thus making RFID helpful in collection development in libraries.

#### Increased Security

The RFID technology has great security capabilities. The barcode system provides only circulation capabilities, but to create an effective security system along with it some other technology must be used. RFID is an improvement over the barcode systems because the RFID tag interacts with both the security technology and the circulation system. The RFID tag has a security chip that is activated when the item is checked out. The security gates installed read the tags as the user exits the library and alarm is raised if items pass through the security gates that have not been deactivated i.e. if the item has not been issued.

For the past decade or more the "tattle-tape" solution was dominant but was found to be unsatisfactory. The point of concern was in terms of patron service and staff time. The accuracy level of the security gates of previous system was poor, leading to many false alarms. The staff was required to ask users to empty backpacks or bags in search of the source of the alarm because the alarm system could not identify correctly the offending item. When the alarm turned out to be false it was an embarrassing situation for both the user and for the library staff. With the RFID system, most libraries reported greater satisfaction with the accuracy of the security system (fewer false alarms).

#### **Inventories**

RFID systems offer the ability to perform inventory checking function quickly using handheld scanners. It allows the library staff to perform an inventory check without removing items from the shelves as is required when doing an inventory manually or on barcoded items. For the inventory capability interaction between the RFID system and the library's Integrated Library System (ILS) is required. In some cases libraries needed upgrades to their ILS that would permit the RFID system to interact with the library database. Some libraries had bought the inventory taking equipment but had not begun using it. Some libraries were primarily interested in using RFID to inventory particularly the most active areas of their collections whereas others intended to perform full inventories using RFID.

Closely linked with this inventory function is the potential use of portable RFID assistants to find requested items that might have been misplaced. This capability is seen as an increased service to users as well as making it easier for staff to find the requested items. This could also result in savings in terms of time and also because the libraries can fulfill requests from their own collection rather than purchase duplicate copies or making requests to other libraries for the mis-shelved items. It can lead to potentially reduce the amount of staff time spent searching for items that are listed as on the shelves but cannot immediately be located.

#### Cost Reduction

Most of the libraries anticipated reduction of costs for circulation staff. Check-in of items by staff as well as self check-in was expected to be faster, and some libraries reported that the check- in with RFID equipment was more accurate than it had been with the barcode system. Libraries that anticipated a reduction in staff numbers deployed at the circulation desk were looking forward to redeploying staff in other areas of the library and providing a variety of enhanced user services. The staff was expected to be relieved of repetitive motions that shall be achieved through reduction in the frequency of staff used in checking out materials as the users themselves will be doing most of the check out.

#### 1.5.5 Problems with RFID Technology

There are difficulties in RFID adoption and implementation in the libraries. Some of them are

- Cost of the technology is relatively high
- Senior management support is usually lacking
- Staff is hesitant to adopt the new technology
- Library professionals lack ICT expertise
- Many challenges in implementation
- LMS compatibility is required
- Challenges in integration
- Proper RFID standards and protocols are lacking
- Limited RFID vendors in India
- Issue of user privacy

#### 1.5.6 Latest development in RFID.

Similar to other identification technologies such as radio-frequency identification (RFID), barcodes, and QR codes, near-field communication (NFC) is a short-range (4–10 cm) wireless communication technology. NFC is based on the existing 13.56 MHZ RFID contactless card standards which have been established for several years and are used for payment, ticketing, electronic passport, and access control among many other applications. Data rates range from 106 to 424 kilobits per second. A few NFC devices are already capable of supporting up to 848 kilobits per second which is now being considered for inclusion in the NFC Forum specifications.1Compared to other wireless communication technologies NFC is designed for proximity or short-range communication which provides a dedicated read zone and some inherent security. Its 13.56 MHz frequency places it within the ISM band, which is available worldwide. It is a bi-directional communication meaning that you can exchange data in both directions with a typical range of 4–10 cm depending on the antenna geometry and the output power.

NFC is convenient and fast: the action is automatically triggered when your phone comes within 10 cm near the NFC tag and you get instant access to the content on mobile, without a single click.3RFID and NFC technologies are similar in that both use radio waves. Both RFID and NFC technologies exchange data within electronic devices in active mode as well as in passive mode. In the active mode, outgoing signals are basically those that actually come from the power source, whereas in case of passive mode the signals use the reflected energy they have received from the active signal. In RFID technology the radio waves can send information to receivers up to hundreds of meters away depending on the frequency of the band used by the tag. If provided with high amount of power, these signals can also be sent to extreme distances (e.g., in the case of airport radar). At large airports it typically controls traffic within a radius of 100 kilometers of the airport below an elevation of 25,000 feet. RFID is also used very often in tracking animals and vehicles.



# 1.6 SMART CARD

Credit card which has been imbedded with a microprocessor chip. This chip has much more storage capability than a magnetic strip which is typically found on the back of a credit card. The storage capability of a microprocessor chip can reach 100 times that of a magnetic strip. A microprocessor chip can additionally be used to conduct several computing operations including the encryption of data stored on the card, and hence, offering much greater security for private and personal information. A magnetic strip card on the other hand is much more prone to wear and tear and is limited to one application .Smart card technology has been gaining increased popularity over the past few years on a global level. According to a white paper by Acer Support, there were over three billion smart cards already in use around the World as early as the year 2001. Industries utilizing this technology include telecommunications, banking, healthcare, transportation, entertainment and leisure, vending, and education. Smart cards are capable of providing secure identification authentication. They enable citizens to easily carry-around critical personal information, such as health and financial records. They also enable owners the ability to conduct a multitude of different transactions such as the purchasing of products and services through monetary value stored on the card in the form of electronic cash.

Smart cards are becoming more popular within university settings. They enable the joining of several cards into a single smart card. The level of sophistication of utilized applications varies from university to another and universities within certain regions of the World may have varying levels of interest in certain functionality over others. The complexity associated with activating certain applications make it at times difficult to implement, and end-users may not be as willing to spend on the expensive technology.

In the library, for effortless productivity, smart cards are used to allow students to access books easily. At the same time, those smart cards benefit the librarians as well. It allows management of shelved books. The librarian just has to give a quick digital check to see the shelved books. He or she can easily find out the location of every book in the library along with the number of books and other relevant information. These modern technologies reduce the stress of a librarian regarding the potential thefts. With smart cards, students get reminders about the due dates, which decrease the chances of overdue. At the same time, librarians get to maintain an automated collection of due dates for issued books. Smart cards provide a digitized database, including all the records regarding every student who has ever entered the library. So, a librarian can simply make a single search to find the records of students.

# 1.7 SUMMARY

Security is capricious in nature and application, practiced throughout many domains and with heterogeneous actors. Owing to this multidimensional nature, the idea of security is difficult to define. However, the learn about proposed that the notion of protection may additionally be defined when perception the applied context. In addition, by way of developing and offering a consensual body of information within the utilized context, thinking definition may be achieved. Therefore, the study goals have been the tabulation of the understanding classes of protection and the presentation of these inside an built-in framework. Security is most vital to forestall from harm of understanding aid and spent amount on it for users benefit. It is duty of each and every Librarian to put into effect fantastic security device and measures. If a security program is to be effective, there should be huge appreciation of the significance of security to the mission of the repository. Proper safety device ought to put into effect to avoid loss and harm of library series and asset along with body of workers and user security.

Academic libraries have been plagued with security issues for a long time. It is difficult to replace materials that are stolen from the libraries or mutilated as such materials may be out of print or the library may not have the money to purchase a replacement copy. The traditional ways of manually checking patrons' bags are both inefficient and not user-friendly. A better way to deal with security in academic libraries is to embrace the electronic security systems. That will better ensure an effective security of library materials from theft, mutilation, or other forms of crimes.

# 1.8 GLOSSARY

Active Tag: An RFID tag that has its own power source that sends signals to the readers and antennas. Usually has a battery life of 5-10 years.

**Barcode:** A Barcode is a number that is coded in the form of varying patterned lines that is printed on a product or item and read by machines like scanners, phones, and other devices. The lines are read, decoded, and the code is then used to identify the product or item it has been printed on.

**Barcode Scanner:** A device, also known as an optical scanner, that uses a light source (typically a laser) to scan and decode barcodes.

**Frequency:** The rate at which cycles of waves occur in a single second. Frequency is measured in Hertz and 1 Hz is equal to one wave cycle per second. There are several levels of frequencies in RFID tags that are beneficial for different applications. The four frequencies that RFID Tags use are low (135 kHz), high (13.56 MHz), ultra-high (860 – 960 MHz), and microwave (2.4 GHz).

**NFC RFID Tags:** NFC Tags, or Near-Field Communication Tags operate within the HF Frequency on a single frequency of 13.56 MHz. NFC tags are incredibly standardized and operate via ISO 14443 A and B, making them easily adoptable, globally. NFC tags use Near-Field communication (magnetic coupling) to send and receive data at short distances - on a few centimeters or inches.

**Radio Frequency Identification (RFID):** Describes the various methods of using radio waves to identify unique objects. Typically, this interaction happens when a reader communicates with a transponder to retrieve information stored on its microchip.

# **1.9** ANSWERS TO IN-TEXT QUESTIONS

5. No	7. D
6. Radio Frequency Identification Technology	8 A

# 1.10 SELF-ASSESSMENT QUESTIONS

1. Discuss in details about RFID technology, its components and various advanatges and disadvantages of Using RFID technology in Libraries.

2. Explain about various modern library security technologies and comparison between, Bar Code, Smart card and RFID.

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# **UNIT V: Emerging Technologies in Libraries**

# **LESSON 3**

# Video Conferencing and Audio Conferencing

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 What is Video Conferencing?
  - 1.3.1 Why Video Conferencing?
  - 1.3.2 Steps involved in Video Conferencing
  - 1.3.3 Advantages of Video Conferencing System
  - 1.3.4 Disadvantages of Video Conferencing System
  - 1.3.5 Current Trends
  - 1.3.6 The Future of Video Conferencing
- 1.4 Types of Video Conference
- 1.5 Components of a Video Conferencing System
  - 1.5.1 Benefits of IP Based Video Conferencing
  - 1.5.2 Application of Video Conferencing in Libraries
- 1.6 What is Audio Conferencing?
  - 1.6.1 Types of Audio Conferencing
  - 1.6.2 Advantages of Audio Conferencing
- 1.7 Summary
- 1.8 Glossary
- 1.9 Answers to In-text Questions
- 1.10 Self-Assessment Questions
- 1.11 References
- 1.12 Suggested Readings

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# **1.1 LEARNING OBJECTIVES**

In this Lesson, the students will be introduced to the concept of Video Conferencing and Audio Conferencing. After reading this lesson, the students will be able to differentiate between Audio and Video Conferencing system. The students will also study the basic components which are involved in Video and Audio Conferencing. This lesson will also highlight the major advantages and disadvantages of Video and Audio Conferencing system for the users.

# **1.2 INTRODUCTION**

Video conferencing is a live connection or a visual communication session which involves two or more users regardless of their location for the purpose of communication which usually involves audio and video and transmission in real-time. There is a use of multimedia applications in video conferencing that involves two different media in digital form (Umaru and Oman, 2020. p.2). Video conferencing is not just a substitute for face-to-face tutorials rather it can also provide features that are not available in face-to-face to enrich the sessions.

Video conferencing is all around the world. It is widely used to conduct meetings and job interviews, to deliver education and training and it generally overcome the barriers of distance.

# **1.3 WHAT IS VIDEO CONFERENCING?**

'Video Conferencing' is a two-way synchronous communication of sound and vision. With the help of videoconferencing technology, people in different places or locations can see and hear each other in real-time.

In simple words, we can say that 'Video conferencing is the technology which allows transmission and reception of audio and video data over a network for communication between users at different remote locations in real-time.

Video Conferencing allows people to meet and share information without any actual meeting by travelling. With the help of Videoconferencing apart from seeing and hearing we can:

- 1) Display a close-up of pictures, graphs, maps, and small objects.
- 2) Play a video type, DVD, CD.



- 3) Display your powerpoint presentation or other computer files.
- 4) Record your session.
- 5) Collaborate on computer data with others in the session.

# 1.3.1 Why Videoconferencing?

- ➢ It offers real contacts over long distances.
- ➢ It offers real time interaction.
- ➢ It allows body language.
- > The visual contact goes beyond email or other communication.
- > It forces the learner to speak another language.
- ➤ We learn to use multi-media and to integrate a variety of material in their presentation.
- It helps to become more aware of cultures, opinions etc., and increase motivation and self-confidence.

# 1.3.2 Steps involved in Choosing Video Conferencing System

#### i. Intended use for the system

- How do we wish to use the equipment.
- Whom are we going to talk.

# ii. Number of sites

- How many offices do we need to communicate.
- What resources will each of them have at their disposal.

# iii. Number of participants per side

How many people are to participate in video calls.

- What kind of videoconferencing set-up for each location.
- Same videoconferencing set-up for every location?
- More deluxe systems for the headquarters
- iv. Size of the room(s)
  - Where do we want to put the equipment?
- v. Connectivity

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- ISDN, BRI, PRI, T-1, Fractional T, ATM Frame Relay, xDSL, Cable-modem.
- What connectivity best suits and internal communication requirements.
- What connectivity will remote sites make use of?
- vi. What type of systems or formats we will be calling?
  - An ISDN system typically sends and receives voice and video data using the h 320 standard.
  - IP based (network) system typically communicates using the h.323 voice/video standard.

#### vii. Do we need data capability in addition to video and audio?

- ability to only see and talk to the other people.
- Or we require the ability to do collaborative computing and share data.

#### viii. Custom Designed

- OR get a custom designed videoconferencing system to suit a particular videoconferencing requirements.

#### 1.3.3 Advantages of Video Conferencing System

- Reduce travel cost
- Accelerate decision making
- Provide enhanced control of projects
- Improve use of executive time
- Provide cost effective training to remote locations
- Be used as a medium to conduct interviews
- Reinforce close relationships with suppliers, clients and remote staff
- Provide you with the capability to respond to a communication need immediately.

# 1.3.4 Disadvantages of Video Conferencing System

- Technical failures with equipments. If a small amount of time lag occurs during conferencing, it can be disconcerting and even confusing, if not handled effectively.
- Unsatisfactory for complex interpersonal communication.
- Costs may be prohibitive to some potential users due to extra charges for ISDN2 use and protracted on-line tutorial time.
- Acoustical problem within the teleconferencing room

#### 1.3.5 Current Trends

• Video-enabled communication solution are steadily gaining popularity, and this is reflected in the growing market for video conferencing solutions in Asia as well as the rest of the world.

• A typical video conferencing is associated with ISDN room conferencing systems.

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• Things have changed. Video conferencing is today focused on new, enabling technologies that allow us to visually communicate, person-to-person or group-to-group over any network, any protocol, and any device.

• The underlying technologies that make visual communications possible have dramatically improved.

- The video conferencing technology is now shifting from ISDN to IP.
- Currently, more than two-thirds of video conferencing is done through IP networks.

#### **1.3.6 The Future of Video Conferencing**

The most important development in videoconference will be the result of increased bandwidth on Internet based communications. To date, Internet videoconferencing products such as Microsoft's NetMeeting and White Pine's Cuveeme have allowed restricted communications over the Internet with restricted quality video and audio. However this is about to change. These products, and an increasing number of new ones, are about to benefit from the increased bandwidth that ADSL, satellite, optical and radio are going to offer. The net result will be the integration of the two solutions.

These developments will offer educationalists a wealth of new opportunities that will include:

- Lower connection charges the costs of ISDN connection charges will disappear as the connections will be via the Internet. At worst, these will be local telephone charges. It will dramatically reduce 'on line' charges, especially in International videoconferences where, usingISDN, two- six International calls is charged. As the Internet offers Global connectivity, users will no longer have to worry about which country they connect with as the connection charge will be uniform.
- 'Multipoint' videoconferencing will be as cost-effective as 'point to point1 using Internet 'reflector'sites. Education Authorities should now assess the future development and hosting of such reflectors to offer password-protected 'safe' videoconferencing areas to education. The potential of Distance Learning is enormous as the bandwidth increases, offering schools the opportunity to offer elective or required courses for which certified teachers are not available or insituations where student numbers are not sufficient to hire a full time teacher in one campus.
- Videoconference solutions will be easily integrated into existing PC's, allowing communication across an existing LAN, WAN or the Internet. This will allow organisations to implement a flexible solution to internal and external communications using the same equipment. The development of GPRS and UMTS will further enhance communications by allowing the integration of mobile telephony into the system. Groups on a field trip will be able to videoconference with students



back at school or with any group of learners anywhere in the World. This flexibility, coupled with the advantages of application sharing and collaborative software, will offer un-precedented communication.

• Thanks to the new bandwidth offered by these new technologies, the World Wide Web will dramatically change in communication style. Video and multimedia are becoming more widespread on theInternet. Video, as a medium, will become more common place as developers utilize it in sites. Web TV and radio will be areas where schools and educators can disseminate information. Whosoever said video is dead did not read the small print.

# **1.4 TYPES OF VIDEO CONFERENCE**

Videoconference may take place with just one site (called point to point) or with a connection to a number of sites together (called multipoint).

- I. Point to Point: In point to point, videoconferencing between two sites is almost like being there. It is an ideal way for classes or small groups of people to meet and discuss issues. Meetings can be formed or informal because videoconferencing point to point is so easy to use that it wasn't interfere with the flow of conversation. Each of the parties meets at the videoconference room and then it is as simple as and prove call.One group dials the other and the meeting or class is underway.
- II. Multipoint: In multipoint, we can connect several sites if we want to hold a class or meeting between many different locations. It is technically possible to connect 20 or more sites. Multipoint meetings are usually a little more formed than point-to-point simply because of the numbers involved. The chairperson (or coordinating lecturer) controls the meeting so that all sites have an equal opportunity to speak.

A Multipoint Videoconference is connected through a piece of equipment called a Multipoint Control Unit (MCU) – commonly called a 'Bridge'. The bridge can dial out to all sites or each site dials a central number and all parties are connected.

# **MULTIPOINT MODES**

There are two common modes of operation for multipoint videoconferences:



- i. VOICE ACTIVATED: In this mode of operating, any sites that speaks will be automatically seen on the screen. All the sites see the connect speaker and the current speaker sees the previous speaker. The system will also switch to a site at any continuous sound, so it is best for all sites to must their microphones unless speaking.
- CONTINUOUS PRESENCE: This mode allows us to see several sites on screen at once. The screen is usually divided into four and one site appears in each rectangle. This mode is ideal if there is meeting with four other sites with 2-3 people at each site.

Three Main Types of Videoconferencing Systems are as follows (Integrated Video Conferencing):

- I. Room (Roll-about) systems: These are big videoconferencing systems standing in a room, usually containing one or two TV monitors, a camera on top of it and a codec. The system is mostly used in bigger rooms and for a large audience, usually in a distance learning programme with remote guest speaker. This type of system usually work with a 1-3 ISDN connection and has good image and sound quality.
- II. Compact Videoconferencing Systems (Set-top videoconferencing): These are small boxes (the size of a video recorder) containing the codec and different types of Network Connections with video, audio and data inputs and output. The system can be used as a mobile system or as the core system in an existing Audio/Video setting. These systems usually use ISDN protocol but evolve towards IP.
- III. Desktop Systems: Desktop video conferencing (DVC) is a computer based technology combining both voice and video into an interactive format. Desktop system uses multi-media personal computer with special hardware and software. There is a small camera on top of the monitor which can capture 2 to max. 5 people with workable quality images. This type of system is often used with 1 ISDN connection and as a consequence can only transmit less information.

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#### **IN-TEXT QUESTIONS**

- 1. Video Conferencing is a \_\_\_\_\_\_ communication of sound and vision.
- 2. Video Conferencing offers Real-Time Interaction.True/False
- 3. A typical video conferencing is associated with room conferencing systems.
- 4. The video conferencing technology is now shifting from ISDN to
- 5. A\_\_\_\_\_\_is connected through a piece of equipment called a Multipoint Control Unit (MCU) commonly called a 'Bridge'.

# 1.5 COMPONENTS OF A VIDEO CONFERENCING SYSTEM

Any video conferencing system consists of the following major components:

- 1. Monitors: Desktop systems display video in a small window on the computer monitor, much like the movies and other media that we are used to playing on our computers. Portable and fixed systems have one or two large TV monitors, in conference -type settings, large movie or presentation screens can be used, and the video is projected onto the screen. Strings of monitors are also used in large group settings. The monitor is a television screen on which we can see the people at the offer site(s).Some systems use two monitors one to display the people you are talking to and the other to display still images, which may be sent from either site.
- 2. Main Camera: The main camera is usually positioned on or above the monitor. (i.e. could be run time DT Care to their quality model). It can be controlled remotely to focus on participants and capture the images sent to other sites and also have zoom features. The camera can be anything from a tiny desktop camera that sits on top of a computer monitor (desktop system) to a high-quality model with remote control pan and zoom features (room system).
- **5. CODEC:** In simple terms, a codec is any technology for compressing and decompressing data. Codecs can be implemented in software, hardware, or a combination of both. The codec takes the analog video signal and codes (digitizes and compresses). The codec also has to decode (decompress and un-digitize) the received transmission. The most obvious consequence of a slow codec or low-bandwidth connection is a "jerky" picture mid an audio time delay.

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The 'CODEC' is a device responsible for compressing the signal down to a size which canbe transmitted usually 2, 4 and or 6 channels. Each channel transmits 64 kilobits per second (kbps).

- 4. Keypad/Remote/Tablet: The Keypad (or remote or tablet) is used to operate the equipment.
- **5.** Audio: Most high-quality systems come with a microphone designed for use with a small group of people. In many cases, an additional microphone can be connected as well, making the setup more versatile for larger groups or to add mobility. Most systems offer sophisticated diagnostics and processing as a built-in feature to cancel out background noise and echo.
- 6. Control Software: The software for video conferencing is the user interface through which one can interact with the system. This includes a GUI dial-pad, status monitors, the video window, and volume controls. The engine behind the software also does the work of generating dial tones, taking care of the quality of service parameters, maintaining a directory (address book) and other miscellaneous functions.
- 7. H.323 Gateway and Gatekeeper: A gateway device bridges ISDN with the network & a Gatekeeper is an H.323 network component, which maintains a record of all H.323 devices on a network, including their IP addresses & assigned for routing. A H.323 Gateway bridges H.320 and H.323 systems & takes care of the required transcoding between two transport network IP & ISDN(Integrated Services Digital Network). The H.323 standard specifies how the audio, video, data and control information will be assembled into an IP packet.

The standard can work on an ordinary 10/100 Mbps network. The clients using H. 323-based video conferencing need a static IP address so that they can communicate with each other. IP-based transport is simpler because it uses TCP/IP protocol for communication, which is there on most networks and the Internet.

# **Add-on Equipments**

The other pieces of equipment (peripherals) to a videoconference system can be:

- Document camera
- Videocassette recorder.
- Computer or laptop
- ➢ Extra microphones.
- Auxiliary camera.
- ➢ Video-microscope.

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#### 1.5.1 Benefits of IP Based Video Conferencing

- Higher quality Video/Audio: IP video calls offer better quality audio and video than ISDN-based connections.
- Improved Reliability: IP based video calls require only a single connection andtherefore provide improved reliability.
- Dynamic Bandwidth Allocation: IP networks dynamically allocate the available bandwidth based on user and application requirements.
- Centralized Management: As IP video systems are connected to the corporate LAN/WAN, they can often be controlled and managed by centralized management systems.
- Improved Statistics: Corporate IP conferencing environments often use a gatekeeper product to control and track their video-conferencing usage. In addition,gatekeepers can provide detailed usage statistics for all systems on the network.
- Simplified Billing & Cost Allocation: IP based video systems tend to communicate with central management systems and video gatekeepers. These two management devices keep track of each and every call made and received by the video system. By applying basic cost rules to this call detail information, support managers can quickly generate usage-based billing and departmental cost allocations.

# **1.5.2 Application of Video Conferencing in Libraries**

Video Conferencing is also termed as Web Cam Services which is applicable in service deliveries as a solution for communication problems in integrated text based services. On this digital platform the user and librarian can both interact with each other face to face including visual elements. Video Conferencing allows better communication abilities further enhancing opportunities and leads to productive collaboration. There are two main applications that could be used in smart library services for Video Conferencing:

**1. Software Based (Web Conferencing):** This type of Conferencing is best suited for interviews, one on one conversations and meetings. The commonly used software for this type of Video Conferencing includes Skype, Facetime and Google Hangouts etc. This kind of softwares require mostly mobile devices to connect with the other parties.

**2. Hardware Based (Video Conferencing):** These systems are normally more capable and reliable for larger groups or audiences and for more complex setups. In this type of system, the hardware set ups may have multiple cameras, which may be adjusted or zoomed as per the convenience of the person speaking. These set up requires hardwares including computers and projectors (Umaru and Omame, 2020, p.6).



# **1.6 WHAT IS AUDIO CONFERENCING?**

Audio conferencing is the process of using electronic communication medium to conduct the meetings between three or more persons who are communicating using audio only. This type of conferencing is accompanied with multiple options of online collaboration tools, like screen sharing, team messaging and meeting recording etc, which further adds and enhances the value of audio meetings.

Audio conferencing can be conducted either through telephone line or the Internet by using the phones or computer device. If the person only wants to listen then he/she just needs the speakers and if the person wants to speak as well then there is a requirement of a microphone as well.

#### **1.6.1 Types of Audio Conferencing**

There are mainly three types of Audio Conferencing Systems which are as follows:

- 1. **Distributed (Remote) Audio Conferencing**: It connects several participants from different places or locations.
- 2. Local Audio Conferencing: It connects several participants who are located in the same conference or meeting room.
- 3. **Integrated Audio Conferencing:** It brings together those participants who are located remotely or are available at nearby location.

# 1.6.2 Advantages of Audio Conferencing

There are several advantages of Audio conferencing as it is a useful communication tool for everyone in today's digital environment, which includes the following:

• It is a cost-effective communication tool as it is a cheaper alternative for face-to-face meetings and travel.

• It is a reliable communication tool as there are very less chances of any disturbances or technical problems than other types of communication tools, such as video conferencing.

- It is user-friendly and easy to use communication tool as it is simple to set up and use.
- It is a very convenient communication tool as it allows anyone to conduct meetings and conferences at any particular time and place which is convenient for all the group members.



It is a flexible communication tool as it can be used for different types of meetings, online discussions and orientation/training sessions etc.

# 1.7 SUMMARY

There are many applications and benefits of video conferencing. It overcomes the costly and sometimes impractical, element of travel. Video conferencing has vast potential for increase in the efficiency of human interaction. Video conferencing services offer the company or organization the added edge of effectively communicating and collaborating with its clientele and company associates simultaneously.

It can be concluded that Audio environments such as telephone and audio conferencing systems will remain effective for remote group collaboration. The users of audio conferencing systems need to ensure that the topic of discussion or group task assigned to them is best suited for that audio environment in which discussion is taking place. Also, in addition to this, there should be a 'sense of presence among the group members as they should feel together in the same media space although they are separated by physical medium. Some additional features can also be added to audioconferencing systems to enhance the overall conference quality which includes 'voice activity detectors' that perform a microphone muting function and indicate the current speaker. Colours or tones could also be used to get attention or for voting purposes (Jeffrey, 1998, p.10).

#### **IN-TEXT QUESTIONS**

- 6. Video Conferencing allows better communication abilities, further enhancing opportunities and leads to productive collaboration. True/False
- 7. \_\_\_\_\_ Audio Conferencing connects several participants from different places or locations.
- 8. \_\_\_\_\_Audio Conferencing brings together those participants who are located remotely or are available at nearby location.

# 1.8 GLOSSARY

BANDWIDTH: Indication in KHz or MHz for the capacity of a carrier.

**BPS:** Bits per second: a speed unit for data transmission.



**BRIDGE:** A bridge is the central connection point for single videoconference units in order to have a multi-point conference. See MCV.

**CODEC:** A Coder-decoder (hardware or software-based), digitises and compresses the analogue audio and video data that will be sent and digitises and unfold the digital data received from the partner(s).

**COMPRESSION:** Reducing the amount of information of data before storage or sending. In videoconferencing, one can reduce the frame rate, the frame size, the resolution and/or leave out redundant information (i.a. that already has been sent).

**DISTANCE LEARNING:** Attending classes in a location different from that where the course is given.

**DOCUMENT SHARING:** Partners in a videoconference share and work on the same document (window on a whiteboard).

**FPS:** Frames per second.

**FULL-MOTION VIDEO:** Video transmission at 25-30 frames per second.1ISDN twisted pair can deliver 10-15 frames per second (with lower resolution).

**H.320:** A group of standards for videoconferencing including a video compression standard and audio standards.

**ISDN:** Integrated Services Digital Network is a set of protocols for the integrated transmission of video, voice and data, usually over copper wired telephone networks. A single ISDN connection runs over2telephone lines. Videoconferencing systems use from 1 - 3 ISDN connections.

MULTI-POINT: Videoconference in which more than two locations are involved

**PICTURE IN PICTURE:** The windows containing incoming and outgoing information can be superposed: one smaller image in a corner over the other image.

**POINT-TO-POINT:** Direct bilateral link.

**REAL-TIME:** Real-time interaction is only possible when the exchange of information is very fast, with only a small delay, and arrives in the same order as it is sent.

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# **1.9 ANSWERS TO IN-TEXT QUESTIONS**

- 1. Two-way synchronous
- 2. True
- 3. ISDN
- 4. IP

- Multipoint Videoconference
  True
- 7. Distributed (Remote)
- 8. Integrated

# 1.10 SELF-ASSESSMENT QUESTIONS

- 1. What is Video Conferencing System? Explain in detail.
- 2. What are the components of a Audio and Video Conferencing System? Give a detailed description.
- 3. What are the advantages and disadvantages of a Video and Audio Conferencing System?
- 4. Write a short note on the types of Video and Audio Conferencing.
- 5. What are the applications of Video and Audio Conferencing in Library Services?

# **1.11 REFERENCES**

Jeffrey, P. (1998). Telephone and Audio Conferencing: Origins, Applications and Social Behaviour. GMD FIT. Sankt Augustin, Germany.

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# 1.12 SUGGESTED READINGS

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# LESSON 1

# Functional Requirements for Bibliographic Records (FRBR)

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 History and Development
- 1.4 FRBR Framework: Entity-related Model of FRBR
  - 1.4.1 The FRBR Entities and Attributes
  - 1.4.2 Relationship in FRBR
- 1.5 RDA and FRBR
  - 1.5.1 The relationship Between FRBR and RDA
- 1.6 Summary
- 1.7 Glossary
- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

# 1.1 LEARNING OBJECTIVES

At the end of this lesson, you will be able to:

- Understand FRBR as a conceptual model
- Understand FRBR groups, entities and attributes
- Understand FRBR relationships
- Relationships of FRBR Group 1, 2 and Group 3 entities
- RDA vs FRBR

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**1.2 INTRODUCTION** 

The Functional Requirements for Bibliographic Records (FRBR) model was developed as a solution to the problems that were caused by the limits of cataloguing codes such as the AACR. The foundation of it is an entity-relation model, which illustrates the connections between various types of documents, the characteristics of those documents, and the individuals and organisations who produce and disseminate those documents. The FRBR identifies each entity's attributes or characteristics as well as the relationships between and within entity groups.

Functional Requirements for Bibliographic Records (FRBR) is a conceptual model that outlines fundamental components of the universe of recorded information. Between the years 1992 and 1995, members of the IFLA Study Group on Functional Requirements for Bibliographic Records worked to establish FRBR, and it was first made public in 1998. FRBR is not a data model. The FRBR does not function as a metadata schema. FRBR is not a structure for the design of system architecture. It is a theoretical representation of the entire bibliographic universe. It is believed that FRBR will eventually take the place of ISBD.

FRBR is designed to support four generic user tasks. The work of Cutter, Lubetzky, and the Paris Principles served as the foundation for the development of these four tasks, which, in essence, constitute the four primary purposes that a catalogue serves:

- to find entities that correspond to the search criteria specified by a user
- to identify entities, such as people, works, and subjects
- to select entities, such as people, works, and subjects
- to obtain access to the entities described

In 2016 a fifth user task was proposed in the draft IFLA Library Reference Model (LRM). The fifth task is to explore relationships between one resource and another.

# **1.3** History and Development

The

International Federation of Library Associations and Institutions (IFLA) established the conceptual entity-relationship model, FRBR, from the point of view of the user, to link user retrieval tasks with access to online library catalogues and bibliographic databases. The relationships between the entities serve as linkages to move across the hierarchy of interactions, representing a more all-encompassing approach to recovery and access. Because the model is distinct from specific cataloguing standards like the Anglo-American Cataloguing Rules (AACR) or the International Standard Bibliographic

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#### (Theory)

#### **IN-TEXT QUESTIONS**

- 1. RDA has been introduced in the year....
- 2. RDA is the combination of two technologies and framework: FRBR and FRAD—True/False
- 3. FRBR was developed by....
- 4. FRBR was published in the year....

Description, it is noteworthy (ISBD. This examination of FRBR's beginnings aims to place FRBR in a historical context given the proactive motivation for the Functional Requirements for Bibliographic Records. The participants of the International Conference on Bibliographic Services in Copenhagen, Denmark, recommended that national bibliographic agencies adopt the elements of the bare bibliographic level record as identified in the final report of the International Federation of Library Associations and Institutions (IFLA) Study Group on the Functional Requirements for Bibliographic Records on November 27, 1998. 1990 – Stockholm meeting (IFLA). The development of FRBR timelines is:

- 1992 Terms of reference completed
- 1994 First draft for comment
- 1998 Final draft, FRBR published
- 2009 Current draft
- 2013 RDA was implemented referencing FRBR
- 2016 FRBR-Library Reference Model (IFLA-LRM)

Just one year prior, the published final report of the Section on Cataloguing had been accepted by the IFLA Standing Committee. The study's potentially broad suggestions received their first noteworthy validation with this formal approval. Since then, several national bibliographic organisations have launched comparable assessments of their data and cataloguing procedures to comply with these guidelines created to promote global bibliographic sharing.

#### 1.4 FRBR Framework: Entity-related Model of FRBR

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#### (Theory)

FRBR offers recommendations to the international cataloguing community regarding a minimal set of required elements that are required to be included in resource descriptions in order to support the user tasks. These recommendations are provided so that resource descriptions can better serve the needs of users. FRBR Utilizes an entity-relationship framework which carries Entities (a class of things), Relationships (associations among entities), and Attributes (characteristics of the entities).

The FRBR model defines a total of nineteen different properties and relationships between entities, in addition to four user tasks and three groupings of entities.

#### 1.4.1 The FRBR Entities and Attributes

The FRBR model classifies items according to the function or role that they play, then organises these entities into three distinct groups.

Group 1 Entities - Works, Expressions, Manifestations, and Items

Group 2 Entities - Persons, Corporate Bodies, Families

Group 3 Entities – Concept, Place, Event, Object, plus all Group 1 & 2 Entities

Work, expression, manifestation, and item are Group 1 entities (WEMI). They are the results of creative or intellectual endeavours. The individuals, families, and business organisations in Group 2 are in charge of guardianship of the creative or scholarly work of Group 1. Concepts, objects, events, and locations are Group 3 items that focus on Group 1 or Group 2 and Group3 intellectual effort.

#### Group 1 Entities - Works, Expressions, Manifestations, and Items

The first group consists of four entities mentioned or documented in bibliographic records: work, expression, manifestation, and item (WEMI). These are the outcomes or consequences of "intellectual or creative endeavour." Group 1 consists of the elements of a bibliographic resource, or what is collected in libraries and other information organisations. As shown in Figure 1, the four entities are interconnected at the highest level. Each of the Group 1 entities, as well as those from the other two groups, are described in greater depth below.



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**Figure1**: Tillett, B. (2004). What is FRBR? A Model for the Bibliographic Universe Conceptually. USA, LCMS: Cataloging and Distribution Service

The Group 1 entities serve as the FRBR model's cornerstone:

This category includes all of the entities that are concerned with the creative or intellectual aspects of the products that are to be described. The following items constitute the entities that make up this group:

- i. Work: is an original intellectual or artistic production that stands on its own.
- ii. Expression: the intellectual or creative realisation of a work in the form of alpha-numeric notation, musical or choreographic notation, sound, image, object, movement, etc., or any combination of such forms. the term "realisation" can also refer to the work itself. Expression can manifest itself as a work in any of the following categories: sound, image, object, movement, and so on.
- iii. Manifestation: refers to the actual materialisation of an expression of a work.
- iv. Item; single example or specimen of a manifestation

Each entity in Group 1 of the FRBR has its own set of linked attributes. In retrieval tools, attributes aid users in locating, identifying, selecting, and obtaining information resources. Following is a concise list of characteristics:

• Attributes of Works: Title, Date, Termination, Audience, Context, and Other Distinguishing Characteristics

• Expression Attributes: Form of Expression, Date of Expression, Language of Expression, Summary of Content, Extensibility of Expression, and Other Distinguishing Characteristic

• Manifestation Attributes: Title of the Manifestation, Statement of Responsibility, Edition/Issue Designation, Place of Publication, Publisher, Publication Date

• Item Attributes: Item Identifier, Fingerprint, Item Provenance, Marks/Inscriptions, Exhibition History, Item Condition

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#### Group 2 Entities – Persons, Corporate Bodies, Families

Group 2 entities consist of the human beings, either as individuals or as groups, who are responsible for the Group 1 entities in many different ways. While creating the bibliographic record, we indicate the relationships to these entities via access points. In this group, the original FRBR model includes only persons and corporatebodies; a third entity, families, was added in FRAD. The FRBR and FRAD models establish that persons, families, and corporate bodies create works, realize expressions, produce manifestations, and own or provide access to items.

Responsibility for the creation, distribution, maintenance, and protection of the first group's contents falls on the second Group2. Group 2 entities as defined by FRBR include:

- i. Person: includes living and deceased individuals associated with a work, expression, manifestation, or thing.
- ii. Corporate body: an organisation or collection of individuals and/or organisations working as a unit and associated with one or more entities of group 1.



**Figure2:** Tillett, B. (2004). What is FRBR? A Model for the Bibliographic Universe Conceptually. USA, LCMS: Cataloging and Distribution Service

#### Group 3 Entities – Concept, Place, Event, Object, plus all Group 1 & 2 Entities

Group 3 includes subjects of Group 1 or Group 2's intellectual endeavour, and includes, Concepts, Objects, Events, Places, Group 1 entities (WEMI) and Group 2 entities. Concepts are abstract ideas, objects are physical things, events are occurrences, and places arelocations. Group 3 also includes all the other entities in the FRBR model, because works can be about otherworks, expressions, manifestations, and even individual items, as well as about persons, families, and corporatebodies.

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The third category consists of the entities that function as the subjects of works. These entities comprise Group 3:

- i. Concept: an abstract concept or notion
- ii. Object: a physical item
- iii. Event: an action or event
- iv. Place: a location



**Figure3**: Tillett, B. (2004). What is FRBR? A Model for the Bibliographic Universe Conceptually. USA, LCMS: Cataloging and Distribution Service

#### 1.4.2 Relationships in FRBR

Numerous additional relationships cover topics like digitised editions of a work to the original text and derivative works like adaptations and parodies, as well as new readers that are critical evaluations of an existing text, Group 1's connections to Groups 2 and 3 are covered above, but there are also other intergroup links to consider. Relationships between and among entities are the foundation of FRBR. By showing how one object is related to another, relationships assist the user "navigate" the information space included in a bibliography, catalogue, or bibliographic database. Relationship types can take many different forms, for instance:

#### Equivalence connections

There are equivalence linkages between the original and its reproduction, provided that intellectual property and authorship are protected.Reproductions such as photocopies, microfilms, issues, facsimiles, and reprints are a few examples.

#### Derivative connections



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A bibliographic work and a modification based on the job have derivative connections. Examples comprise: Versions, versions, summaries, abstracts, digests, and translations adaptations of older works that result in new creations and genre shifts new outcomes depending on the writing's aesthetic or thematic elements

#### Descriptive connections

There are descriptive links between a bibliographic item and a description, critique, assessment, or review of that item, for example, between a work and a book review summarising it. Annotated editions, casebooks, comments, and reviews of previously published material are additional examples of descriptive connections.

Barbara has influenced the more bibliographic relationships reflected in FRBR. Table 1 displays some of the relationships identified in FRBR model.

Туре	Explanation	Examples
Work-to-Work	Relationships that exist	concordances, indexes,
Relationships	betweentwo separate works	librettos, digests, paraphrases,
		parodies, dramatizations, etc.
Whole–Part	These are relationships that	Relationship between a chapter
Relationships	have some sort of component	and the whole work, between a
	aspect	book and the series of which it is a
		part, between an article and the
		journal in which it was published,
	× >?	etc. Whole-part relationships
	<b>OY</b>	may be found at the work, expression,
		manifestation, and item levels
Expression-to-	Relationships that exist	Same work: Abridgements,
Expression	betweentwo separate	revisions, translations,
Relationships	expressions	arrangements, etc.
		Different works: identical to thework-
		to-work relationships listed
	À . O	above.
Manifestation-to-	Relationships that exist	Reprints, microfilms, and facsimiles;
Manifestation	between	simultaneouslypublished editions;
Relationships	two separate manifestations	multipleformats; etc
Y		
Item-to-Item	Relationships that exist	Binding changes, extracts, etc.
Relationships	betweentwo separate items	

In addition to the types of relationships that are specified in the FRBR model, the FRAD and FRSAD models each define a number of other types of relationships that are suitable for the respective tasks they are designed to perform. These ideas, together with the FRBR and FRAD models, played an important role in the development of RDA, which stands for Resource Description and Access.



# 1.5 RDA and FRBR

According to RDA, FRBR entities and components serve as the data elements for bibliographic description, access, and the connections between entities. FRBR is a conceptual model whereas RDA is a cataloguing standard that is based on the FRBR conceptual model. RDA integrates the FRBR conceptual model with cataloguing principles. FRBR is not a cataloguing code in and of itself. However, it shows how users gain from a well-structured system built on the FRBR entities and connections.

#### **1.5.1** The relationship Between FRBR and RDA

Functional Requirements for Bibliographic Records is the abbreviation for this phrase. An IFLA Study Group (1992–1997) established FRBR, and IFLA still oversees and encourages the usage of FRBR today. The FRBR comprises a conceptual model of entities, connections, and characteristics, outlines specific user tasks—find, identify, choose, and obtain—those bibliographic records are meant to satisfy, and suggests several components for inclusion in national bibliographic records.RDA's intellectual underpinnings come from FRBR. RDA will use the FRBR attributes as the basis for specific data elements to be included in bibliographic descriptions, address the FRBR relationship, and the FRBR user tasks (find, identify, select, obtain) for defining a set of mandatory data elements. For example, RDA will use the names of bibliographic entities: "work," "expression," "manifestation," and "item." RDA will also base its guidelines for authority control on the FRAD (Functional Requirements for Authority Data) framework. There is a chapter for each organisation and broad rules in each part.Each chapter has an FRBR user task related to it. Future editions of RDA may expand on the chapters on recording properties and relationships for ideas, objects, and events to comply with FRAD fully.

#### **IN-TEXT QUESTIONS**

- 5. FRBR is based on .....model
- 6. How many groups are there in FRBR model?

# 1.6 SUMMARY

In this chapter key aspects of FRBR, such as concepts, function and entity models and their relationship have been discussed. The FRBR model conceptualises reality and undoubtedly demonstrates novel aspects, notably in regards to "Semantic Web"-related activities, but it also exhibits elements of conservatism in its methodology. Academics may

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use alternatives to FRBR in the catalogue in the future. In light of the contemporary digital world, FRBR's language, connections, and user duties are already supporting us in examining our cataloguing traditions. IFLA, together with other interested parties, will keep promoting. FRBR is the backbone of the development of RDA(FRBR+FRAD).

# 1.7 GLOSSARY

**FRBR:**Bibliographic Records Functional Requirements (FRBR) The International Federation of Library Associations and Institutions (IFLA) developed the Functional Requirements for Bibliographic Records (FRBR) conceptual entity-relationship model, which links user tasks of retrieval and access in online library catalogues and bibliographic databases from a user's perspective.

**FRANAR:**In April 1999, the International MARC Program, the IFLA Division of Bibliographic Control, and the IFLA Universal Bibliographic Control created the Working Group on Functional Requirements and Numbering of Authority Records (FRANAR) (UBCIM).

**RDA:**Resource Description and Access (RDA) is a set of standards, guidelines, and instructions for producing well-formed metadata for cultural heritage and library resources by worldwide norms for user-focused linked data applications.

The following definitions have been modified from Richard C. Perkinson's Data Analysis: The Key to Data Base Design (Wellesley, Mass: QED Information Sciences, Inc. 1984).

**Attributes:** Are a quality or description of an object. For instance, a publication's features may include details like the publication's name and release date.

**Entity:** A subject of interest to the organisation who, where, what, or when data may be captured. There is something that has to be named or described to be identified. It might be either conceptual or actual. Authors, works, publications, and other such things are examples of entities of interest to bibliographic organisations.

**Function**: The reason that information is recorded. Examples include identifying an author, setting one work apart from another, comparing editions, Etc.

**Relationship:** There is a significant connection between the two things. One publication might replace another; a particular work could be based on a previous one, Etc.

**Requirements for Authority Data in Terms of Function (FRAD)**:an expansion of the model for authority records in the Functional Requirements for Bibliographic Records. It outlines the entities in authority records, their relationships, and the tasks that users must perform.

# 1.8 ANSWERS TO IN-TEXT QUESTIONS

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- 1.2010
- 2. True
- 3. International Federation of Library Associations and Institutions (IFLA)
- 4. 1998
- 5. Entity-Relationship
- 6. Three

# **1.9 SELF-ASSESSMENT QUESTIONS**

- 1. Is FRBR a model of data?
- 2. What is FRBR if it is not a data model?
- 3. Which are the entities of group 1, 2 & 3 of FRBR? Describe them briefly.
- 4. Give some examples of attributes for a work. Why is it important to define the attributes of an entity?
- 5. Discuss some of the benefits of FRBR over other frameworks like ISBD

#### **Practical exercises**

- 1. Place the following in the order work, expression(s), manifestation(s), item(s):
  - a. Paperback copy
  - b. Ronald Hayman's playback
  - c. Paperback copy autographed by the author
  - d. The book published in 1973 by Davis-Poynter
  - e. The author's text edited for publication

2. Identify some work(s), expression(s), manifestation(s), item(s) for Ranganthan's Colon Classification

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# LESSON-6

# FEDERATED SEARCH AND MULTIMEDIA DATABASE SEARCH

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Federated Search
  - 1.3.1 Definition
  - 1.3.2 History of Federated Search
  - 1.3.3 Need and Purpose of Federated Search Tools
  - 1.3.4 Types of Federated Search
  - 1.3.5 Federated Search Technologies
  - 1.3.6 Advantages of Federated Search
  - 1.3.7 Drawback of Federated Search
- 1.4 Multimedia Database
  - 1.4.1 Multimedia Database Searching
  - 1.4.2 Sub-Section 2
- 1.5 Summary
- 1.6 Glossary
- 1.7 Self-Assessment Questions
- 1.8 References
- 1.9 Suggested Readings

# **1.1 LEARNING OBJECTIVES**

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The lesson's learning outcomes are: To understand Federated search technology and its implication in search activity. It also covered the historical aspect of federated search and associated advantages and drawbacks of Federated search.

# **1.2 INTRODUCTION**

Libraries have implemented portals as one solution to the issue of bringing together enormous amounts of information in the electronic information environment. A portal is a doorway or a place where people can begin their online information search. There are severalportals, such as"institutional portals" introduced by universities which is a "layer that aggregates, integrates, personalizes, and presentsthe user with information, transactions, and applications in accordance with their job and preferences. The second type of portal is dedicated to a specific subject area and is called a "subject portal."The third category of the portal is a "federated search tool," which aggregates the resources to which a library subscribes and facilitates cross-searching of these resources.

In this chapter, we will learn about Federated Search, a comparison between metasearch engines and federated search, its need during our search retrieval, advantages and drawbacks of using federated search.

Federated search is the centralized coordination of searchable resources. It involves the coordination of the queries transmitted to various resources and, in return, a fusion of search results and displays it to the end-users. It means users need not jump from one help to another for fetching the information. You can suffice all your information needs from one place.

# **1.3 FEDERATED SEARCH**

increasingly common function of modern Web-based automated library and information retrieval systems is federated search, which enables users to conduct a single query across several online databases. A portal is a more comprehensive way to get information than a simple Web search engine. Broadcasting is another name for searching, parallel searching, cross-referencing, etc.

An

Metasearchers, crosssearchers, cross-database searchers, portals, broadcast searchers, and





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parallel searchers are only a few of the names given to these resources in the academic literature. The National Information Standards Organization (NISO) in the United States has coined the word "metasearcher" to describe this search engine. It has even launched a " Metasearch " initiative (NISO,2003). However, the name "metasearcher" can be misleading because it is often used interchangeably with online Metasearch engines like Metacrawler, which operate differently than federated search tools. (Fryer, 2004)

# Fig. 1 Graphical Representation of Federated Search (Source: Kumar, S, et. al, 2008)

The term "federated searching" refers to the capability of specific search tools to search many databases, usually subscription databases, all at once through a single interface. Federated search tools scour the web for information that would be inaccessible to a standard web search engine.

### 1.3.1 Definition

Federated search is a method of information retrieval that enables the concurrent querying of many sites. When aend-user performs a query, it is shared across all federated search engines, databases, or other query engines. Once the results have been received from the many search engines, the federated search will compile them into a single set of results for the user to peruse.

Peter Jasco defines federated search as "Transforming a query and broadcasting it to a group of disparate databases with the appropriate syntax, merging the results collected from the databases, presenting them in a succinct and unified format with minimal duplication, and allowing the library patron to sort the merged result set by various criteria" (Chen, 2006).

To put it plainly, Federated Searching refers to a search engine that shares a single interface that allows users to query several databases from different providers simultaneously. Using a single search query, users can query numerous data sources simultaneously with federated search technology. This way, users may see all their search results in one convenient place. That is to say, consumers are liberated from the burden of independently consulting several data sources. Instead, they can perform a combined search of many other databases, including OPACs, websites (like Amazon.com and Google), subscription databases, and citation databases.

### 1.3.2 History of Federated Search

Federated searching was first implemented in 1998 by the WebFeat Team, an information technology consultancy initially established in 1992. In 1998, the WebFeat Team took the initiative to connect any or all of their databases simultaneously through a straightforward and standard user interface. They later developed this concept into a product



they called Webfeat. WebFeatis capable of searching any database, whether it be a proprietary database, a licensed database, a free database, a catalogue, Z39.50, Telnet, or anything else! And with SMART, WebFeat's next-generation usage tracker, you can report the exact database usage within your library with just a few clicks of the mouse. WebFeat developed SMART.

### 1.3.3 Need and Purpose of Federated Searching

The needs of the Federated searching are as follows:

- 1. When trying to access information, patrons of libraries may find it difficult due to the proliferation of many kinds of databases, which are supplied by a variety of vendors and come equipped with a wide variety of user interfaces and login credentials;
- 2. Users have been turned off by the usage of library language on online public access catalogs (OPACs) and website pages of libraries, as well as by the inclusion of lengthy lists of databases, which users find difficult to select from and search;
- 3. The necessities and anticipations of library patrons, particularly the students who use academic libraries, are the significant need for federated search. When trying to access information, patrons of libraries may find it difficult due to the proliferation of many kinds of databases. These databases are generated by various vendors and have a wide variety of user interfaces and login options.

Federated search serves the following purposes:

- 1. Modifying a query and sending it as a broadcast to several databases, each of which has its unique syntax.
- 2. It combines the findings from the various databases, presenting them in a concise and unified format with minimal duplication.
- 3. Providing a way to sort the merged result set, which can be done either automatically or by the user of the portal;

### **1.3.4 Types of Federated Searching**

Federated Search can be broken down into its two primary parts. An "index" is accumulated data that may be searched. This index was designed to make it easier to do searches on time. Second, the "search function" is the component of the system that scans the index to locate relevant information in answer to a particular query. Federated search is made feasible through a collaborative effort between the index and the search function.

• Search Time Merging or Query Time Merging:When performing this kind of federated search, a query is sent to every data source one at a time. It is necessary to add an individual index for each data location in the search for it to work correctly. The findings are given in a format that is not organized and corresponds to the



importance of each data source. However, additional content indexing is unnecessary, even though adjustments are restricted.

- Index- Time Merging: To conduct this kind of search, every piece of content needs to be in the same index. The search can better handle the data and produce more accurate results. In this instance, the search results are arranged according to their level of relevancy. Because it needs the creation of a wholeindexing system, implementing this approach is more time-consuming and labor-intensive. Despite this, it is worth the effort because it will provide a search experience that is the best in its class and speedier response times. Implementing such a solution is made much simpler by federated search technologies.
- **Hybrid Federated Search:**The hybrid technique combines the merging done at the time of the query with the merging done at the time of the index. You should try your best to establish a central index for every data source you need (as in index-time merging). There are some instances where the data sources cannot be reflected in the central index and need to be stored separately. You must search each index, the primary index, and additional indexes. The compiled information is then used to produce the final list (as in query-time merging).

Regarding performance, hybrid federated search provides better results than merging at query time. This is because hybrid federated search decreases the number of indexes that need to be searched. However, because there are several indices, the search takes far longer than it would when only a single index exists. Although this is the simplest approach, there is a possibility that reaction times will be slow, which may reduce the importance of providing users with quick responses in real-time.

## **1.3.5 Federated Search Technologies**

There are mainly four technologies used for Federated Search:

- I. Screen Scrapping or HTTP
- II. Z39.50 Protocol
- III. ZING-SRW Protocol
  - IV. XML gateway

### I. Screen Scrapping or HTTP:

HTTP, which stands for "Hyper Text Transfer Protocol," is the single most significant technology that drives the web, even though it is almost entirely invisible. Without this protocol, HTML and XML accessed through the web would



be incapable of doing the plethora of duties we ask of them on a regular basis. The Hypertext Transfer Protocol, sometimes known as HTTP, is a protocol used at the application level for decentralized, collaborative hypermedia information systems.

Since its inception in 1990, the worldwide information endeavor known as the World Wide Web has used HTTP. The HTTP protocol may be broken down into the request and the response. During a connection with a server, a client will transmit a request to the server using a request method, URI, and protocol version. This will be followed by a MIME-like message containing request modifiers, client information, and possible body content. TCP/IP is the protocol typically used for communication when using HTTP. The Transmission Control Protocol (TCP) ensures that data packets traveling to and from a web server are correct and in the correct order. Despite this, it does not guarantee that packets will arrive regardless of the network's conditions. When communications are backed up or unavailable, the delivery of web pages is sluggish and may eventually time out.

### II. Z 39.50 Protocol:

The Z39.50 standard is a national one for information retrieval in the United States. Information Retrieval (Z39.50): Application Service Definition and Protocol Specification is the full name of this standard. ANSI and NISO created it in 1995.Z39.50 is an open standard for network applications that permits communication between systems that operate on different hardware and use diverse software.

The Z39.50 standard was established to solve issues while accessing numerous databases simultaneously. These issues include familiarity with each system's distinct menus, command language, and search processes. The Z39.50 standard makes it possible for a searcher to utilize the user interface of the local system, which they are already familiar with, to search not only the catalogue of the local library but also any remote database system that supports the standard. This makes the search process much simpler.

### III. SRW (Search/Retrieve Web Service):

A new HTTP-based information retrieval protocol called Search/Retrieve Web Service offers similar functionality to Z39.50 but does it use entirely different technology. SRW was created to be a simple and accessible tool for conducting web-based research and other forms of data retrieval. It uses open-source tools like SOAP and XPath for the same tasks that have previously required custom solutions.

The protocol can be transmitted in one of two ways: by using Simple Object Access Protocol (SOAP) or URL parameters.

This alternative is known as SRU (Search Retrieve by URL). Simple XML over HTTP and possibly other transports are feasible but are not specified by the current standard.

The primary purpose of SRW is to facilitate a user's access to and exploration of a distant records warehouse. To accomplish this, the client initiates a searchRetrieve operation by sending a search Retrieve Request to the server, followed up with a search Retrieve Response. You can put many parameters in the request, but most of them aren't required. Most of the return is a comprehensive count of the total number of records matching the query in XML format.

### IV. XML (Extensible Markup Language)

EXtensible Markup Language is the full form of XML. Just like HTML, XML is a markup language, but unlike HTML, its primary purpose is not presented. Tags in XML are not limited to a set of predetermined options. Your custom tags are required. The World Wide Web Consortium suggests using XML since it is selfdescribing by design. There are no associated costs with using this open specification. Instead of HTML, you should use XML. HTML focuses on presentation, while XML focuses on data transfer. In layman's terms, XML is a method of transmitting data that does not rely on any one application or piece of hardware. It can be used for either document encoding or data serialization. Its compatibility with Unicode means that data may be conveyed in virtually all written human languages.

It's safe to say that XML's impact on the web now rivals that of HTML when that language was first developed. It's impossible to avoid XML. It is the standard method of exchanging information between programs and is gaining popularity for archiving and describing data. XML makes sharing data between disparate systems and databases easier, just like it does in the real world. In XML, information is kept as text files. Using this method, you can save information without worrying about compatibility issues with your computer's software or hardware. Thanks to this, generating information that programs can exchange is much less hassle.

# 1.3.6. Advantages of Federated Search

- When using federated searches, fewer results come up with a specific search linked to their topic compared to Google's multitude of unrelated results. More is not always preferable. In addition to allowing users to fill out forms and combine data from many sources, federated search engines search content in real-time. Real-time data is critical for researchers looking for up-to-the-minute or frequently changing content.
- Most students struggle with the task of sorting through hundreds of thousands of search results to find the few that are most relevant and useful. Researchers can save a



lot of time by using a federated search engine. As a result, the user doesn't have to worry about performing each of the numerous searches himself.

- Targeted searches are quality-filtered. Federated search engines shine in libraries, corporate research environments, and the federal government, where results quality matters.
- Federated searches validate the information. Anyone can write an Internet report, for example. That doesn't mean accuracy was checked. Students can ensure the accuracy of their research by using this new library automation option. Educators and professionals verify federated search engine information.
- When conducting a federated search, you can access resources that may already be on hand in the library. Federated search engines are like a knowledgeable librarians, pointing users in the direction of relevant, high-quality results.

### **1.3.6. Disadvantages of Federated Search**

Currently, the federated search has several limitations, which are as follows:

- Without a universal authentication standard, federated search engines can't access some databases.
- Complete duplication is impossible because databases download small sets and metadata standards differ for each resource.
- Relevancy ranking is limited by metadata quality, which rarely includes abstracts or fulltext.
- Federated search systems are software, but they must be built and operated as a service, which is costly.
- Federated search engines can't increase native search accuracy and precision.
- Federated search isn't for powerful queries. Only basic Boolean commands can be used, as with metasearch engines.
- Login-required databases won't work with federated search.
- Some databases only operate with one federated search product. LexisNexis doesn't allow Z39.50 or XML gateway access, so MetaLib can't search its databases. WebFeat cannot search databases without a front-page search box. Many libraries have pay-per-search databases and don't want them federated for budgetary reasons.

# **1.4 MULTIMEDIA DATABASE**

A multimedia database is a collection of interrelated multimedia data that comprises text, graphics (such as sketches and drawings), photographs, animations, video, and audio, among other types of data, and has a large volume of multimedia data from a variety of



sources. The term "multimedia database management system" refers to the framework that handles the various forms of multimedia data, which can be saved, transmitted, and utilized in a variety of different ways.

Content of Multimedia Database management system :

- 1. Media data It is an actual data representation of an object.
- 2. **Media format data** Information about the format of the media data after it goes through the acquisition, processing, and encoding phase.
- 3. **Media keyword data** Keywords description relating to the generation of data. It is also known as descriptive content data. Example: date, time, and place of recording.
- 4. **Media feature data** Content-dependent data such as the distribution of colors, kinds of texture, and different shapes present in data.

### 1.4.1 Multimedia Database Searching

The ability to search for information using queries in many data kinds, including text and other multimedia formats, is made possible by multimedia search. Multimedia search can be implemented through multimodal search interfaces, which allow users to submit search queries as textual requests and other media. Multimodal search interfaces enable users to submit search queries as textual requests and through other media. In the realm of multimedia search, we can differentiate between two techniques.

- Metadata Search
- Query by Example

### 1.4.1.1. Metadata Search

The layers in the metadata that include information about the content of a multimedia file are utilized insearch process. Text searches are much more straightforward, quicker, and more effective than other types of searches since they don't have to deal with the complexities of the content being searched, which could be an audio file, a video, or an image.

### 1.4.1.2. Query by Example

In the sample query, the component used to perform the search is multimedia content (image, audio, video). To put it another way, inquiry is a form of media. Audiovisual indexing is one of its most common applications. When developing metadata, selecting the criteria used to create the metadata will be required.

# 1.5 SUMMARY

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This chapter provides detailed information on federated search engines enabling users to search multiple databases simultaneously, which may cut down on the number of steps required to obtain results from a variety of library resources. Federated search engines also have the potential to obtain search results from databases that users would not have access to in the absence of the federated search.

For users to make better use of the federated search engine that their libraries provide, it is very helpful for users to learn other information literacy basics, such as the ability to interpret bibliography or to tell the difference between books, book chapters, and periodical articles

# 1.6 GLOSSARY

**Federated Search:**A search tool designed to query multiple networked information resources via a single interface (example: Google Scholar). The metasearch engines developed in the second half of the 1990s were capable of searching only publicly accessible Web sites, but the 21st century has seen a new generation of federated search engines designed to search local and remote library catalogs, subscription databases, and digital repositories as well as Web sites, using standardized protocols, such as Z39.50.

**Z39.50**: A client-server protocol established as a NISO standard that allows the computer user to query a remote information retrieval system using the software of the local system and receive results in the format of the local system, often used in portal and gateway products to search several sources simultaneously and integrate the results.

**Metasearch:**A search for information using software designed to optimize retrieval by querying multiple Web search engines and combining the results. Dogpile, Mamma Metasearch, and WebCrawler have commonly used metasearch engines. SearchEngineWatch.com provides a complete list.



# 1.7 SELF-ASSESSMENT QUESTIONS

- 1. Explain the concept of Federated Search. Discuss different types of Federated search.
- 2. Discuss the advantages and disadvantages of Federated search.
- 3. What is a multimedia database? Explain different types of Multimedia searching.

**1.9 REFERENCES** 

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# **LESSON 1**

# **Protocols: Z39.50 Standard for Retrieval and OAI-PMH**

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# **STRUCTURE**

- Learning Objectives 1.1
- 1.2 Introduction
- 1.3 History
- What is the Z39.50 standard? 1.4
  - 1.4.1 A Standard
    - 1.4.2 A Client/Server Architecture
- Functions of Z39.50 1.5
- Some Key Features of Z39.50 1.6
  - 1.6.1 Facilities
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  - 1.6.3 Attributes and Attribute sets
  - 1.6.4 More About Z39.50
- 1.7 **Recent Developments and Initiatives**
- 1.8 Implications for the Libraries
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- 1.10 Glossary
- Answers to In-text Questions 1.11
- 1.12 Self-Assessment Questions
- 1.13 References
- 1.14 Suggested Readings

#### **LEARNING OBJECTIVES** 1.1

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At the end of this lesson, you will be able to:

- Z39.50 searching and retrieval protocol
- How Z39.50 works
- Z39.50 components and facets
- Implementation of Z39.50 for libraries.

# **1.2 INTRODUCTION**

Information retrieval systems are becoming more automated, and Z39.50, a national and international standard, defines a protocol for such systems. It's a method of communicating between clients and servers across a TCP/IP network in order to perform database queries and retrieve results. Both ANSI/NISO Z39.50 and ISO 23950 address this issue. Z39 is the starting point for NISO standards (the National Information Standards Organization) that pertain to libraries. Either specialised software or an ILS supporting Z39.50 is required for usage. Z39.50 is analogous to a "back door" into a library catalogue. Z39.50 needs access to another library's catalogue in order to fetch its records. If it does, however, there is no cost associated with using the record from the library.

ANSI/NISO Z39.50 is a standard method of communication between two computers for information retrieval is defined in Z39.50. Z39.50 standardises the processes and capabilities for finding and retrieving information, making it simpler to use vast information databases.

In particular, z39.50 facilitates information retrieval in a distributed, client-and-server system in which a client computer sends a search request (query) to a server computer. The server's software searches one or more databases, producing a collection of records that satisfy the search request's requirements. Records from the resultant set are returned by the server to the client for processing. The strength of z39.50 is that it decouples the client-side user interface from the databases, information servers, and search engines. z39.50 allows client implementers the flexibility to combine data from a number of databases and servers and offers a consistent picture of information from a wide range of sources.

# 1.3 History

Within the library world, Z39.50 is the progenitor of federated search.

The protocol was first developed in the early 1970s to facilitate the exchange of bibliographic data between big databases like the Library of Congress and the Online Computer Library Center (OCLC). A group of the National Information Standards Organization was established in 1979 to look at creating a standard data protocol that would make it easier to share bibliographic data.



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Z39.50-1988, also known as Z39.50 Version 1, is the result of all of these efforts. In retrospect, it's clear that Version 1 was nothing more than a theoretical idea draught, almost impossible to execute, as reported by Clifford Lynch6. Lynch, an early member of the Z39.50 group, now considers the initial draught to be a complete failure that should never have been authorised by the committee. 7 After the first version of the protocol was approved, the Library of Congress was designated as the organisation responsible for its ongoing development and upkeep.

In 1988, the NISO ratified the standard, and a group of z39.50 implementers began enhancing and expanding the standard's utility. The z30.50 Implementers Group (ZIP) is responsible for version 2 and version 3 development. Version 4, work began in Autumn 1995. A complete trimline of z39.50 NISO Standards Series is represented in table 1 below:

 Table 1: z39.50 NISO Standards Series

Z39.2-1994 (R2001) Information Interchange Format

Z39.7-1995 Library Statistics

Z39.9-1992 (R2001) International Standard Serial Numbering

Z39.14-1997 Guidelines for Abstracts

Z39.18-1995 Scientific and Technical Reports — Elements, Organization, and Design Z39.19-1993 (R1998) Guidelines for the Construction, Format, and Management of Monolingual Thesauri

Z39.20-1999 Criteria for Price Indexes for Printed Library Materials

Z39.22-1989 Proof Corrections

Z39.23-1997 Standard Technical Report Number Format and Creation

Z39.26-1997 Micropublishing Product Information

Z39.32-1996 Information on Microfiche Headers

Z39.41-1997 Printed Information on Spines

Z39.43-1993 (R2001) Standard Address Number (SAN) for the Publishing Industry

Z39.47-1993 (R1998) Extended Latin Alphabet Coded Character (ANSEL)

Z39.48-1992 (R1997) Permanence of Paper for Publications and Documents in Libraries and Archives

Z39.50-1995 Information Retrieval (Z39.50): Application Service Definition and Protocol Specification (Version 3)

Z39.53-2001 Codes for the Representation of Languages for Information Interchange

Z39.56-1996 Serial Item and Contribution Identifier (SICI)

Z39.62-2000 Eye-Legible Information on Microfilm Leaders and Trailers and on Containers of Processed Microfilm onOpen Reels

Z39.64-1989 (R1995) East Asian Character Code for Bibliographic Use

Z39.66-1992 (R1998) Durable Hardcover Binding for Books

Z39.71-1999 Holdings Statements for Bibliographic Items

Z39.73-1994 (R2001) Single-Tier Steel Bracket Library Shelving

Z39.74-1996 Guides to Accompany Microform Sets

Z39.76-1996 Data Elements for Binding Library Materials

Z39.77-2001 Guidelines for Information About Preservation Products

Z39.78-2000 Library Binding

Z39.79-2001 Environmental Conditions for Exhibiting Library and Archival Materials



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Z39.82-2001 Title Pages for Conference Publications
Z39.84-2000 Syntax for the Digital Object Identifier
Z39.85-2001 The Dublin Core Metadata Element Set
Z39.86-2002 Specifications for the Digital Talking Book
ANSI/NISO/ISO 12083 Electronic Manuscript Preparation and Markup

ANSI/NISO/ISO 12083 Electronic Manuscript Preparation and Markup

# 1.4 What is the Z39.50 standard?

Z39.50 is a connection between a client (or origin) and a server that is stateful (target). Z39.50 offers two search levels, referred to as a SCAN and a SEARCH. SCAN queries get result sets with minimum information, mostly the title of an item. These queries offer a simple way to get a list of results from a given destination. Once an item has been chosen, the server may be queried for the item's complete information. SEARCH is the second kind of request. A SEARCH request varies from a SCAN request in terms of the data returned in the results set. A SEARCH request, unlike a SCAN request, returns the whole metadata record for each item inside the results set.

One may assume that the Z39.50 protocol has been a phenomenal success given the virtually unanimous support it has among librarians; however, this isn't always the case. Z39.50 has a lot of support in the library community, but it hasn't reached its full potential as a protocol. Z39.50 has remained more of a fringe protocol even in the lack of workable substitutes, sustained mostly in reaction to the perceived necessity for its support within the library community than the actual adoption of the protocol. This is caused in part by the protocol's complexity. A Z39.50 server that included components for encoding and decoding/encoding ASN.1/BER communications between the host and destination was formerly needed in order to implement Z39.50 capability. This procedure was often a significant roadblock to implementation due to the protocol's esoteric nature (i.e., the fact that it is largely utilised by the library community), since very few people outside of the vendor community understood how to construct the requisite components to use the protocol. Additionally, the cost of the protocol itself in terms of the resources that must be put into the system is high. And with that, Z39.50 has seen a kind of reawakening, although this time outside of the library community. Within the GIS (geographic information systems) community, the Z39.50 protocol is being used to develop small organisational networks through GIS software solutions that use Z39.50 as the networking protocol, as well as shared information networks like the Federal Geographic Data Committee (www.fgdc.gov).

Adding support for the Z39.50 protocol is no longer hampered by its high cost. This is owing to the open-source library community and Z39.50 toolkits.ZOOM11 (Z39.50 Object-Oriented Model) is credited for simplifying Z39.50. The ZOOM effort, started in 2001, established object-oriented APIs that have been ported to several programming languages. Open sourcetoolkits like YAZ12 (Yet Another Z39.50 component) help create and communicate with Z39.50 servers. These components are used in PHP, Ruby, PERL, C#, etc. Digital repository managers may quickly add Z39.50 capability by plugging toolkits into their repository software. Today, one must examine whether Z39.50 support is still beneficial to one's user group since other Internet-friendly protocols have emerged and gained traction in the library community.

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### **IN-TEXT QUESTIONS**

- 1. Z39. 50 is.....protocol
- 2. Who maintains Z39 50 protocol?
- 3. When was the first version of Z39 50 came?
- 4. Name any library automation software which support z39.50
- 5. Who maintained Bath profile?

### 1.4.1 A Standard

Aagreement on how to carry out a task or participate in an activity in order to get results that may be anticipated is the essence of a standard.

All of the National Information Standards Organization's (NISO) standards are approved by the American National Standards Institute after going through a consensus-building procedure that draws on the expertise of implementors and vendors, product creators, and product consumers. ANSI is the organisation that oversees this process (ANSI). The Z39.50 standard is a NISO standard that provides protocol specifications (rules and processes) to promote communication between a wide variety of system types.

It was developed through collaboration and is made available to the general public in order to encourage a wider adoption of its use.

Z39.50 is just one of many NISO standards that cover the use of both already available technologies and those that are yet to be developed for the management, retrieval, and storage of information. The definition and implementation of technical standards in the fields of information services, libraries, and publishing all work toward the same end goal, which is to make information systems easier to use and more cost-effective to maintain.

People who produce and sell products and services have the potential to access greater domestic and worldwide markets if they accept these standards and put them into practise. This is true both domestically and globally. Consumers stand to benefit from the establishment of standards, which serve to ensure that products and services originating from a variety of origins meet a predetermined minimum level of quality.

### 1.4.2 A Client/Server Architecture

The client-server architecture is a type of network architecture that involves the separation of computing tasks between two distinct computer systems. This style of architecture is also known as a client-server model. Servers, which are essentially shared computer systems, are



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in charge of managing a variety of different network services. Some examples of these servers are database servers, print servers, and file servers (database servers). A personal computer (PC) or workstation that is being used to run a programme designed for a single user is referred to as the client. This programme is capable of running either independently or in tandem with a server. Clients are dependent on servers for resources like as files, data, communications, network devices, and tasks that necessitate more sophisticated processing capabilities. Servers provide these for clients.

### 1.5 Functions of Z39.50

The Z39.50 standard makes it possible for a user on one system to conduct a search and retrieve results from another system (which also implements Z39.50) without the user having to be familiar with the search syntax of the other system. Z39.50 enables the exchange of data between computers that, in the absence of this protocol, would be unable to communicate with one another. This data exchange may include proxy records or entire texts. Z39.50 makes it easier to trade cataloguing records, most commonly through the inclusion of MARC data into an integrated library system (ILS). Z39.50 is an industry-wide standard for libraries that is implemented in both automated library management systems and individual research tools. Z39.50 queries are a standard method used in the implementation of interlibrary catalogue searches for interlibrary loan requests.

z39.50 is a standard that helps to standardise the way in which clients and servers interact with one another and work together, even when there are variations across computer systems, search engines, and database formats. It acknowledges that information retrieval (IR) is made up of two fundamental components, namely the selection of information and the retrieval of that information, and it provides a common vocabulary for both of these operations.

After the query has been translated, it is then sent to the server in a format that has been standardised by the z39.50 client. First, a connection is established between the source and the destination through the exchange of a number of messages at the beginning of the session. Next, it negotiates the expectations that will be placed on the actions as well as the constraints that will be placed on those activities. Finally, it sends the query to the server in a format that has been standardised by the z39.

The server will complete the request by doing queries against the appropriate databases, and it will then transmit the results back to the original source.

## **1.6** Some Key Features of Z39.50

The fundamental functions of Z39.50 are to carry out a search, establish a connection between a client and a server that are running on separate systems, and display the prepared results to the user on their screen. During a Z39.50 session, the Z39.50 client software that initiates a request on behalf of the user is referred to as the Origin of that session. The Z39.50 server software system is referred to as the Target, and it is given the responsibility of providing a response to the request that was made by the Origin.



### **1.6.1 Facilities**

Facilities in Z39.50 are groupings of devices that implement the protocol and provide support for particular processes include record retrieval requests, session negotiation, and search communication.

A Z39.50 search session or Z-Association can be negotiated between an Origin (the client) and a Target (the server) with the help of the Initialization Function. This facility is responsible for establishing client-server rules. In order to establish the guidelines, you will need to supply information on the protocol version used by both the client and the server, the default character set, record size and transfer restrictions, and other Z39.50 capabilities such as sorting, browsing, and deleting result sets.

A friendly and intuitive user interface is provided by the Search Function for the creation of search queries. Z39.50 provides users with access to a vast selection of keywords for use in conducting searches. Users are able to construct sophisticated queries by making use of Boolean operators, truncation, and several other search operators, as well as providing search parameters (such as access points). A search query is characterised by its attributes, which will be covered in further detail below (e.g., a word, a phrase, or an exact title). The server is instructed on how to understand the query word based on the value of the attributes (such as searching for "Twain" only in author fields). Additionally, Z39.50 enables the saving of multiple search results as well as their consolidation into a single list of results.

With **the Present Facility**, the user may ask for a subset or the whole set of matching records to be given to the client from the server. Additionally, you may choose which data fields to transmit and in what format with the help of this service.

There are more Z39.50 Facility protocols that may handle capabilities like the following: Sorting the results according to how the user has set it.

Delete the search results totally or only for the entries that meet certain criteria.

Search (browse) through the different database fields and index lists of objects such as topic phrases, titles, and author names.

Authentication and password protection are used for access control.

Control of resources and termination of Z39.50 search sessions by either the client or the server.

Two newer facilities that are not readily available in many implementations yet are: **Explain**, which enables the client to exchange information with the server about what type of server the client is querying and what the client must do to communicate successfully with that server in a Z39.50 session; and **Extended Services**, which define operations that the client may request of the server, such as saving a search for later re-use or running a search query on a periodic basis. Both of these facilities were developed relatively recently.

### 1.6.2 Profiles

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The rich capability given by the Z39.50 standard creates barriers that prevent independently built Z39.50 systems from being interoperable with one another. It is not sufficient for a vendor to merely state that their products "conform" to the standard in order to ensure their products' interoperability with those of other manufacturers'. The implementations can take on quite a few different shapes, depending not only on whether or not Z39.50 facilities and services are supplied, but also on the local practises that libraries utilise when putting cataloguing standards and authority management into action. The disparities that exist between Z39.50 systems could potentially cause interoperability problems and have contributed to an increase in the complexity of Z39.50 implementation. The creation of Z39.50 profiles was Z39.50's answer to the challenges described above. A profile is a detailed specification of the Z39.50 capabilities and functionalities that an implementation will offer. A profile may be found in the Z39.50 specification document. Interoperability can be improved through the use of profiles by: assisting customers in the specification of requirements for Z39.50 products; defining a core set of Z39.50 features to assist vendors in the configuration of products; expanding the market for Z39.50 products; improving the success of users in information retrieval; and leveraging local investments in Z39.50 by providing global access to Z39.50.

There are three different types of profiles: one for apps that utilise geographical data (the GEO Profile), one for applications that use cultural heritage and museum data (the GILS Profile), and one for applications that use data from the government (the GILS Profile) (the CIMI Profile). Information pertaining to all profiles can be obtained from the Z39.50 Maintenance Agency.

An international Z39.50 specification for library applications and resource discovery, also known as The Bath Profile, is an example of a profile project that has broad library-related ramifications. This profile reflects the global community's agreement on a fundamental set of qualities, such as the ability to retrieve bibliographic record information and holdings information. In the United States, the National Information Standards Organization (NISO) is providing funding for the development of a national Profile that will fulfil the standards that are particular to bibliographic records. The Bath Profile and the Z Texas Profile will serve as the foundation for the NISO Profile, both of which were developed to make the process of sharing resources easier across the state of Texas. It is believed that it will be released in the year 2002.

#### 1.6.3 **Attributes and Attributes Sets**

When conducting a Z39.50 search, the user is required to first supply search phrases, which are then compared to access points included inside the database. The user's query identifies information about the search words, also known as attributes, which define how each phrase is to be handled when it is utilised in the search. These attributes can also be referred to as information about the search words.

There are a great number of distinct types of features, some of which are as follows:

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*(Theory)* It is strongly recommended that you use characteristics to identify database access points. Some examples of these features are searchable fields and indexes that may be offered in the

Some examples of these features are searchable fields and indexes that may be offered in the search. For example, a search for an author's name or the title of a publication could be specified by using attributes that are connected to the application of the resource.

Relation attributes are adjectives that represent qualities such as 'less than,' 'greater than,' and 'equal to,' among other features. The phrases "less than," "greater than," and "equal to" are all examples of relation qualities. Utilizing relational features would be the method for formulating the search query for finding books with publication dates after 1996. In addition to these characteristics, the truncation or absence of characters in search words, in addition to the structure of the query itself, are also other ways that inquiries can be managed. Attributes are a component of Z39.50 implementations and are included in published attribute sets. The characteristics of searches conducted for particular types of information are determined by these attribute sets. The "bib-1" attribute set that has been registered is a good illustration of this, among other examples. This collection provides an explanation of a standard approach that would be followed when searching for bibliographic information.

### **1.6.4 More About Z39.50**

### The Standard

There is a free PDF version of ANSI/NISO Z39.50-1995, Information Retrieval — Application Service Definition and Protocol Specification on the NISO website (www.niso.org>), and physical copies may be ordered via NISO Press Fulfillment.

### Z39.50 Organizations

Following is a list of organisations who are actively participating in the process of developing and maintaining the Z39.50 standard and protocol.

**National Information Standards Organization (NISO)** The National Information Standards Organization (NISO) is responsible for the creation and promotion of all kinds of technical standards that are utilised in information services of all kinds. ANSI, the American National Standards Institute, is the national clearinghouse for the production of voluntary standards in the United States. NISO is a non-profit organisation that has been recognised as a standards developer by ANSI. The voting members and other supporters of NISO come from a diverse group of information producers and consumers. This group includes government agencies, information-based enterprises, and publishers, among other organisations. Through its participation in Technical Committee 46 of the International Organization for Standardization (ISO), NISO has established itself as a pioneer in the development of international standards.

Information on Z39.50 and other standards may be found in the quarterly publication Information Standards Quarterly, which is published by NISO. To obtain a sample issue email NISO at nisohq@niso.org.

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You will be kept up to date on NISO's current national and international standards activities, the availability of draught standards, the progress of committees, new standards and related publications, and news that is relevant to NISO's constituency by NISO-L, the organization's electronic mailing list service. To sign up, send an email to listproc@cni.org with the subject "Subscribe." The following line should be included in the message: subscribe NISO-L (your name). Every message that is posted to NISO-L is saved in the archives. The National Information Standards Organization (NISO) has a Z39.50 Resource web page online at the following URL: http://www.niso.org/standards/ resources/Z3950 Resources.html.

Z39.50 Implementors Group (ZIG) Since 1990, ZIG has served as a forum for Z39.50 implementors and has been responsible for guiding the standard's ongoing development. ZIG members include universities, libraries, suppliers of CDROMs and library systems, publishers, consultants, information service providers, and bibliographic utilities. ZIG members also include information service vendors. Anyone who is interested in the development and implementation of Z39.50 is welcome to join the organisation. You may visiting the following information on ZIG activities by website: get http://lcweb.loc.gov/z3950/ agency/zig/.

**Z39.50 Maintenance Agency** Z39.50 has an official Maintenance Agency and Registration Authority, and that agency is the Library of Congress. The Library of Congress is responsible for maintaining information about Z39.50 resources, the development and maintenance of Z39.50 (existing as well as future versions), the implementation and use of the Z39.50 protocol, and the register of implementors.

Their website, which can be found at http://lcweb.loc.gov/z3950/agency/, offers connections to software vendors, Z39.50 hosts that are offering free interoperability testing, and several Z39.50 databases and collections that are available online.

## **1.7 Recent Developments and Initiatives**

Tools for scanning and explanation, as well as testbeds for Version 3, are currently in the process of being built.

The development of Version 4 has begun in ZIG (z39.50 Implementers Group). The vast majority of features relevant to the search of bibliographic data have already been incorporated in version 3; the definition of sorted list queries is the most significant piece of work that is still being done at this time.

Interlibrary Loan (ILL) services could potentially be made available to z39.50 clients by utilising the Extended Services Item Order service, which is the topic of the inquiry that is now taking place.

A number of implementation projects, such as the European German DBV-OSI II and the European Commission's (EC's) OPAC Network in Europe (ONE), will develop high-quality

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applications for the public domain z39.50 during the year 1996. These applications will be made available via the Internet.

The goal of the Government Information Locator Service, also known as GILS, is to make it easier for members of the general public to find the information they need and gain access to it across the entirety of the federal government in the United States.

z39.50 will be utilised by GILS in order to provide a connection that is consistent even while moving between geographically separate GILS servers.

CIMI, which is an acronym that stands for the Consortium for the Computer Interchange of Museum Information, is considering using z39.50 as a tool to assist it in accomplishing its goals of establishing museum resources on digital networks and ensuring the open and standards-based interchange of museum information.

### **IN-TEXT QUESTIONS**

- 6. OAI-What is the full form of SRU/SRW?
- 7. What is Zing

### **1.8 Implications for the Libraries**

- OPACs
- Cataloguing
- Union Catalogues
- Inter-Library Loan
- CD-ROM Access
- SDI
- Web Searching and Filtering

## 1.9 SUMMARY

Z39.50, which serves as the industry standard for information retrieval across the globe, has advanced to a more complex degree of development. New applications that make use of the features are continuously being discovered by user communities. Since its inception, Z39.50 has been a lightning rod for major information access concerns, and in the current Internet-based information environment, it continues to bring issues to the attention of those involved in designing, enhancing, and deploying information retrieval applications. Z39.50 has been a lightning rod for major information access concerns since its inception.

As a direct consequence of this, the standard keeps evolving. The Z39.50 Implementors Group has given their approval for the balloting of a maintenance revision in the year 2002.



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This version will include clarifications and modifications (ZIG). In addition, the Z39.50 Interest Group (ZIG) has been discussing how to position Z39.50 in the context of the web, how to incorporate more recent technology, and how to increase the acceptance of the protocol among non-library populations that could benefit from a common information retrieval protocol.

# 1.10 GLOSSARY

**NISO:**The National Information Standards Organization is an organization in the United States that operates on a not-for-profit basis and is responsible for the development, management, and publication of technical standards for publishing, bibliographic, and library-related applications.

**Z39.50:**The Z39.50 protocol is an international standard for the retrieval of information that is utilised by computer systems that are part of a network. It provides users looking for information with the ability to search many systems located on a network or the Internet through the use of a single user interface.

**ANSI:** The American National Standards Institute is a private non-profit organisation that manages the creation of voluntary consensus standards for American products, services, processes, systems, and employees.

# 1.11 ANSWERS TO IN-TEXT QUESTIONS

- 1. Computer-to-computer communications
- 2. Library of Congress
- 3. 1988
- 4. KOHA
- 5. Library and Archives Canada
- 6. Search/Retrieve via URL/Search/Retrieve Web service
- 7. Z39.50 International-Next Generation

# 1.12 SELF-ASSESSMENT QUESTIONS

- 1. What is z39.50. Discuss the key technologies associated with z39.50 protocol.
- 2. Discuss the similarity between z39.50 and SRU/SRW with examples

# **1.13 REFERENCES**

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# **1.14 SUGGESTED READINGS**

Sphot:

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# LESSON 1

# **Open Archives Initiative Protocol for Metadata** Harvesting

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## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 History of OAI
- 1.4 OAI VS. Z39.50
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# **1.1 LEARNING OBJECTIVES**

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At the end of this lesson, you will be able to:

- Understand OAI-PMH concept
- OAI-PMH Components
- How OAI-PMH Functions
- OAI-PMH architecture

## **1.2 INTRODUCTION**

The Open Archives Initiative Protocol for Metadata Harvesting, also known as OAI-PMH, is the protocol that provides access to the database for other archives and serves as a management mechanism for the collection of metadata descriptions. The Open Archives Initiative is responsible for the development of the Protocol, which is founded on the principle of establishing interoperability standards in order to facilitate and encourage a wider and more effective distribution of knowledge within the scientific community.

Considering the significant development of activities related to digitization, a rising number of digital repositories are being created by a wide range of educational and scientific organisations. On the other hand, one cannot assert that the digitalization of information is the solution to the issue of inadequate access to it. It is a very challenging undertaking to make all of these huge and varied materials available to the public. One of the most serious challenges that digital repositories are up against in the present day is their inability to communicate with one another. Interoperability may be thought of as the capacity of different systems, organisations, and people to collaborate in order to achieve shared or separate objectives. In the realm of computer science, it is backed by open standards for communication between computer systems, as well as for the definition of resources and collections, amongst other things. Search interoperability is defined as "the capacity to run a search across different collection of metadata entries and acquire relevant results," as stated by Priscilla Caplan. The term "interoperability" covers a wide range of topics related to archive initiatives, such as their metadata formats, underlying architecture, openness to the development of third-party digital library facilities, integration with the established scholarly communication mechanisms, usability in cross-disciplinary settings, and capacity to contribute to a cooperative metrics system for usage and citation, etc. Interoperability covers a broad phrase that encompasses many various facets of archive initiatives, such as the information formats they use, the architecture they base their systems on, and the degree to which they are open. [3]. Even the most sophisticated search engines have been unable to create an index of the available materials. Federated search is one of the methods that may be used to fix this issue. It is the process of simultaneously searching numerous internet databases in order to provide the user with relevant results. Because conventional search engines rely on crawler technology, a significant number of databases have been hidden from view; nevertheless, federated searching provides a solution to this issue and makes it possible to search the deep web without each accessing each database. Interoperability is typically thought of in this context in relation to the finding and accessibility of resources.



# **1.3 History of OAI**

OAI may be traced back to the efforts that were undertaken to improve interoperability between all eprint/pre-print servers that contained scientific and technical materials. These servers were the original inspiration for OAI (Breeding, 2002). The everincreasing expense of journals was the single most significant cause that led to the establishment of pre-print archives, but this was only one of several contributing factors. Articles and papers written by academics and researchers would be submitted to these servers, which makes it possible for the material to be disseminated across the academic community much more quickly than it is now possible via the use of conventional print periodicals.

In the 90s, there was a consistent increase in the quantity of e-print and pre-print repositories. This increase resulted in an information overload as well as some other concerns, which may be summed up as follows:

- i. The end-users and academics may be unable to be aware of the presence of a repository.
- ii. There may be overlapping coverage in terms of themes.
- iii. Due to the multi-disciplinary nature of the subjects being discussed, it was necessary for the documents to be stored across many different repositories.
- iv. The end-users/scholars had to explore individual repositories in order to retrieve the papers of their interest.
- v. Duplication of efforts was caused by the existence of discipline-specific and institution-specific archives.
- vi. In addition, it was not ideal to mandate that academics submit their work to a number of different repositories.

In order to find a solution to these issues, it became clear that a structure needed to be developed in order to provide some form of integration of the electronic print and pre-print archives. Late in the year 1999, in Santa Fe, New Mexico, a gathering to discuss the challenges facing the e-print industry was organised. The majority of the effort consisted of defining an interface that would enable eprint servers to provide their metadata for the papers that they stored. This would allow search engines or other repositories that were comparable to it to collect its information. Thus, by offering a single search engine for many collections, these archives would act as a federation of repositories, making it simpler to find the information included in those collections.

Following the discussion, In January of 2000, a specification for the Open Archives Initiative was given, which included the concepts that had been agreed upon. Herbert Van de Sompel, Rick Luce, and Paul Gisparg were among the people who were involved in the introduction of this specification. It was supported by organisations like the National Science Foundation, the Coalition for Networked Information, and the Digital Library Federation.

In order to provide the protocol with a strategic direction, the OAI Steering Committee was established in August of the year 2000. In July 2001, version 1.1 of the protocol was made available. The Open Archives Initiative Technical Committee, also known as the OAI-TC,



was founded in order to construct and draft version 2 of the Open Archives Initiative Protocol for Metadata Harvesting in response to criticisms and ideas provided by implementers. It wasn't until June 2002 that the OAI/PMH version 2.0 was finally made available to the public (http://www.openarchives.org/OAI/2.0/ openarchivesprotocol.htm).

# 1.4 OAI VS Z39.50

Why don't we use the Z39.50 protocol for metadata search and transfer? Metadata harvesting is the foundation of "federated searching", which may be provided by both the OAI and Z39.50. Federated searches let consumers access numerous resources via a single interface.

Both methods search differently. While OAI-PMH facilitates the bulk transmission of metadata from repositories to the database of Service Providers, Z39.50 enables clients to search many information servers in real time using a single interface that connects to all of the servers at once.Clients do not have to search various data sources in real time since they may search the metadata database that the service provider maintains. This database compiles information from a variety of data suppliers.

There were many reasons to use a new protocol instead of Z39.50. Reasons:

i) The Z39.50 protocol is very sophisticated yet also challenging. It is possible to utilise it to construct federated search systems, in which a client sends a search query in parallel to a number of information servers, gathers the results, eliminates or clusters duplicates, sorts the obtained data, and then shows it to the user.

ii) One must be concerned about the unavailability of servers (because if there are enough servers, at least one will always be offline), and speed tends to be controlled by the slowest individual server in the federation. The administration of searches that are performed on many servers presents scalability challenges.

iii) There are a lot of different reasons why Z39.50 makes it difficult to construct high-quality federated search services that span several separate servers.

iii) As a result of a lack of specificity in the standard, various servers interpret Z39.50 queries in their own unique ways. This results in semantic discrepancies when a search is carried out.

iv) The performance of Z39.50-based federated searches is sensitive to the response time of the server, the amount of results, and the capacity of the network, which slows access speed.

The open archives committee decided against using distributed search in favour of having servers provide metadata in bulk for harvesting services. These servers would be subject to only a few simple scoping criteria, such as providing all metadata that has been added or changed since a particular date or providing all metadata pertaining to papers that meet matching gross subject partitions within an archive. PMH is easy to implement since it doesn't need a separate port like Z39.50 (port 210). It uses HTTP, which any web server,



browser, or downloader may listen to. It means you can use wget or curl to gather repository information. No special tools are needed as Yaz for Z39.50.

# 1.5 Metadata Standards & OAI-PMH

As the lowest common denominator for interoperability, the OAI Protocol for Metadata Harvesting suggests using Dublin Core that has been encoded in XML. The Dublin Core standard may be "downgraded" to almost any other information system. A harvester may ask for metadata in any format other than Dublin Core from a server, and the server may provide the information in one or more schemas. The List Metadata Formats request returns a record's metadata Prefix, schema, and optional Namespace (if no identifier is given). The full repository returns all available metadata formats.

## **1.6** Components of OAI-PMH

The OAI-PMH may be broken down into two main components. The following are these:

### 1.6.1 Service Provider

Service Providers create value-added services using OAI-PMH metadata. They acquire info from data sources to serve consumers better. They work like search engine web-crawlers. They gather each repositories' information in XML format. The parsed metadata provides a search interface and browsing indexes for all collaborating data providers/repositories. Service Providers employ OAI-PMH metadata harvester to construct value-added services like topic gateways and email notifications.

### 1.6.2 Data Provider

Data Providers manage OAI-PMH metadata-exposing systems. Data providers are digital content repositories or archives that are prepared to exchange metadata through OAI protocols. Data Providers reveal their metadata by installing software so harvesters may construct value-added services. Data Providers or repositories use OAI-PMH to provide metadata. Data includes text, photos, audio, and video.

# 1.7 The OAI-PMH Architecture

The metadata that is stored in the database of the data providers is transferred in bulk to the database of the metadata that is retained by the service providers. In order to finish the transmission of metadata, the data source and the service provider/harvester go back and forth with a series of questions and responses to each other. Communication between a harvester and a repository using the OAI-PMH Protocol is enabled via the use of the HTTP-transaction framework. Both the HTTP GET and POST methods may be used to send

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requests to the server. All correct responses are encoded in XML, whereas HTTP status codes are used to signify unsuccessful, error-handling, and flow-control responses.





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### **1.8 OAI/PMH Request Verbs**

A service provider may only issue a request to a data provider using one of these six "verbs" specified by the protocol:

- 1. **Identify:** It is possible to get information about a repository by using the Identify tool. It includes things like copyright notices, administrator email addresses, and submission procedures. This verb gets repository details. An identify request to an OAI-PMH server will provide the repository's name, administrator's e-mail address, base URL, version of OAI-PMH supported, time stamp of the first record put in the repository, how it handles deleted records, and harvesting granularity allowed by the server. Harvesting granularity refers to an item's repository time stamp, not the metadata schemas allowed by the OAI-PMH server. Any valid IS08601 granularity may be used for harvesting. Digital repositories usually utilise a day as the harvesting granularity. Thus, requests arrive in YYYY-MM-DD format, but might enable hours, minutes, seconds, etc.
- 2. ListMetadataFormats: It is possible to get the metadata formats that are offered by a repository by using the listMetadataFormats function.
- 3. ListSets: The set structure stored in a repository may be retrieved with the help of ListSets. Sets, which enable selective harvesting based on sets, are very helpful for multi-disciplinary and inter-disciplinary repositories, hence it is important for them to employ sets.
- 4. ListIdentifiers: This verb returns the Identifier of a repository of OAI-PMH repository entries. For lengthy requests, a request using this verb may be accompanied with parameters defining a date range (from and until), a metadataPrefix, a limit by set, or the usage of a resumptionToken. ListIdentifier requests deliver just the identifier for each item in a repository, which may be used with the GetRecord verb to get the item's complete metadata record. An example of a ListIdentifiers request on the institutional repository OAI-PMH server of the Ohio State University Libraries might be: http://kb.osu.edu/oai/request?verb=ListIdentifiers&set=hdl 1811 29375&metadataPrefix= oai dc.
- 5. ListRecords: This verb harvests OAI-PMH server metadata records. This verb may be coupled with parameters restricting records to be harvested by date (until and from) or by set, as well as a metadata preference (metadataPrefix) or a resumptionToken for harvesting big datasets. In general, the ListRecords request appears identical to the ListIdentifiers request, except for variable use and the answer request structure, which is comparable to GetRecord. An example of a request for Braceros records in the Ohio State University Libraries' OAI-PMH server might be:



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http://kb.osu.edu/oai/request?verb=ListRecords&metadat aPrefix=oai\_dc&set=hdl\_1811\_29375.

6. GetRecord: This verb retrieves a repository's metadata. GetRecord needs identifier and metadataPrefix. To request record id: oai:kb.osu.edu:1811/29431 from the 2006– 07 Mershon Center Research Projects (Use of Force and Diplomacy) collection in Unqualified Dublin Core, provide the following: http://kb.osu.edu/oai/ \srequest?verb=GetRecord&identifier=oai:kb.osu.edu:1811/294 \s31&metadataPrefix=oai dc.

## Verbs and their Functions

- i) Identify Retrieve information about the repository
- ii) ListMetadataFormats Retrieve the metadata format available from a repository
- iii) ListSets Retrieve the set structure of a repository
- iv) GetRecords Retrieves an individual metadata record from a repository
- v) ListIdentifiers Retrieves unique identifiers from an item
- vi) ListRecords Harvest records from a repository

# **1.9 OAI-PMH Application**

OAI-PMH is a low-barrier approach that digital repositories may use to make the metadata in their collections harvestable to the general public. The method consists of just five verbs and a restricted range of parameters. And despite the fact that many individuals, including the authors, are of the opinion that digital repositories should make their metadata harvestable to the outside world, the obvious question for those who build digital repositories is, "What's in it for me?" Since the harvesting of big repositories might involve the transport of hundreds of gigabytes of data, it is obvious that metadata harvesting necessitates the allocation of resources to the harvesting operation. If one were to harvest all of the metadata that is accessible, for instance, using the institutional repository at Oregon State University would need the transmission of around fifty gigabytes of data. If harvesting was done on a consistent basis by a number of different organisations, then this form of data transmission might very simply start using considerable resources. Therefore, having harvestable metadata may make one a nice neighbour within the present information ecosystem; yet, doing so does come at a price.

# **1.10** Some existing DATA Providers

As mentioned previously, Data Providers may be thought of as repositories or archives of digital material. These archives often include some type of metadata that describes the content itself. The Data Providers make their metadata accessible to harvesters by installing a



piece of software in such a way that it enables harvesters to harvest the metadata of the Data Providers in order to develop value-added services.

### **ArXiv E-Print Archive**

ArXiv is an electronic printing service that is used in the domains of physics, mathematics, non-linear science, and computer science. The academic standards of Cornell University are adhered to throughout arXiv's material. Cornell University, a private educational institution that is not-for-profit, is the owner of arXiv and is responsible for its operation and funding. Additionally, the National Science Foundation provides some of the funding for ArXiv.

Website: http://arxiv.org/

URL: http://arXiv.org/oai2

### **Open Video Project**

The Open Video Project is a shared digital video repository & test collection that was developed with the intention of catering to the needs of academics working in a wide range of digital video-related fields. The Open Video Project was created with the intention of catering to the needs of academics working in digital video-related fields..At this time, the Open Video collection stores either the video itself or the metadata for a total of 1844 digitised video segments.

Website: http://www.open-video.org/

URL: http://www.open-video.org/oai2.0/

### **CogPrints**

Archive of electronic publications in Cognitive Sciences. An electronic archive that allows authors to self-archive their papers in any field of Psychology, neuroscience, and Linguistics, as well as in many fields of Computer Science (such as artificial intelligence, robotics, vision, learning, speech, and neural networks), Philosophy (such as the mind, language, knowledge, science, and logic), Biology (such as ethology, behavioural ecology, sociobiology, behaviour genetics, evolutionary theory), Medicine (such as psychiatry, neurology, human genetics, imaging), and Anthropology (such as human genetics, imaging).

Website: http://cogprints.ecs.soton.ac.uk/

URL: http://cogprints.ecs.soton.ac.uk/perl/oai2

### E-Prints in Library & Information Science (E-LIS)

E-LIS is an electronic repository that allows free access to scientific or technical publications in the fields of librarianship, information science and technology, and associated application

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activities. These materials may or may not have been published. E-LIS is an archive that allows users to deposit preprints, postprints, and other types of LIS publications. Users may search for documents in electronic format and download them for free using this resource, which is available to the global LIS community. The goal of the E-LIS Archive is to make it easier for professionals who are working in the same field to communicate with one another via the rapid distribution of publications.

Website: http://eprints.rclis.org/

URL: http://eprints.rclis.org/perl/oai2

## **1.11 Existing Service Providers**

Harvesting the metadata that is made available by the Data Providers is the responsibility of the Service Providers. Their work is analogous to that of the web crawlers used by search engines on the internet. They go to all of the various repositories in order to harvest all of the metadata that each one gathers, which is then stored in their database in XML format. After the metadata has been gathered, it is processed so that an integrated search interface and browsing index may be provided for the collections of all of the cooperating data providers and repositories.

- i) OAIster
- ii) Networked Computer Science Technical Reference Library
- iii) iCite: CITATION INDEXING
- iv) Electronic Thesis/Dissertation OAI Union Catalog

### **IN-TEXT QUESTIONS**

- 1. OAI-PMH is based on ..... architecture?
- 2. Name any threes software systems which support the OAI-PMH
- 3. What is a data provider?
- 4. What is the latest/current version of OAI-PMH?
- 5. Who manages the Open Archives Initiative?

# 1.12 SUMMARY

The proliferation and spread of digital media are progressing at a rate that is higher than it has ever been. Even if it just focuses on a certain subject of research, a digital library will never be able to support itself. Therefore, the digital libraries have a responsibility to collaborate and share their materials. The advantages of having networked digital libraries

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have already begun to become apparent to the relevant authorities. Interoperability has been the primary barrier to progress when it comes to the efficient transfer of resources across networks involving digital libraries. Interoperability is accomplished via the use of extremely simple methods using the OAI Protocol for Metadata Harvesting.

The creation of universal interoperability standards was supposed to be the means by which the Open Archives Initiative was supposed to accomplish its goal of increasing the availability of scholarly content. The protocol's use has increasingly expanded into the realm of digital libraries as its breadth has grown. The maturation process of the protocol was kicked off with the publication of version 2.0 of the protocol, which was done recently. It covers not only the various formats for text documents, but also those for images, videos, audio, and other forms of multimedia.

There are still certain large-scale archives, such as PubMed Central, which do not reveal their information via makinguse of the OAI Protocol for Metadata Harvesting. These archives house a vast amount of information. On the other hand, the number of repositories that are OAI-compatible has been constantly increasing. The simplicity of this protocol, together with its very straightforward use, has been its most notable advantage. It has the potential to become a significant driving force in the efficient utilisation of digital archives and the widespread adoption of digital libraries.

# 1.13 GLOSSARY

**OAIster:**OAIster is an online unified bibliographic catalogue of open access content gathered with OAI-PMH.

iCite:iCite provides bibliometric information for journal articles indexed in PubMed.

**DOI:**The DOI system provides a technical and social framework for the registration and utilisation of persistent interoperable identifiers.

# 1.14 ANSWERS TO IN-TEXT QUESTIONS

- 1. Client-Server
- 2. Fedora, Eprints, Dspace

3. A data provider maintains one or more repositories (web servers) that support the OAI-PMH as a means of exposing metadata.

#### 4. OAI-PMH

5. Herbert Van de Sompel and Carl Lagoze are responsible for coordination of OAI activities, which are centered at Cornell University.

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## 1.15 SELF-ASSESSMENT QUESTIONS

- 1. Prepare a list of OA repositories.
- 2. How OAster functions? Explain the process.
- 3. What are the key benefits in using OAI-PMH for the Libraries?

#### **1.16 REFERENCES**

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Lagoze, C., Van de Sompel, H., Nelson, M., & Warner, S. (2002). Open archives initiativeprotocol for metadata harvesting-v. 2.0.

## **1.17 SUGGESTED READINGS**

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# **LESSON 1**

# **ARTIFICIAL INTELLIGENCE IN LIBRARIRES**

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# STRUCTURE

- 1.1 Learning objectives
- 1.2 Introduction
- 1.3 Brief History of Artificial intelligence
- 1.4 Advantages and Disadvantages of Artificial Intelligence
- 1.5. Approaches of Artificial Intelligence
- 1.6. Types of Artificial Intelligence
- 1.7. Application of Artificial Intelligence in library activities and services
- 1.8. Challenges of using AI in Libraries
- 1.9. Summary
- 1.10. Glossary
- 1.11 Answers to In-Text Questions
- 1.12. Self-Assessment Questions
- 1.13. References & suggested readings

# **1.1 LEARNING OBJECTIVES**

After reading this chapter, you will be able to know:

- Brief about Artificial Intelligence
- History of artificial intelligence
- Advantages and disadvantages of AI
- Approaches and types of AI
- Applications of AI in Libraries

# **1.2 INTRODUCTION**

The Human beings have thought of thinking machine for a long time. These thinking machines have characterized in various ways, but one of them was to call them intelligent .

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Not in a human sense, but in an artificial manner .These machines would then be called 'artificial intelligence' or considered to have "artificial intelligence". Artificial Intelligence is the combination of two words. The dictionary meaning of artificial is natural but made by people whereas the Intelligence is the study of mental faculties through the use of computational model. Artificial intelligence is a wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence. Artificial Intelligence or AI is also considered as combination of computer science, psychology, and philosophy. Artificial Intelligence mainly focuses on understanding and performing intelligent tasks such as reasoning, learning new skills and adopting to new situations and problems. It further focuses on three cognitive skills i.e. learning, reasoning and self-correction. Artificial Intelligence is considered as a young discipline which carries society beyond imagination. AI broadly Artificial intelligence (AI) broadly refers to any human-like behaviour displayed by a machine or system. In AI's most basic form, computers are programmed to "mimic" human behaviour using extensive data from past examples of similar behaviour. This can range from recognizing differences between a cat and a bird to perform complex activities in a manufacturing facility.

There are strong link between the development of computers and the emergence of AI. However, the seeds of AI were sown long before the development of modern computers. The term was coined by McCathy in 1956 at Dartmouth College, USA where the first workshop for celebrating the new field of AI took place. It was here that many of the sub-sequent classical foundations of the subject were first laid. Further, it was also computer's inability to efficiently store or quickly process information created obstacles in the pursuit of AI in the coming years.

Seeing the demand of intelligence users and the efficiency, effectiveness and speed in working environment, libraries have also started using the AI in different operations such as for Reference Service, accessing online databases, acquisition, machine leaning in library services, cataloguing, classification and in the indexing of periodicals.

# **1.3 BRIEF HISTORY OF ARTIFICIAL INTELLIGENCE**

Now a day, the Artificial intelligence has become part of day to day life. It provides the solution for speech-to-text (Natural language processing), video analytics, quality control, autonomous driving, financial and entertainment services. It was Marvin Minsky and Dean Edmonds who built what could be described as the first AI computer, based on a network of the neuron models of McCulloch and Pitts. At the same time, Claude Shannon considered the possibility of a commuter playing chess and the type of strategies needed in order to decide which move to make next.

When we see the latest happening of Artificial Intelligence, we find that OpenAI builds on GPT-3 to develop DALL-E, which is able to create images from text. The National Institute of Standards and Technology releases the first draft of its AI Risk Management Framework,



voluntary U.S. guidance "to better manage risks to individuals, organizations, and society associated with artificial intelligence.

# **1.4 ADVANTAGES AND DISADVANTAGES OF ARTIFICIAL**

Artificial Intelligence have the capability of processing large amounts of data much faster and makes predictions more accurately than possiblehumanly. It uses the machine learning that can quickly turn it into actionable information.

#### **Advantages of Artificial Intelligence**

Artificial Intelligence facilitates human work with great speed, efficiency and effectiveness in work environments. Artificial Intelligence not only improves the performances of library services but also reduce the rate of human error, defects and perform the task faster than human being can:

- (i) It has the ability to perform stressful and complex tasks that human may struggle/rarely do.
- (ii) Use of AI is capable of delivering consistent results
- (iii) It is good at detail-oriented jobs
- (iv) It reduced time for data-heavy tasks
- (v) It commit less errors and defects
- (vi) It has infinite functions
- (vii) it can perform the task faster than a human can perform

#### **Disadvantage of Artificial Intelligence**

Although Artificial Intelligence is a promising and innovative idea in the library systems whereas it has some of the disadvantages also which have been discussed below:

- (i) AI is an expensive to process large amount of data.
- (ii) Lack of ability to generalize from one task to another
- (iii) AI requires deep technical expertise
- (iv) Lack of human touch
- (v) It has the ability to replace the human job
- (vi) It may corrupt young generation
- (vii) It can be misleading to mas scale destruction

With the changing time, it has been observed that the Artificial Intelligence is taking place at every walk of life. The library and information science discipline is also getting benefit from the efficient expert system for technical services, acquisition, cataloguing, classification, indexing of periodicals as well as information processing and management.



# **1.5. APPROACHES OF ARTIFICIAL INTELLIGENCE**

There are four approaches of Artificial Intelligence i.e. thinking humanly, thinking rationally, acting humanly and acting rationally. Thinking humanly approach is based on mimicking thought based on the human mind whereas thinking rationally approach is based on mimicking thought based on logical reasoning. Acting humanly approach is based on acting in a manner that mimics human behaviour whereas acting rationally approach is based on acting in a manner that is meant to achieve a particular goal.



Fig. 1.1: Approaches of Artificial Intelligence

The two approaches thinking humanly and thinking rationally concepts concerned thought processes and reasoning, while others deal with behaviour. Norvig and Russell in their book Artificial Intelligence a modern approach written in 2010, focus particularly on rational agents that act to achieve the best outcome, noting "all the skills needed for the Turing Test also allow an agent to act rationally." While these definitions may seem abstract to the average person, they help focus the field as an area of computer science and provide a blueprint for infusing machines and programs with ML and other subsets of AI.

# **1.6. TYPES OF ARTFICIAL INTELLIGENCE**

The artificial intelligence have been categorized into different types such as weak and strong, weak artificial intelligence system designed to carry out one particular job, it includes video games such as chess, Amazon's Alexa through which we question and receives the answers whereas the strong system carries human like tasks, it tend to be complex and complicated system. These kinds of systems can be found in applications like self-driving cars or in hospital operating rooms. Further, in an another classification, it has been classified in two categories based on functionality which consists of reactive machine, limited theory, theory



of mind and self-aware and based on capabilities (Artificial narrow intelligence, artificial general intelligence and artificial super intelligence). Further, ArendHintze in 2016 categorized it in four types. They are: reactive machines, limited memory, theory of mind and self-awareness. These four types have been discussed one by one:

#### (i) **Type 1: Reactive machines**

These AI systems have no memory and they are task specific. It is good for simple classification pattern recognition tasks. It uses algorithms to optimize outputs based on set of inputs. It has the capacity of accomplishing the calculations much faster and can easily beat the human. Chess-playing AI'<sup>s</sup> for example, are reactive systems that optimize the best strategy to win the game. Reactive AI tends to be fairly static, unable to learn or adapt to novel situations. Thus, it will produce the same output given identical inputs.

#### (ii) **Type 2: Limited memory**

It can handle complex classification tasks. This kind of AI uses historical data to make predictions. It is capable of complex tasks such as self—driving cars, but still vulnerable to outlines or adversarial examples. Autonomous vehicles can "read the road" and adapt to novel situations, even "learning" from past experience.

#### (iii) **Type 3: Theory of mind**

It is fully adoptive and has an extensive ability to learn and retain past experiences. It can deliver personal experience to everyone based on their motives and needs. It is also able to learn with fewer examples because it understands motive and intent. This type of AI will be able to infer human intentions and predict behaviour, a necessary skill for AI systems to become integral members of human teams.

#### (iv) Type 4: Self-awareness

As the name suggests, AI systems have a sense of self-awareness, which gives them consciousness. Machines with self-awareness understand their own current state. This type of AI does not yet exist. It has human level intelligence that can bypass our intelligence.

# 1.7. APPLICATION OF AI IN LIBRARY ACTIVITIES ANDSERVICES

The Artificial Intelligence can be applied in many a disciplines. It is being tested and used in the healthcare sector for dosing drugs and doling out different treatments tailored to specific patients and for aiding in surgical procedures in the operation room. The artificial intelligence are also being used in the financial sector for detection and flag activity, in banking and finance such as unusual uses of debit card and to make trading easier to



streamline it. This is done by making supply, demand, and pricing of securities easier to estimate. As far as the education sector is concerned, it not only assists students but also adopts their need in helping them work at their own pace. The AI tutors are also available to provide additional support to the students, ensuring they stay on track. It can also change where and how students learn, perhaps even replacing some teaching. It also provides help in automating the grading system.

American Library Association in 2019 said that Artificial Intelligence matters to libraries because it canbe used for organizing and making available large collections of information. In the similar direction, Sridevi and Shanmugam (2017), artificial intelligence is the modern technology which is used to manage the digital library. The ultimate promise of artificial intelligence is to develop computer systems or machines that think, behave and in fact rival human intelligence, and this clearly has major implications on librarianship.

Majority of AI related applications have come up for libraries to preform task of manpower, budget, collection development, scheduling etc. the best thing about artificial intelligence system in libraries are that they are less prone to errors unlike human being, can work for 24/7 days without getting tired. It is also capable of maximizing the speed, efficiency and effectiveness in processing library materials and enhances library services delivery at all levels. According Vijayakumar and Vijayan in their article 'Application of information technology in libraries: An overview;written in 2011 suggested thatAI are used in classification, cataloguing, and indexing of library materials via use of optical character recognition and neutral network, the system is able to obtain the bibliographic records of books and classify them accordingly.

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Fig. 1.2: Application of Artificial Intelligence in Library services and Activities

## (i) Cataloguing

It analyses the function of cataloguing activities for all types of material and media. The department proposes and develops cataloguing rules and principles, vocabularies, guidelines, tools and standards for bibliographic information. This department also monitors the relevant and innovative approaches related to cataloguing. The automatic cataloguing is possible by using Optical Character Recognition (OCR). There are two ways to apply Artificial Intelligence techniques in cataloguing, human-machine interfaces in which intellectual work is divides between intermediary and support system another is an expert system with full cataloguing capabilities associated with electronic publishing system.

## (ii) Acquisition

Acquisition department is responsible for Selection, procurement and accessioning. The department may select vendors, negotiate consortium pricing, arrange for standing orders and select individual titles or resources. Several systems have been incorporates for the acquisition of these resources. Monograph selection Advisor, a pioneering effort in applying this emerging technology is another area of building library collection. The task modeled is



the item-by-item decision that a subject bibliographer makes in selecting monograph. The prerequisite is that the knowledge base has to be broad enough and the interfacing aspect must be easy enough for the library to get the desired information from the machine. The use of modern tools and techniques in the acquisitiokn process has fasten the speed of the library activities speacially in the acquisition department.

#### (iii) Classification

It is considered as a system of knowledge organization. The automatic cataloguing is possible by using Optical Character Recognition (OCR). The application of expert system in the field of library classification includes Coal SORT, EP-X and BIOSIS.

#### (iv) Reference Services

It helps library users in directing to the library materials, give advice on library collections, and services on various kinds of information sources. It also help the users by answering the question that the users have in mind as well as helping the users to locate the information that they need in the library. The services such as REFSEARCH, POINTER, Online Reference Assistance (ORA), AMSWERMAN, and PLEXUS are part of Artificial intelligence being used for locating reference resources.

## (v) Indexing of Periodicals

Just like reference, acquisition, cataloguing, classification indexing of periodical is also an area where an expert systems are developed. Indexing of periodical article involves identification of concepts, to translate the concepts into verbal descriptions, & selecting and assigning controlled vocabulary terms that are conceptually equivalent to verbal descriptions. The reason for automating the intellectual aspects of indexing is to improve indexing consistency and quality. Based on the information provided by the indexer, the systems can arrive at appropriate preferred terms automatically to assign relevant subdivisions. The system can make inferences & based on the inference, it can take appropriate action. The 'Med Index' is the best example of the library indexing system. As there is a lack of exposure to these expert system oriented services in many libraries, very few library users have interacted with knowledge-based systems. In addition, most of these expert systems oriented services are evolving over the period and undergoing many improvements to suit the needs of the library patron.



#### (vi) Information Retrieval

Information retrieval is another aspect of librarianship that has felt the touch of artificial intelligence. Library information retrieval deals with the recall of information or resources from a file or database, it is concerned with the structure, analysis, organization, storage, searching, and retrieval of information stored in a library's collections, information Centre or the Internet. As the information held in libraries grew, several types of information retrieval tools were invented to cope with the vast amount of information therein and make them accessible to users. Nowadays, the quantity of new information being generated is at an exponential rate, this led to the invention and use of computerised and artificial intelligence retrieval systems to facilitate information searching and retrieval from the library's collection, be it paper-based or electronic.

#### (vii) Collection Development

It should be added that artificial intelligence systems could also be developed to handle resource development or collection development of the library. Collection development deals with the resource selection, acquisition and development in the library, or simply the process of meeting the information needs of library users in a timely and economical manner mainly through acquisitions (purchase), or gifts from sister organization and various other bodies. After the selection of books that would be purchased by a library, a list is normally sent to book sellers and vendors to submit the prices with respect to the quality and format (print or electronic, paper-binding or hardcover-binding). Likewise, the intelligent system can learn from past experiences and submit the list of items to be acquired based on the previous performances of the book-sellers or vendors, especially now that most book-sellers and vendors can be accessed via their emails or homepage. Corroborating this assertion, it has been observed thatan artificial intelligence systems can give suggestions based on past purchases or user interests - a strategic method to improve acquisition of library materials and enhance the user experience via recommendations of magazines, journals, authors, books, etc.

# **1.8. CHALLENGES OF USING AI IN LIBRARIRES**

Artificial Intelligence systems are generally not in operational use in most libraries today. The limitations in implementing artificial intelligence systems in libraries were revealed by Omame, I. M. and Alex-Nmecha, J. C. in the year 2020 in their research paper'Artificial intelligence in libraries. In Managing and adapting library information services for future users'. The paper highlighs the following points:



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- (i) Lack of technical know-how to use and operate artificial intelligence system among the library staff.
- (ii) Lack of adequate funding to develop or procure artificial intelligence system in libraries. Since the budgets for hardware and software are frequently tight, there's always constrain to the type of system the library can purchase or develop.
- (iii) High system development and maintenance cost of artificial intelligence system in libraries.
- (iv) Erratic power supply to power artificial intelligences system in libraries especially in developing countries.
- (v) Inherent complexities of expert/artificial intelligence systems' development.
- (vi) Intelligent system lacks that common base of human knowledge, severely constraining the types of functions that they can perform.
- (vii) Intelligent systems lack that common base of human knowledge, severely constraining the types of functions that they can perform.
- (viii) Level of effort and technical expertise needed to create artificial intelligence systems in Libraries. The level and nature of effort that must be invested to develop an intelligent library system is directly proportional to the power and complexity of the system of the system. This implies that , the more intelligent the system is, the more the effort that must be invested therein. Currently,the required skilled personnel with expensive development tools or techniques, needed to develop sophisticated intelligent system in libraries are lacking or costly, hence , the lack of such systems in libraries.
- (ix) Limited amount of artificial intelligence experts among library automation vendors. The field of artificial intelligence is complex and thus, requires a specialised knowledge in that aspect far beyond the development of conventional library automation systems. Consequently, this will require hiring new personnel that area before any significant, widespread work can be done the area of artificial intelligence systems in libraries.







# **1.9. SUMMARY**

IFLA library policy and Advocacy Blog, 2018 revealed that "A good librarian, through working with a user, can provide a much better tailored service, potentially using up time freed up by using AI".

AI has gained tremendous applications in Library and Information Sciences, such as through reference science, Information Retrieval, Cataloguing. Classification, Indexing of periodicals Acquisition, E-databases, OPAC, Web Search engines, robotic system and machine learning in library Sciences. This modern tool provides quick and innovative access to desired information. Libraries are also using robotic system for book retrieval and delivery. The use of robotic cranes stores and retrieve material for users on request from the online catalogue of stored books. Just after the request by the patrons, robotic cranes search the item and retrieve it and deliver it to concerned staff from where users can get it. This process not only save the cost but also minimize the storage space.

There are a number of possible applications of Artificial Intelligence implemented and they have been creating a positive impact on libraries. This has proved that applications

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of AI saves time and money in almost all sectors in the society. The application of AI in the academic libraries have been increasing in very high speed. As authors of this paper discussed, implementation of AI in libraries has triggered the discovery of many new ideas. The development of expert system libraries greatly benefited, sometimes it appears like "Librarianship is at stake" and now it is challenging to ensure the values of librarianship. Artificial intelligence (AI) systematically tops popular lists of the most imperative emerging technologies. With a mixed feeling of fear and eagerness, readers seem to agree that the AI shapes the future libraries.

Artificial Intelligence mainly focuses on understanding and performing intelligent tasks such as reasoning, learning new skills and adopting to new situations and problems. It further focuses on three cognitive skills i.e. learning, reasoning and self-correction. Now a day, the Artificial intelligence has become part of day to day life. It provides the solution for speechto-text (Natural language processing), video analytics, quality control, autonomous driving, financial and entertainment services. There are four approaches of artificial intelligence i.e. thinking humanly, thinking rationally, acting humanly and acting rationally. Thinking humanly approach is based on mimicking thought based on the human mind whereas thinking rationally approach is based on mimicking thought based on logical reasoning. Acting humanly approach is based on acting in a manner that mimics human behaviour whereas acting rationally approach is based on acting in a manner that is meant to achieve a particular goal. ArendHintze in 2016 categorized AI in four types. They are: reactive machines, limited memory, theory of mind and self-awareness. Overall, it has been noticed that despit several difficulties on the implementation of Artificial Intelligence in the libraries such as lack of technical know how to use and operate AI in libraries. It has been giving a lot of benefit to the libraries where Artificial Intelligence applications are in use.

## 1.10. GLOSSARY



Amazon's Alexa

Artificial Intelligence is the combination of two words, the dictionary meaning of artificial is natural but made by people whereas the Intelligence is the study of mental faculties through the use of computational model.

There are four approaches of artificial intelligence i.e. thinking humanly, thinking rationally, acting humanly and acting rationally.

Amazon's Alexa through which we question and receives the answers whereas the strong system carries human like tasks, it tend to be complex and complicated system.

# 1.11 ANSWERS TO IN-TEXT QUESTIONS

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1. McCathy	4. Ten Volumes
2. 1956	5. Dartmouth College, USA
3. Field Tag	

# 1.12. SELF-ASSESSMENT QUESTIONS

- 1. Describe Artificial Intelligence and mention its application in Libraries ?
- 2. Discuss the Type of Artificial Intelligence?
- 3. Discuss the approaches and Types of Artificial Intelligence in Libraries?

## **1.13. REFERENCES&SUGGESTED READINGS**

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# Chapter 1:

# **Research: Concept, Need and Purpose**

Structure

- **1.0 Objectives**
- **1.1. Introduction**
- **1.2 Concept of Research**
- **1.3 Definition of Research**
- 1.4 Need and Purpose of Research
- **1.5 Type of Research**
- **1.6 Process of Research**
- 1.7 Significance of Research in Library Science
- 1.8 Summary
- 1.9 Answerstocheck your progress
  - **1.9.1** Answers to Multiple Choice questions
  - **1.9.2** Answers to Short Questions

# 1.10 Keywords

# 1.11 Acronyms

# 1.12 References and further reading

# 1.0 Objectives

After studying this unit, you will be able to:

- Understand the meaning of research.
- Understand the need and purpose of the research.
- Distinguish between different kinds of researches.
- Understand the process of research design.

## **1.1 Introduction**

Research is the key to growth. It is the continually rising societal necessities which generated the necessity for study and creation as unique activity in the modern society. The advancement in the society from prehistoric to the most advanced were solely by the acquisition and application of knowledge, based on their capacity to comprehend their environments and govern them through concerted actions. At first, learning was more based on observation, experience, trial-and-error learning, basic deduction and inference reasoning, etc. Knowledge about fire was practically an act of chance and categorization of toxic plants or insects was by trial and error approach. However, owing to the increasing capacity for study, the ability to obtain fruitful results from it, and the capacity to use it to solve issues, research has become an essential component of human endeavours. It offers solid solutions to challenges that develop in numerous academic disciplines.

Through study, knowledge expands and develops, resulting in the expansion of the boundaries of knowledge and scholarship. Additionally, research enables man to find solutions to his issues and settle disputes. With the advent of Universities, research became one of their important functions, besides their teaching, training, and publications functions. Increasing pursuit of research has resulted in the growth of a body of literature over the years on research methodology, which has now developed into a subject in its own right.

This demonstrates the significance of study. It is believed that research outcomes are responsible for our society's advancement.

With the rise of Universities, research became an important part of what they do, along with teaching, training, and putting out books and other materials. Over the years, more and more people have done research, which has led to the growth of a body of literature on research methods, which is now a subject in its own right.

In addition to teaching, training, and publishing, research became one of the most significant responsibilities of universities after their establishment. A growing interest in research has led in the development of a body of literature on research methodology, which is now a discipline in its own right.

In this Unit, we will discuss in detail the concept of research, why and how research is important, as well as the different kinds of research, how they are done, and the research process.

## **1.2 Concept of Research**

Etymologically, the word "research" is derived from the French term 'researche'. This is a two worded term i.e. 're' (again) and search (find) which means that we are taking up an activity to look into an aspect once again or we want to look for some new information about something.Research is the process of looking into something in a close and careful way.It is an attempt to find solutions to problems (both intellectual and practical) by using scientific methods. So, research is basically a methodical search for facts (truths) using methods that are objective and can be checked. The goal is to find out how the facts relate to each other and draw broad conclusions from them. In this way, it is a method to think critically. In a globalised world, it is important for any type of organisation to have a system for getting information and tools for analysing it so they can make good decisions with the least amount of risk.

The Merriam Webster Dictionary defines a research as a 'studious inquiry or examination, especially investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new and revised theories or laws". This definition clearly indicates that research isnot merely a search for truth, but it is a prolonged, intensive and purposeful search.

## **1.3 Definition of Research**

Research refers to a "systematized effort to gain new knowledge" (Redman and Mory, 2010). It is a process to discover new knowledge to find answers to a question. The Advanced Learner's Dictionary (1952) defined research as "a careful investigation or inquiry specially through search for new facts in any branch of knowledge".Research is a movement, a movement from the known to the unknown. In general research is described as a "a scientific and systematic search for pertinent information on a specific topic" (Kothari, 2020). In the words of Creswell (2008) research is a process of steps used to collect and analyse information to increase our understanding of a topic. It consists of three steps: Pose a question, collect data to answer the question, and present an answer to the question.

Slesinger and Stephenson in the Encyclopedia of Social Sciences(1934)defined research as: "manipulation of things, concepts or symbols for the purpose of generalizing and to extend, correct or verify knowledge, whether that knowledge aids in the construction of a theory or in the practice of an art". Bogardus (1953) opines that social research is 'the investigation of the underlying processes, operative in the lives of persons who are in association'.

In the words of P.V Young "Social research is defined as a scientific undertaking which, by means of logical and systemised technique to: discover new facts or verify and test old facts, analyse their sequences, inter-relationships and casual explanations which were derived within an appropriate theoretical frame of reference, develop new scientific tools, concepts and theories which would facilitate reliable and valid study of human behaviour.

Ranganathan describes research to represent a critical and exhaustive investigation to discover new facts, to interpret them in the light of known ideas, theories and laws, to revive the current laws and theories in the light of the newly discovered facts to apply the conclusion to practical purpose. Simply, research refers to a process of enunciating the problem, formulating a hypothesis, collecting the facts or data, analysing the same, and reaching certain conclusions either in the form of solution to the problem enunciated or in certain generalizations for some theoretical formulation.

The general summary of the core aspects given in all of these definitions summarised research as :

- Theoretical and methodological investigation of a phenomenon, event, or activity;
- Intent to discover data, facts and their interpretations;
- Arrive at conclusions to formulate new theories and laws or revise the already established theories and laws;
- To communicate the results for peer review;
- To be accepted or rejected before adding this new knowledge to the already existing general pool of knowledge.

#### Self-Check Exercise

1) Write Concept of Research?

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

# 1.4 Need and Purpose for Research

As mentioned earlier, knowledge is the most important and potent resource that may open up possibilities for a society's financial success. Only through the pursuit of study to push the boundaries of knowledge can new information be discovered. Pandit Jawaharlal Nehru persuasively explained the Scientific Policy Resolution (SPR) of the Government of India in 1958 to emphasis the importance of research, especially with regard to scientific, technical, and social knowledge in the Indian context.

According to SPR the dominant aspect of the modern world is the extensive growth of science and its application to satisfy national needs. For the first time in human history, this has provided the average person in scientifically advanced nations with a quality of living as well as social and cultural amenities that were previously only available to a very tiny and privileged portion of the population. The notion of the welfare state has developed as a result of the realisation that adequate material and cultural amenities and services can only be supplied for each member of the society via scientific approaches, methods, and application of scientific knowledge. Another important point of note, particularly beginning from the middle of the last century, is the increasing emphasis on the organising principle for all socio-economic development as a mix of science, technology and societal knowledge (STSK). This mix is a complex and multidimensional process, involving science, technology and societal knowledge. Societal knowledge combines political, economic, sociological, demographic, occupational, health, legal, regulatory and environment information and knowledge to comprise a complete knowledge universe. Again development is not merely cultivating physical resources, but also very much on building up human resources. Any imbalance in these development approaches weakens the overall capacity of a State to transform itself into a welfare state.

A number of R&D facilities in the fields of science, technology, social sciences, and humanities have been established in India during the last five years as a consequence of this strategic approach. Institutions of higher education and training, advanced study institutes in a variety of fields, and organizations dedicated to the development of managerial and technical expertise have all been founded. Building up our knowledge base is undoubtedly a goal of the establishment of learned societies and professional associations, publication of primary and secondary sources for information and knowledge dissemination, information systems and industrial development, multimedia communication through the Internet and websites, and many other initiatives. In this procedure, research is crucial.

Knowledge management has emerged as a key issue for businesses and the industrial community to battle competitiveness globally. This is a significant difficulty that has prompted them to spend a lot of money on research into the production of new knowledge. The Indian context also shows this pattern, though it is now a little blurry.

Another extremely significant development that supports research efforts is the accessibility and availability of knowledge and information through the Internet.

#### **Purpose of research**

The main goal of research is to find systematic ways to solve problems. The following are general ways to define the research's purpose:

- •To get acquainted with a phenomena or to achieve new insights into it.
- To examine the frequency of connection or independence between any event or action.
- To determine the individual characteristics or characteristics of group of activities along with the frequencies of its occurrence.
- To test a hypothesis of a causal relationship between variables

#### Self-Check Exercise

1) Write the need and purpose of research?

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

# **1.5 TYPES OF RESEARCH**

Research can be classified differently depending upon the approach, the purpose and the nature of research activity. Broadly speaking, research can be either fundamental or applied research. The distinguish feature between the two are given below:

Fundamental Research	Applied Research
It is also known as basic or pure research	It is also known as action-oriented
	research
Focuses on developing ideas and establishing	Designed to address real-world issues
generalisations. It concerned with elucidating	rather than just acquiring information
concepts and their relations, hypotheses,	for its own purpose by applying the
ultimately leading to development of theories.	theory of pure research for the benefit of
	the society,
It is performed for knowledge enhancement	Performed for solving the practical
	issues
This research does not have immediate concern	This study is performed on finding the
for findings to actual problem;	solution to problem and has general
	applicability; is often costly and
	undertaken on a huge scale.
Sometime conducted to gain knowledge for its	Performed for the benefits of the
own purpose	society.
For Example:	For Example:
• Research concerning some natural	• Most educational research is applied
phenomenon or relating to pure	research because its aim to develop
mathematics.	genralisation about teaching-learning
• Some library and information science	process and instructional materials.
studies might be considered pure or	• Evaluation of a library service.
fundamental research since their goal is to	• Application of five laws for solving
fully comprehend the subject rather than	various problems in libraries.
applying knowledge in real-world contexts.	
<ul> <li>Development of theories</li> </ul>	
• Five laws of Library science	

#### **Self-Check Exercise**

- 1) Write the need and purpose of research?
  - Note: i) Write your answer in the space given below.
    - ii) Check your answer with the answers given at the end of the Unit.

#### **1.6 Process of Research**

The implementation of the research consists of a number of action that are fundamentally carried out in a certain sequence. Instead of following a certain order, these acts or activities often overlap one another. The following is a quick explanation of each step:

Identifying the research topic: A researcher's initial action is to choose a study subject. While doing so, a researcher should limit one's research to the one option that has the greatest potential for in-depth study. The selected research topic must be specific and relevant to the problem. One should also focus on how the current study relates to earlier studies.. The necessary data for the study should be readily available and accessible. The research topic should be such which contribute the knowledge in the specific field.

Formulating the research problem: Once the research topic has been decided there is a need to identify the research problem. To identify the problem area for the study the researcher should examine the current literature, accessible in the area from an interdisciplinary viewpoint and need to focus on how the present study relates to earlier studies. The objectives of the study are clearly stated in the research problem. In other words, the researcher has to justify why the study in the first place. In addition to describing how the study relates to the particular subject, his aim statement should clarify how the research was conducted.

Review existing literature: To understand the basis of research, it is important for the researcher to review the existing literature. Which involve surveying the existing books available in the field; reviewing other published literature like articles, journals, reports, conference proceedings etc. The researcher need to prepare his own index for a period, in chronological order, in addition to his consultation of various indices.

Development of Hypothesis: A hypothesis is a tentative assertion prepared on the basis of the objective of the study and includes the suggested solution to the problem. The hypothesis provides accountability and responsibility of research procedure. Working hypotheses might not represent the sole options available to address the research problem but act as a link or interface between the research problem and theory. Thus, hypotheses are tentative assertions that, after the

research process, may be accepted or rejected. Additionally, a hypothesis offers a framework and directs the researcher toward finding the problem's solution.

Preparingtheresearchdesign:Oncetheresearcherhasgainedenough knowledge about the problem statement there is a needs to prepare a plan that will act as the outline of the investigation in research process. A research design's primary purpose is to describe how the researcher will discover the answers of the research questions. The research design consists of a series of steps that has to be carried out during research which are discussed in detail in chapter 2.

Designing of sample: Research design is a predetermined strategy for gathering data in order to choose a sample from a certain population. Due to the limitation of resources and time it in not possible to select the whole population of the study. Therefore a selection of a sample must be made by the researcher using a sampling technique. The sample design should be chosen by the researcher after evaluating the nature of the inquiry and other relevant considerations.

Collection of Data :Data can be collected in a variety of ways. There are mainly two types of data collection methods: primary data and secondarycollection methods. Primary data is unique and firsthand& directly related to the topic under investigation. Interviews, focus group discussions, personal/telephonic interviews, and questionnaires are some of the data collection techniques. Whereas secondary data refers to the information that has previously been gathered and produced for a different purpose. For instance it includes already published documents, expert opinion polls, library records, users feedback, public data, and earlier studies on the subject of interest. To check the reliability and validity of the collected data in the research process, requires a comprehensive and quality assessments.

Analysisofdata: The work of data analysis begins once the researcher has collected the data. For further examination, the collected data is presented in the form of tables and figures for further analysis. The acquired data may subsequently be analysed by the researcher using different statistical methods.

Generalisationsandinterpretations:Once the data is analysed the researcher lead to certain generalisations. The researcher try to explain the results by linking the results with the research objectives and stating clearly the implications of the study. It's known as interpretation. This further leads to the generation of new questions which lays the base of new researches.

#### **1.7 Significance of Research in Library Science**

Here the term research in LIS is confined to systematic studies designed to provide librarians with more effective ways of achieving library objectives. Thus, covering activities designed to discover facts and relationships that will make libraries more effective, excluding routine activities of applying what is already known. The aim is to cover landmarks in research.

Librarianship does not have a long tradition of research scholarship. The beginning took place in 1930s.Need began to be felt for carrying out careful studies regarding various library

phenomena. Thus, research programme at Doctoral level was initiated at the library school at the University of Chicago (established in 1928). Between 1930 to 1946, the first fisty doctoral degrees in Library science were awarded to persons at University of Chicago. The Five laws of Library Science by S.R Ranganathan (1931) is considered as a seminal work. This was followed by his Colon Classification (1933) and Prolegomena to library classification (1937).

During recent decades, there has been an increased research acitivy due to the following reasons:

- 1) Library collection have grown steadily
- 2) Large increase in the number of librarians and information specialists
- 3) Increase in the scale of library and Information activity
- 4) Greater availability of financial support for research in L&Is,
- 5) Founding and growth of doctoral programmes in library schools
- 6) Rapid and innovative changes in technology have forced the profession to provide more emphasis to research in L&IS, whereby L&IS can keep pace with complexities of the modern world.

Increase in research activities is reflected in bibliographies, indexing and abstracting services in 17 is. Substantial number of research projects are being carried out in libraries, documentation centres, information centres and library schools. More and more professionals are going for research degrees. Pursuits of a research degree provides research training and helps to develop critical and analytical thinking. This is due to the fact that technological and social changes and presenting new opportunities as well as challenges, realisation is coming that research has an important part to play.

#### 1.8 Summary

#### **1.9** Answers tocheck your progress

- **1.9.1** Answers to Multiple Choice questions
- **1.9.2** Answers to Short Questions

#### 1.10 Keywords

#### **1.12 References and further reading**



# **LESSON 2**

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iversity

# **RESEARCH PROBLEM AND RESEARCH DESGIN**

## **STRUCTURE**

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Research Problem
  - 1.3.1 Identification of Research Problem
- 1.4 Sources of Research Problem
- 1.5 Research question
  - 1.5.1 Formulation of Research Question
  - 1.5.2 Techniques of developing research questions
  - 1.5.3 Characteristics of Research Question:
  - 1.5.4 Purpose of Research questions
- 1.5 Research Design
  - 1.5.1 Meaning and Defination of Research Design
  - 1.5.2Characteristics of a Good Research Design
  - 1.5.3. Need of Research Design
- 1.6 Types of Research Design
  - 1.6.1 Exploratory research design
  - 1.6.2 Descriptive Research Design
    - 1.6.21 Cross-sectional research
    - 1.6.22 Longitudinal research design
    - 1.6.23 Causal research design
  - 1.6.3 Diagnostic/Conclusive Research Design
  - 1.6.4 Experimental Research Design
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# 1.1 LEARNING OBJECTIVES

The objectives of the lessonare :

- to identify the research problem
- to know the sources of research problem
- to discuss the formulation, techniques of developing research questions •
- to identify the characteristics and purpose of Research questions

# **1.2 INTRODUCTION**

Before conducting a research, much planning is necessary. Effective planning facilitates the performance of research work with great ease. This lesson focuses on the basic concept of research planning and includes a comprehensive review of research design, variables influencing research design.

The first stage in the research procedure is to formulate a problem. It is necessary to comprehend the issue, identify its source, and devise solutions. The success of the study as a whole depends on the identification and selection of the research area in general and the subject or question in particular. Many research projects fall short because the problem chosen is insignificant or because it does not address the prevalent societal issues. Therefore, it is important for researchers to be careful when choosing a specific study problem and topic. Identifying a research problem indicates a specific area for addressing the research questions. A researcher who is interested in doing research should choose the subject that interests him or her and that seems to be important to society, or that they believes needs to be explored for a greater knowledge of society.

Once the problem of research is identified the guideline for conducting the research need to be prepared so is to enable the researchercan keep a track of his actions and to know that he/she is moving in the right direction in order to achieve his goal. The design may be a specific presentation of the various steps in the process of research. These steps include the selection of a research problem, the presentation of the problem, the formulation of the hypothesis, conceptual clarity, methodology, data collection, survey of literature and documentation, the testing of the hypothesis, interpretation, bibliography, presentation and report writing which are discussed in detail in this lesson.

## **1.3 RESEARCH PROBLEM**

The research process is initiated by the discovery of a problem, and defining its goal is the first step towards its solution. A research problem is a specific or clear expression [statement] about a problem that needs to be solved, an issue that needs to be resolved, a



question that needs to be answered, or an issue that has been raised in the academic literature, in theory, or in practise and that need thoughtful analysis and investigation. (Kumar, )

A research problem doesn't provide instructions, make a general or hazy claim, or pose a moral dilemma. Simple and straightforward formulation of the research problem is not always simple. Some people may take years to pick the study question to be researched, while others may make that decision in a matter of minutes. The social concerns could provide a wider perspective, but they might not make clear which one.

Regardless of whether the study is descriptive, exploratory, explanatory, or theoretical, it focuses primarily on questions such as what, why, how, etc. For example, when a description is sought in library and information science, the following questions may be posed: what types of users borrow books, what books are borrowed, how the books are acquired, what factors influence the selection of particular books, what physiological and psychological effects are associated with book selection, etc. In some instances, the question may pertain to the verification of a hypothesis, such as "the selection of books in a library depends on the nature of the collection and the level of the users," or it may pertain to a problem involving the determination of structural and personality factors in document usage. Thus, the motive for study is the progress of knowledge, which is stated usually as a question to be answered, a hypothesis to be investigated, or a problem to be addressed.

#### **1.3.1 Identification of a research Problem**

It is difficult to identify the problem in a clear and straightforward manner. It might be challenging to understand what the researcher is attempting to study when research investigations are conducted in certain ways. When a researcher is confused and has scattered views of the conditions that lend themselves to inquiry, this poses one of the most difficult situations for that researcher. An essential step in the whole research process is the identification of a research problem. It requires a lot of consideration, investigation, and speculation on the part of the researcher. It takes a lot of work, time, and energy. Finding the issue condition is quite tough for a researcher. This can occur as a result of her insufficient understanding of the research process. One may not be acquainted with the fields in which research is required or the steps they must take to choose an appropriate research area. Researchers have an idealised, unrealistic perception of the research issue. The following are the main tasks that an investigator should do while examining a problematic scenario:(VanDalen, 1973)

- i. Assembling information that could be relevant to the issue,
- ii. Deciding if the facts are relevant based on observation,
- iii. Identifying any patterns in the data that might point to the main challenge,
- iv. Providing many theories for the problem's root cause
- v. Determining if these theories apply to the issue by observation and investigation,



- vi. Analyzing the connections between explanations that might provide a clue as to how to solve the issue
- vii. Tracing the connections between facts and explanations and
- viii. Challenging the examination of the problem's fundamental assumptions.

A research problem must have a solid foundation in knowledge. The researcher should first pick a broad topic in which one desires to do study, and then immediately begin a review of the relevant information.

#### **IN-TEXT QUESTIONS**

- 1. After the selection of research problem in the study, review of relevant information is initiated. True/False
- 2. The first step in research process is:
  - a) Hypothesis testing

b) Analysis of Data

d) Research Methodology

c) Identification of research problem

# **1.2 SOURCES OF RESEARCH PROBLEMS**

Many investigators of study and researchers have inclined to do research studies but do not have the idea for the mode of selection of topics. The different issue in the third world countries is that many researchers in the third world countries do not take significant question for probing. The degree of success lies mainly the value of the question remains addressed. Hence it is essential to have a correct way and means of selecting the problems. How do the investigators get the ideas of deciding a topic of research? How they have to formulate relevant questions and hypotheses? The ideas would emanate from vast sources. These are:

- i. **Researches conducted by others.** Participation to professional seminars and conferences in most cases lends ideas of research.
- ii. **Reviewing the already published work** that appears in the literature and getting ideas from research documents such as reports, monographs and articles, questions which either others have posed or which arise in the course of one's reading could become research questions.
- iii. **Experience**, i.e., one's own life experiences in professional work or the general life experiences for many years.
- iv. **Institution and corporate priorities**: Various government organizations. provide research topics. Various institutions spell out the areas and circulate a list of various topics in which it feels the necessity of research.



# **IN-TEXT QUESTIONS**

3. What are the main sources of selecting a research problem?

# 1.5 RESEARCH QUESTION

#### **1.5.1 Formulation of Research Questions:**

Research questions constitute the most important element of any research. These are different from the research objectives. They describe the ideas contained in the research objectives. However, research questions emerge after the research objectives. In fact, they point out the data that the required to be collected in a study.

The selection of the research problem is related to the following: What is the purpose of the research? What is already known? Is any other information required? What must be determined or measured? How should it be measured? Can the necessary data be gathered, i.e., will respondents provide accurate information? Is the current time suitable for doing research? Can a hypothesis be formulated? Are time and funds sufficient for the research?

The important factors to be borne in mind while selecting a right problem:

- The emphasis of the problem is determining the relationship between two concepts or variables.
- The general issue is transformed into several research questions.
- It is possible to gather data on the problem.
- It is expressed simply and without ambiguity.

The question statement may be framed in one of three ways: 'query', 'relationship', or 'comparison'. The examples that follow effectively describe the three types of question statements:

## Question form

For example: How might Library orientation program results into the effective usage of library?

#### Relationships form

For example: What role does libraries play as an Information resource in promoting Human Rights?

#### Comparison

For example: What is the comparison between the Library science education course of China and India?

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#### **1.5.2** Techniques of developing research questions

Developing research questions and deciding the specific topic for research are both the art and science. The researcher should spell out clearly what has tobe done and such narration based plan would clearly help him/her to develop and frame the research question. Many researchers, have suggested and provided the basic techniques ofdeveloping research questions. These are:

- 1. Record all questions that occur in mind after reading literature or after discussions with others or after thinking on various aspects of study.
- 2. Review these questions whether each questions in necessary and delete those which are outside the scope of the study. This will also remove overlapping between questions.
- 3. Classify questions on the basis of their nature, i.e., separate what, Why and how questions.
- 4. Examine the scope of the questions. Depending on the time and money available for the study, the scope cannot be too ambitious. Only areas are to be chosen which would be manageable within the time and resources.
- 5. Separate major or key questions (which form the core of the research) from subsidiary questions.

It is useful to provide and concentrate importance on the following aspects while deciding the techniques for research.

- i. Types of research
- ii. Purpose of research
- iii. Developing research questions and relationship between research questions and hypotheses.

#### ACTIVITY

Identify and formulate any three research questions as per the area of your likeness of Library and Information Science field.

#### **1.5.3** Characteristics of Research Questions:

The problem that is ultimately identified as a potential research topic is best articulated as a question or statement for which the proposed study is intended to provide a solution. Goodresearchquestionsmusthavethefollowingcharacteristics:

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- i. Research questions must be amenable to research.
- ii. Research questions be based on a solid theoretical basis.
- iii. A good research question must explain the relationship among variables.
- iv. The research question should not be vaguely formulated.
- v. It should equip the researcher with insight into what can be done, what relevant data be gathered to find the answer.
- vi. It must serve as a guide for planning the study and choice of statistics for interpreting the results.
- vii. The solution of the research question must provide an advance knowledge in the field appreciably without violating the human rights of the people.
- viii. The solution of the research question should be of a practical or theoretical value to educators, parents social workers or others.
- ix. The breadth of the application of the findings should be in terms of range of individuals and years of applicability should be wide.
- x. It must lead to the development of other investigations.
- xi. The solution of research question should be well within the reach of a researcher in terms of his competency, accessibility to data, financial resources, time at his disposal, his/ her determination and other related considerations.

#### **1.5.4 Purpose of Research Questions:**

The main function of research question is to define the scope of the research, i.e., to determine what is to be studied and the extent to which it will be studied. We can cite one example of the study of users. The main objectives of this research could be:

- i. to study the users and the patterns of documents usage in libraries,
- ii. to examine the economic, institutional and other support systems of libraries;
- iii. to analyse the phases of library growth;
- iv. to examine the degree of awareness of users in understanding the availability of documents:
- v. to assess the changing attitudes of users in using library and information materials;
- vi. to assess the collection usage in various types of libraries;
- vii. to evaluate the nature and volume of different types of documents and information usage; and
- viii. to develop a theoretical model for assessment of libraries and users.



#### **IN-TEXT QUESTIONS**

- 4. A good research question didn't explain the relationship among variables. (True/False)
- 5. The research question statement may be framed in one of three ways: \_\_\_\_\_ and \_\_\_\_\_.

## 1.5 Research Design

#### 1.5.1 Meaning and Definition of Research Design

After the selection and formulation of research problem you have to decide about the type of research design to be followed. The design of research is said to be the plan of action, the strategy and the structure of the overall procedure by which you intend to gain more knowledge of a specific problem or a specific aspect of the society.

The word 'design' means to prepare a preliminary sketch or the plan for work to be executed and research design means a plan of action to be carried out in connection with a research project. It is however, not an unbreakable rule, for a hard-and-fast strategy. On the contrary, it is only a guideline for the researcher to enable him to keep track of his actions and to know that he is moving in the right direction in order to achieve his goal. The design may be a specific presentation of the various steps in the process of research. These steps include the selection of a research problem, the presentation of the problem, the formulation of the hypothesis, conceptual clarity, methodology, data collection, survey of literature and documentation, the testing of the hypothesis, interpretation, bibliography, presentation and report writing.

According to Jahoda and Selltiz "A research design is the arrangement of condition for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure".

Another definition of research design is given by F.N. Kerlinger which specifies the process and structure of research. Research design "is a plan, structure and strategy of investigation conceived so as to observe answers to research questions and to control "variance". The term, plan, structure and procedure of research design more clear. The 'plan' includes everything to be done by the investigator in research procedure, that is from writing the hypothesis, defining the hypothesis operationally and collecting data to the final analysis of data. Thus, it means the overall scheme or programme of research. The term structure is taken to mean



more specifically the outline scheme or the paradigm of the specific research project. When one draw diagrams that outline the variables and their relation one build structural schemes for accomplishing operational research purposes. The term 'strategy' refers to the methods to be used to gather and analyse the data. After fixing up the objectives of research projects one has to specify the procedures and methods of investigations. One has also to apprehend the problems that may emerge and decide the steps to be taken to tackle the problem.

Several definitions of research design have been advanced by several writers on the subject of research design. Few of them are presented below: (book)

Miller would describe the research design `asa planned sequence of the entire process involved in conducting a research.

Ackoff defines research design "as the process of making decisions before a situation arises in which the decision has to be carried out." He emphasizes the decision-making aspect of the research in his definition and adds that "it is a process of deliberate anticipation directed towards bringing an unexpected situation under control".

Young Defines " a research design is the logical and systematic planning and directing a piece of research. It results from translating a general scientific model into varies research procedure".

Research design may be compared to the blue print of an architect. Thearchitect before he starts construction work puts the entire design the building on paper. He visualizes the building in his mind first before giving it a concrete shape. Similarly a researcher has to form a plan or a scheme in in his mind first and then he can start working on it later.

Research design is a tentative plan. As the research progresses new aspects new conditions and new connecting links in the data may come to light. end it is necessary to change the plan as circumstances.

The major design decision are in respect of the following (Wilkinson and Bhandarkar, 1990):

- What is the research all about?
- Why is the research being done?
- What kind of data is required for the research?
- From where can the data be obtained?
- How much time will the research take?
- What is a sample research design?
- How should the data be analysed?
- What is the style of report preparation?



A research design helps a researcher to organize ideas and check for flaws and inadequacies in the collected data. It involves the following elements:

- A statement that clearly defines the problem for which the research is being done
- Procedures and techniques for gathering the information required for research design
- Methods that need to be implemented for processing and analysing the data required for research design

The overall research design can be divided into the following four parts: (OER and sahu)

**Sampling part**: It includes the method of selecting items that are to be observed for the research study.

**Observational part**: It includes the conditions under which you need to make observations.

**Statistical part:** It is based on the number of items that need to be observed and the analysis technique to be used for the analysis of gathered data.

**Operational part:**It involves the techniques that help to implement the items specified in the sampling, statistical and observational designs.

#### 1.5.2Characteristics of a Good Research Design

In view of the above discussion of Research Design, the following characteristics are found:

**Objectivity**: The objectivity of the findings pertains to the methods of collection of data and securing the responses. Any research design should permit the use of measuring instruments which are fairly objective in which every observer or judge seeing a performance arrives at precisely. This ensures the objectivity of the collected data which will be used for the analysis, inferences and generalizations.

**Reliability**: refers to 'consistency' throughout a series of measurements. That is to say, if a respondent gives a response to particular item, he is expected to give the same response to that item whenever he is asked subsequently. The investigator should frame this item in such a way that the respondent cannot but give only one genuine responses. There are different methods in determining the reliability of the responses given out by a respondent. Some of these methods are : using 'check item' administering the same test repeatedly using a series of `parallel' forms, etc.

**Validity**: Any measuring instrument is said to be valid when it measures what is purports to measure. For example, an intelligence test constructed for measuring intelligence should measure only intelligence and nothing else.


**Generality**: The next important thing is that a well-planned research design has to Lower the 'generalisation' of the findings of the study. That is how best the data collected from a sample can be utilized ray drawing certain generalisations, applicable, to a larger group from which the sample is drawn.

#### 1.5.3 Need of Research Design

- It facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money.
- It reduces inaccuracy;
- It helps to get maximum efficiency and reliability;
- It eliminates bias and marginal errors;
- Research design stands for advance planning of the method too be adopted for collecting the relevant data and the techniques to be used in their analysis, keeping in view the objective of the research and the availability of staff, time and money.
- It minimizes wastage of time;
- It is helpful for collecting research materials;
- It is helpful for testing of hypothesis;

#### **IN-TEXT QUESTIONS**

- A research Design should not include: a)Hypothesis
  - c) Scope

b) Methodologyd) Findings

- 7. A research Design is:a)Planning of Research
  - c) Research Report

b) Working of Research d) Research Formulation

8. Research design provides guidelines and directions in research investigations. True/ False

#### **1.5.4 Types of Research Design**

In general, four types of research designs are identified:

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Fig. 1.1 Types of Research Designs

#### 1. Exploratory research design

Exploratory research design is also known as formulative research design. In this research design, a specific subject is investigated. It helps to generate a set of hypotheses or research-based questions that can be used at a later stage. The three methods that are applied for explorative research studies are as follows:

- **Surveying the literature**: It is the simplest method for formulating the research problem in which along with new literature, previous hypotheses are reviewed and evaluated for future research.
- **Experience survey**: It is a type of research that involves practically experienced persons in the research work. For such a survey, people with more innovative ideas are carefully selected as respondents and then the investigators interview the respondents. Thus, experience survey enables the researcher to concisely define the problem. This survey also provides information about the practical possibilities for different research works.
- Analysis of insight- stimulating examples: It includes an intensive study of selected instances of a phenomenon. In this method, the attitude of the investigator, intensity of study and ability of the researcher are required to unify the diverse information of the problem.

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Thus, in exploratory research study, the applied method needs to be flexible, regardless of the type of the method, so that the different aspects of the problem can be considered. In exploratory research design, the following considerations are kept in mind:

- A small sample size is used.
- Data requirements are unclear.
- General objectives are considered, rather than specific objectives.
- No definite suggestions are made after research analysis.

#### 2. Descriptive Research Design

A descriptive research study describes the characteristics of a particular problem or an individual or a group. Descriptive studies include specific predictions concerned with study, facts and characteristics concerning an individual, a group or situations. Most of the social research is based on descriptive research studies. In descriptive studies, the questions related to 'what', 'why', 'where' and 'who' need to be answered.

The following steps must be followed while designing a descriptive study:

1. Formulating the objectives of the study: This step specifies the objectives to ensure that the collected data is related to the study, otherwise the research will not provide the desired result.

2. Designing the data collection methods: This step helps to select the method, that is, observation, questionnaires, interview or examination of records, for collecting the data.

3. Processing and analysing the data: The data collected for the research study must be processed and analysed. This includes analysing the data collected through interviews and observations, tabulating the data and performing statistical computations.

4. Reporting the researched data: For reporting the findings, the layout should be well planned, and presented in a simple and effective style.

In descriptive studies, the following considerations should be kept in mind:

- The phenomenon under study should be described.
- The data may be related to the behavioural variables of the respondent.
- The recommendations are definite.

• The objectives should be specific, data requirements should be clear and large samples should be used.

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Descriptive research design requires a clear specification of 'when', 'where', 'who', 'what', 'why', and 'how' of the research. Its main purpose is to describe the characteristics or the function. Some of the conditions in which this research can be recommended are:

- To make a specific forecast
- Discovery of associations among variables
- Estimates of the proportions of a population that have some specific characteristics. •
- To describe the characteristics of product, group, organization or market.

Unlike exploratory research, the descriptive research design is marked by a specific hypotheses, clear statement of the problem and detailed information needs. Generally, descriptive research follows surveys, panels, secondary data analysis and observation methods and can be classified into cross-sectional and longitudinal research.

**Cross-sectional research**: This is the most frequently used research design in business research and involves information collection from a given sample of population elements, and that too only once. They may be either multiple cross- sectional or single cross-sectional. In single cross-sectional designs, only one sample of respondents is drawn from the target population, and the information from this sample is obtained only once. This design is also referred to as sample survey research design.

In multiple cross-sectional design, there are two or more samples of respondents, and the information from each of the sample is obtained only once. Often, information from different samples is obtained at different times over long intervals. Multiple cross-sectional designs allow comparisons at the aggregate level but not at the individual respondent level. Because a different sample is taken each time, a survey is conducted, there is no way to compare the measures on an individual respondent across surveys. One of the special interest, multiple cross- sectional design is cohort analysis, which consists of a series of surveys conducted at appropriate time intervals, where the cohort serves as the basis unit of analysis. A group of respondents who experience the same event within the same time interval is referred to as a 'cohort'.

**Longitudinal research design**: Unlike cross-sectional research design, a fixed sample(s) of population elements is measured repeatedly on the same variable. In other words, the same objects are studied over time and the same variables are measured. In contrast to the cross-sectional design, which provides a snapshot of the variables of interest at a single point in time, a longitudinal study gives a series of pictures that provide an in-depth view of the situation and the changes that have taken place over time. Sometimes, the term panel is used interchangeably with the term longitudinal design. A panel consists of a sample of respondents who have agreed to give information at specified intervals over an extended period.



**Causal research design**: This research design is used to obtain the evidence of cause-andeffect (causal) relationships. Like descriptive research design, causal research design also requires a plan and structure and is more appropriate for the following purposes:

• To understand cause (independent) variables and effect (dependent) variables of the phenomenon

• To determine the nature of the relationship between cause and effect variables to make predictions about effect

In this design, causal (independent) variables are manipulated in a relatively controlled environment, in which the other variables that may affect the dependent variable are controlled or checked as much as possible. The effect of this manipulation on one or more dependent variables is then measured to infer causality. The main method of causal research is experimentation.

#### 3. Diagnostic/Conclusive Research Design

A conclusive research design is more structured and formal than an exploratory research design. It is based on large representative samples, and the data obtained is subjected to quantitative analysis. The aim of conclusive research is to examine specific relationships and test specific hypotheses. To achieve these objectives, the researcher needs to clearly specify the required information. In this research, the findings are considered as conclusive in nature as they are used as inputs for managerial decision-making. The two categories of conclusive research designs are descriptive and causal. Descriptive research designs can further be either cross- sectional or longitudinal.

#### 4. Experimental Research Design

Experimental research design is usually applicable when we are determining the cause and effect relationship or deriving the cause and effect inferences in any experimental research study. Experimental research design is instrumental in answering some of the important psychological questions that are based on the concept of what causes what.

The objective of experimental research design is to establish the cause and effect relationship between variables. The four types of variables related to experimental research design are as follows:

• Independent variables: These signify conditions or measures in the experimental design that can be changed.

• Dependent variables: These variables can be measured and signify the effect or result in the experimental design.

• Control variables: These remain constant in the experimental design.

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• Random variables: These can vary their values in different conditions in the experimental design.

There are many variations in experimental designs, which are created to achieve different results and resolve different problems. We can define the simplest form of experimental design by creating two similar groups, which are equivalent to each other in all respects, except for the fact that one group will receive the treatment and another group will not receive the treatment. The group that receives the treatment can be termed as the treatment group and the group that does not receive the treatment can be termed as the comparison or control group.

The formation of two similar groups that are equivalent to each other is ensured by randomly assigning people or participants into two groups from a common pool of people or participants. The success of the experiment is based on the concept of random assignment of people into two groups. However, as two people cannot be exactly similar, in the experimental design, we refer to the idea of probability and say that two groups are probabilistically equivalent or equivalent in the probabilistic ranges.

#### **IN-TEXT QUESTIONS**

- 8. Which of the following is not a part of research Design:
  - a) Exploratory study b) Sampling Method
  - c) Diagnostic Method d) Experimental Method
- 9. The objective of Exploratory research design is the development of hypothesis rather than their testing. True/ False
- 10. The objective of experimental research design is to establish the cause and effect relationship between variables. True/ False

## 1.6 SUMMARY

Research design is an important step in process of research. It occupies a key position in research work. One to be finally chosen may be based on the practical considerations such as circumstances, nature of the problem, feasibility and calibre of the researcher. A research design or combination of research design selected must be the one which the researcher believes is most likely to produce a solution to the problem undertaken for research. Thus, it is the one which the researcher consider to be the most appropriate one to the problem in hand.

# 1.7 GLOSSARY

**Research Design**: Research Design is important as it guides the researcher to identify the correct methods of data collection and analysis, conditions in which the activity of research

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shall be carried out and approximation of the funds to be utilized for it; maintaining its connectivity to the purpose of research. Agood research designis characterized by its flexibility, effectiveness and suitability etc.

**Variable**: An image, perception or concept that can be measured; hence capable of taking on different values- is called a variable. A variable is also defined as anything that has a quantity or quality that varies.

**Exploratory research design**: Loosely structured research design to explore and gain clarity about the research questions.

**Cross-sectional designs**: A descriptive study done on a representative group of people at a single moment in time.

**Descriptive designs**: Research designs that describe in detail the phenomena under study.

Longitudinaldesigns:Asinglesamplestudiedoveralongerperiodof time. There are periodic measurements done of the study variable.

# **1.8 ANSWERS TO IN-TEXT QUESTIONS**

1. True	6. d)
2. c)	7. a)
3. Researches conducted by others,	8. True
Reviewing the already published work,	9. True
Experience and Institution and corporate	10. True
priorities	
4. False	
5. query, relationship, or comparison	

## **1.9 SELF-ASSESSMENT QUESTIONS**

1. What is research Problem. Discuss the sources of research problem in detail.

2. What is research design. Discuss its different types in detail.

## **1.10 REFERENCES**



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## M-105-RESEARCH METHODS



# Lesson- 3 LITERATURE REVIEW

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#### **STRUCTURE**

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Concept of Literature Review
- 1.4 Importance of Literature Review
- 1.5 Types of Literature Review
- 1.6 Steps in constructing Literature review
- 1.7 Structure and Writing Style
- 1.8 Summary
- 1.9 Glossary
- 1.10Answers to In-Text Questions
- 1.11Self-Assessment Questions
- 1.12References
- 1.13 Suggested Readings

# **1.1 LEARNING OBJECTIVES**

After reading this lesson, the student will be able to :

- Understand the concept of Literature review
- familiarize with the process of carrying out literature review
- Understand the process of reviewing the selected literature
- Know the different types of literature review
- Explain the writing style of literature review

## **1.2 INTRODUCTION**

One of the crucial and necessary step of every research is to undertake the literature review as it plays a significant role in every operational phase of the research process and is an essential component of it. It is valuable even before taking the first step i.e. when the researcher is deciding the research issue that one may wish to discover answers to along the research trip as a researcher thoroughly investigate the available literature to gain the clarity on the research question. The identification of topic of a study reflect on whether it is practical and useful to undertake the study. Once the topic has been selected thesearch for related literature on the topic will again begin.



This lesson discuss in detail the concept of literature review, its importance in research, types and process of conducting a review. A comprehension on how to write the literature

# **1.1 CONCEPT OF LITERATURE REVIEW**

A literature review can be state as a search of the body of knowledge on a particular subject. Reviews of the literature are intended to provide an overview of the subjects covered and show how they relate to the present subject. It summarises the main ideas in the body of literature that is currently accessible on the subject at hand. It is simple to comprehend the research issue of the present study after reading a literature review. A literature review surveys books, scholarly articles, and any other sources relevant to a particular issue, area of research, or theory, and by so doing, provides a description, summary, and critical evaluation of these works in relation to the research problem being investigated. Literature reviews are designed to provide an overview of sources you have explored while researching a particular topic and to demonstrate to your readers how your research fits within a larger field of study.

Writing a literature review helps in gaining and showing skills in two areas:

1. **Information seeking** means being able to quickly scan the literature, either by hand or with a computer, to find a set of useful articles and books.

2. **Critical appraisal**: the ability to use analysis principles to find studies that are fair and true.

## DEVELOPMENT OF LITERATURE REVIEW

In the process of research review of literature start with the selection of topic and goes on till the last step of research. (Creswell, 2009).

**Problem formulation**– In academic research the use of review of literature begin with the selection of topic as at this stage it helps researcher to "frame the problem in the introduction of the study". It aids in the development of your research methods, concept clarification, and theoretical underpinnings of your study.

**Literature review**- theanalysis of the previously published literature is presented in a separate section in the research as a review of literature

**Analysis and interpretation**– discussing the findings and conclusions of pertinent literature.

• it becomes a basis for comparing and contrasting findings of the study.



• It aids in writing the report while incorporating the results with existing information, i.e., when you confirm or refute prior study.

A complete integration of the results with the body of current literature becomes more crucial with the more academically advanced study.



# **1.3 IMPORTANCE OF LITERATURE REVIEW**

A literature review may simply be a summary of important sources. It often has an organisational design and incorporates summary and synthesis, frequently within certain conceptual categories. A synthesis is a reorganisation, or rearranging, of the material in a manner that informs how you are preparing to examine a research topic whereas a summary is a recap of the key content of the source. The analytical aspects of a literature review may ("*Research guides...*," 2022):

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- provide a fresh interpretation of already published information or blend previously published and new interpretations,
- analyse the sources and advise the reader on the most topical or relevant research;
- Show the approach to addressing a need for further research.
- Situate your own study within the framework of the body of prior research
- Show the approach to addressing a need for further research.
- Chart the intellectual development of the area, including significant disputes; or
- In the end of a literature review, it is customary to point out any gaps in the prior study on an issue.

## **1.4 TYPES OF LITERATURE REVIEW**

In every particular area of study, it is useful to think of knowledge as existing on three levels. First, there are the main studies conducted and published by researchers. Second, there are research that summarise and provide fresh interpretations based on and often expanding beyond the primary study. Third, there are the common impressions, conclusions, opinions, and interpretations that become part of the field's legend.

In preparing a literature review, it is essential to recognise that this third layer of information is often claimed as "true" despite its tenuous link to primary research and secondary literature reviews. In light of this, despite the fact that literature reviews are intended to give an overview and synthesis of the relevant sources that one may have examined, there are a variety of ways in which one may use based on the sort of analysis that underpins the research(Kennedy, 2018):

#### ArgumentativeReview

This method selectively explores the literature to prove or disprove a claim, a fundamental presumption, or a philosophical conundrum that has already been established in the literature. The main goal of these type of review is to create a body of writing that promotes an opposing viewpoint. Argumentative approaches to literature analysis can be a valid and significant type of discourse given the value-laden nature of some social scientific studies. These review are used to make summary statements similar to those found in systematic reviews, they can potentially present issues with bias.

#### **Integrative Review**

The social sciences most frequently employ this style of review. It is used in a type of research that evaluates, analyses, and integrates representative literature on a subject in order to produce fresh frameworks and viewpoints. All studies that address comparable



or related research questions are included in the body of literature. In terms of clarity, rigour, and replication, a well-done integrative review satisfies the same standards as primary research.

#### **Historical Review**

The primary purpose of these types of review is to put research in historical perspective in order and to demonstrate knowledge with cutting-edge advancements and to determine the most likely pathways for future study. Few things exist without reference to earlier events in history. Examining research across time is the emphasis of historical literature reviews, which frequently begin with the first time a problem, idea, theory, or phenomenon appeared in the literature before charting its development within a field of study.

#### MethodologicalReview

It is type of a review doesn't always focus on "what someone said (the "findings"), but also on how they said it (the "method of analysis")". It is "a type of systematic secondary research (i.e., research synthesis) which focuses on summarising the state-of-the-art methodological practices of research in a substantive field or topic" (Chong et al, 2021). This type of review provide a framework for understanding the problem of study, research approaches, sampling and data collection and analysis techniques.

#### Systematic Review

It is defined as "a review of the evidence on a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant primary research, and to extract and analyze data from the studies that are included in the review." ("Systematic review: CRD's Guidance..."). This type of review "often incorporates multiple study types rather than focusing on a single preferred study design". In other words it provides a summary of the available research that is relevant to a clearly stated research question. The objective is to purposefully record, critically assess, and scientifically summarise all of the research on a clearly defined research problem. A limitation of this method is the lack of explicit inclusion and exclusion criteria and a clearly defined process of synthesis (Grant & Booth, 2009). Although it is increasingly being utilised in the social sciences, this kind of literature evaluation is mostly employed to analyse earlier research projects in clinical medicine and allied health fields

#### **Theoretical Review**

Theoretical literature review involves the study of theory rather than application with the aim to establish existing theories and their interrelationships as well as identifying the existing research gaps. In essence, it is the identification of the difference between what should be and what is and the development of new theories to bridge that gap.To conduct a theoretical

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literature review there is a need to look at existing theories and knowledge globally, regionally, nationally and locally depending on the scope of the study.

#### **IN-TEXT QUESTIONS**

- 6. The function of a literature review is:
  - a. To identify a research problem
  - b. To provide a reliable research finding
  - c. To give a theoretical background of the study
  - d. To provide reliable research findings
- 7. Narrative literature review method is also known as \_\_\_\_\_
- 8. \_\_\_\_\_ method of literature review starts with formulating research question.
- 9. Methodological review summarise the findings of the studies. True/ false
- 10. \_\_\_\_\_ review method explores the literature to prove or disprove a claim that has already been established in the literature.

# **1.4STEPS IN CONDUCTING LITERATURE REVIEW**

The following are the ways of conducting the review literature:

- a) Exploring the existing literature in the field of the study;
- b) Reviewing the literature selected;
- c) Developing a theoretical framework;
- d) Developing a conceptual framework.

a) **Exploring the existing literature**: The literature relevant to the field of study can be explored or search efficiently if the researcher have knowledge regarding the area of investigation. The literature can be researched in many available sources like Books; Journals; and Internet

**Books:**The key benefit of using the books often include significant and high-quality information, and the results arecombined with other research to produce a cohesive body of knowledge (Kumar 2011, Martin 1985).

How to search a book:Researcher has to look for books in the area of interest, prepare a final list, locate these books in the libraries or borrow from other sources and has to examine their content. If the content is not relevant to the topic, it should be removed from the comprehension list.



The easiest approach to find a book relevant to the subject of study is to browse the catalogues in the libraries. A researcher may search the book through selected keywords of the topic selected. One can consult the librarian/ reference librarian to assist in identifying the ideal book on the area of investigation. You may find books of interest by using resources like **Book Review Index**.

Once the list of relevant title of the books are identified there is also a need to look at the book's contents the book's title does not provide the enough information to determine if it will be useful. After choosing the books that are pertinent to the selected subject, one need to go through their bibliographies. The bibliography of the relevant document will reveal the other relevant sources one can look for. Simultaneously maintaining a record of your references is also important. You may accomplish this by using a reference management software's like Pro-Cite or Endnotes, Mendeley.

**Journals:** Journal provide most current UpToDate information, even though there may be a few years gap between the end of a research study and its publishing in a journal. The list of relevant journal consisting of information pertinent to topic must be prepared like in the case of books. This may be accomplished by obtaining physical copies of the relevant publications, utilising the internet, and identifying and reading the articles by browsing through the index of research abstracts in the relevant topic. To save time and money, the journals must be carefully chosen for their applicability and relevance to the topic of study. The document's content page and abstract would provide a clear indication of whether the article or paper is relevant to the problem. There are various available resources in print and online which save lot of timeand can help the researcher in finding a journals:

- Index of journals (e.g. SCOPUS)
- Abstracts of articles (e.g. Library and Information Science Abstract (LISA)
- Citation index (e.g. Web of Science)

In several fields, there exist specialised electronic databases. Additionally, they might be useful when creating a bibliography. For instance, the electronic databases available in most libraries are EBSCO, LISA, ProQuest, Emerald, Google Scholar etc.

To learn about any more relevant material one should also consult the research supervisor and other qualified professionals.

**Internet:** The Internet has developed into a crucial resource for discovering published material in practically every academic area and professional sector. The researcher may quickly and easily find published content in books, journals, and other sources with an Internet search. Many search engines (e.g.Google, yahoo, Bing etc.) areused to do Internet search. Finding information on search engines are very similar to finding information on books and articles at a library using OPAC as it is based on the usage of keywords searching. An Internet search simply finds any content that includes the terms the researcher provide, either singly or in combination, in the search engine's database. It is crucial that the researcher may choose terms or word combinations and with practise, one will become more



proficient and effective in using keywords in combination with AND, OR, and NOT, and so learn to narrow the search to assist researcher in identifying the most pertinent references.

#### b) Reviewingtheliteratureselected:

After collecting the relevant literature it must be critically examined in order to draw connections between the research topic and the ideas covered in the already published literature. The findings of each of study may be recorded separately and later on can be combined with the relevant subtopics or subareas. For easy comparison and analysis, the results can be organised in a tabular form depending on the particular themes.

The review can be conducted by considering the following aspects:

• Take note of whether the information pertinent to the research topic can be organized around and related directly to the thesis or research question developed.

• Keep track of the theories proposed, the arguments against them, the methodology used, and the arguments against it.

• Consider how broadly the conclusions may be applied to different circumstances. Determine the knowledge gaps—the regions where little to nothing is known—that exist.

• Prior research should be referenced in order to avoid plagiarism, properly credit other scholars, and identify discrepancies such as research gaps, inconsistencies between studies, and unanswered questions.

#### c) Develop a theoretical framework:

Research is a never ending process and due to the time constraints it is important to establish parameters by comparing it to certain key topics related to the research subject. A theoretical framework is made up of concepts, definitions, and references to pertinent academic literature that are used to support a specific research. This framework helps the researcher in grasping the theories and ideasthat are important to the research topic. The reader can critically assess theoretical premises when they are stated in a clear and concise manner. It answers the crucial why- and how-questions and enables the researcher to go from just describing an observable occurrence to generalising its many facets. Generally, theoretical framework and review of literature are complementary to each other. A theoretical framework cannot be developed if we do not look into the literature and inversely if we do not have a good theoretical framework; it is not possible to build a theoretical framework; conversely, without a strong theoretical framework, it is impossible to conduct a thorough examination of the literature (Kumar, 2011).

d) Developing a conceptual framework

The conceptual framework serves as the foundation for the theoretical framework. The conceptual framework is that aspect which is derived from the theoretical framework and



serve as the foundation for the research and the basis of enquiry as opposed to the theoretical framework, which consists of the ideas.

#### **IN-TEXT QUESTIONS**

- 11. The advantage of journal articles for a literature review is
  - a) Reading abstract of articles help to select relevant articles
  - b) provides up-to-date information
  - c) there are many journals to choose from in most fields.
  - d) All of the above
- 12. Internet should not be used for finding published literature. True/ false
- 13. Books, journal articles and internet are the main sources of literature for most of the researcher. True/False.

# 1.5 WRITING STYLE

While writing the review of literature the following thigs need to be considered:

- Each literature review in the academic research must be supported with the citations as an evidence which verify the validity of the review.
- While writing the review, only the important points of each source need to be incorporated which must relate to the research problem.
- Short quotations might be used to highlight a point or when an author's ideas are difficult to paraphrase. While writing the review of literature, avoid utilising lengthy quotations and substitute it with the own words.
- Even if the literature review includes ideas from other people, the researcher ideas are still prominent. For instance, the researcher may use quotations from other sources into its own writing while retaining his/her personal voice by beginning and closing each paragraph with words and thoughts that are unique to you.
- While paraphrasing a source the researcher has to put the author's ideas or information accurately into its own words and should be incorporated with the proper citation.

#### Ways to Organize the Literature Review

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**Chronology of Events:** If the review follows a chronological approach the researcher might discuss the sources in terms of their publication dates.

**By Publication:** Order the sources by publication chronology, then, only if the order demonstrates a more important trend.

**Thematic reviews:** Thematic reviews of literature are put together based on a topic or issue, not on how time went. But the passage of time may still be a big part of a thematic review. Note, though, that thematic reviews that are more honest tend to not go in order of time. A review put together this way would move from one time period to another within each section, depending on the point being made.

**Methodological:** A methodological approach looks at how the researcher did their work. A methodological scope will affect either the kinds of documents in the review or the way they are talked about.

# 1.5SUMMARY

The aim of the literature review is to show the what has been learned and thought about a topic, as well as what its strengths and weaknesses are. It is the presentation, categorization, and assessment of the work produced by other scholars on a certain topic. A literature review may be an independent piece of writing or it can be included in a research thesis.

The review of the literature begins before a research question is developed and continues until the report is finished. The literature review clarifies and emphasises the study issue while also improving the research strategies and knowledge base.

Phases in the process of analysing the literature include locating existing literature in your area of study, reading it, building a theoretical framework from which your study evolves, and using it to construct a conceptual framework that will act as the cornerstone for your inquiry. The best places to find literature are in books, journals, and internet.

# 1.5 GLOSSORY

Literature:

Literature review: Theoretical review Methodological review: Systematic review:

# 1.5 SELF ASSESSMENT QUESTION

1. What do you understand by Literature Review? Discuss the process of Literature Review in conducting the research in LIS.

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2. State the importance of Literature Review in Research. Discuss the different types of Literature review.

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Uttrakhand Notes



# LESSON 3

# **Hypothesis: Definition, Types, Sources and Functions**

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iversity

## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Hypothesis
  - 1.3.1 Meaning and Definition of Hypothesis
  - 1.3.2 Characteristics of the Hypothesis
  - 1.3.3 Functions of Hypotheses
- 1.4 Significance and Importance of Hypothesis
- 1.5 Types of Hypotheses
- 1.6 Formulation of Hypotheses
  1.6.1 Sources of Hypotheses
  1.6.2 Difficulties in formulating the Hypotheses
- 1.7 Testing of Hypotheses
  - 1.7.1 Steps in Hypothesis Testing
    - 1.7.1.1 Two-tailed and One-tailed Tests
    - 1.7.1.2 Errors in Hypothesis Testing
- 1.8 Summary
- 1.9 Glossary
- 1.10 Answers to In-text Questions
- 1.11 Self-Assessment Questions
- 1.12 References
- 1.13 Suggested Readings

# 1.1 LEARNING OBJECTIVES

After studying this unit, you will be able to:

- Understand the meaning of Hypothesis.
- Define the characteristics, functions of Hypotheses

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- Identify the different types and sources of Hypothesis.
- Explain the formulation of Hypothesis
- Understand the testing of Hypothesis.
- Identify the difficulties faced while formulating the Hypotheses
- Understand the significance and Importance of Hypotheses

## **1.2 INTRODUCTION**

Once the problem to be addressed in the course of research has been established, the researcher advisedly construct a tentative solution or answer to it. These suggested solutions or explanations are the hypotheses that a researcher would need to examine based on facts that are already known or may be learned. Thus, hypotheses lead the researcher through the bundle of facts, allowing to see and select just those that are pertinent to the problem or challenge one seeks to solve. Collection of fact for the sake of gathering them will provide no results; to be productive, one needs to gather facts that support or oppose a certain point of view or proposition. Such points of view or statements are called hypotheses, and the purpose of inquiry/research is to examine their consistency with reality. Generally, hypotheses assist in seeing and appreciating 1. the kind of data that must be gathered in order to answer the research question and 2. the most effective form in which they should be organised.

#### **1.3** Hypotheses

#### **1.3.1 Meaning and Definition of**

The term 'hypothesis' is derived from the ancient Greek term 'hypotithenai', which means to put under or to suppose. According to Theodorson and Theodorson, "a hypothesis is a tentative statement asserting a relationship between certain facts". Which means it's an assumption about relations between two or more variables. It is a tentative explanation of the research problem or a guess about the research outcome.

Webster' New International dictionary of English language, 1956, defines the word "hypothesis" as "a propositions, conditions or principal which is assumed, perhaps without belief, in order to draw out its logical consequences and by this method to test its accord with facts which are known or may be determined". Another definition by Goode and Hatt have defined it as "a proposition which can be put to test to determine validity".

Before starting the research, the researcher has a rather general, diffused, even confused notion of the problem.Cohen and Nagel highlights the value of hypothesis thus, "We cannot take a simple step forward in any enquiry unless we began with suggested explanation or solution of the difficulty which is originated it. Such tentative explanations are suggested to us by something in the subject matter and by our previous knowledge. When they are



formulated as propositions, they are called, hypothesis". The hypothesis starts and finishes the research process. A hypothesis may be expressed in a variety of ways, but it always serves the core purpose of predicting the result of the inquiry.

According to werkmeister, "The guesses he makes are the hypotheses which either solve the problem or guide him in further investigation".

For example, if statistics show that the number of questions received at the reference desk has decreased considerably, you might hypothesise that information literacy instruction reduce reference inquires. For each hypothesis, a particular action taken could support or reject it. If hypothesis is supported than there is a good chance that one can act to remedy the problem. For instance, if it is supported that the information literacy instruction reduces reference inquires, then the library can direct more resources into the ventures.

Kerlinger describes it as "conjectural statement of the relationship between two or more variables." Black and Chmion have described it as "a tentative statement about something the validity of which is usually unknown".

The hypothesis is frequently formed through inductive reasoning, in which the researcher conducts a series of observations to build a theory. In all types of research a hypothesis comply to the research objectives, scope, and limitations. A hypothesis guarantees that the whole research process adheres to scientific and reliable standards of reasoning.

According to George A. Lundberg, "A hypothesis is a tentative generalisation, the validity of which remains to be tested. In it's most elementary stage the hypothesis may be any hunch, guess, imaginative idea, which becomes, the basis for action or investigation". In other words hypotheses are a collection of predictions that are examined to ensure the validity of the findings.

#### **1.3.1** Characteristics of Hypothesis:

The contents should be divided into smaller chunks and structured under heading and sub-headings. The purpose is to present a logical and graded arrangement of subject matter. The language should be simple and easy to understand. It should not be bookish and full of jargon. The language used should be appropriate to the level of the learner.

Hypothesis must possess the following characteristics:



Fig. 1.1 Characteristics of Hypothesis

- i Hypothesis must be conceptually clear and precise. If the hypothesis is not clear and precise, the conclusions obtained from it cannot be taken as reliable.
- ii Hypothesis must be testable. The researcher require to perform some prior research so that the research study might not suffer from unprovable hypotheses. A hypothesis is testable if it can be used to draw further conclusions that may then be verified by observation.
- iii Hypothesis must assert relationship between variables, if the hypothesis is a relational one.
- iv Hypothesis must be specific and limited in scope. A researcher should construct more specific hypotheses as it is often more testable. If a hypothesis is relational, it should specify the relationships between the variables.
- v Hypothesis must be asserted in most simple terms in order to be understood by everyone. But one must remember that simplicity of Hypothesis has nothing to do with its significance.
- vi Hypothesis must be consistent with most known facts or a considerable body of established facts.
- vii Hypothesis must be testable within a reasonable timeframe. Even an excellent hypothesis should not be used if it cannot be tested in a reasonable amount of time, since one cannot spend a lifetime gathering data to test it.
- viii The hypothesis must explain the facts that need an explanation. This indicates that the original problem condition should be able to be deduced by combining the

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hypothesis with other recognised generalisations. Therefore, a hypothesis must explain what it purports to explain; it must have empirical support.

#### **1.3.2 Functions of Hypotheses:**

The most important function of a hypothesis are:

- 1. Hypothesis explains all the connected facts adequately.
- 2. Hypothesis provides direction to the research and obstruct irrelevant review of literature which leads to the precise and fruitful research.
- 3. It enables the researcher to direct enquiry along the right lines. It suggests experiments and observation and provide groundwork for the same.
- 4. Hypothesis determine the method of verification as well as the procedure for enquiry Hypothesis limits the scope of enquiry to a manageable area because instead of random collection of data, it enables the researcher to search only for relevant facts. Therefore, it leads to economy of time and money.
- 5. It leads to the discovery of laws. It explains facts and laws and thus seeks to verify knowledge.
- 6. Hypothesis leads to conclusion which is sometimes very significant for the advancement of knowledge. The significance of an object or event can be determined by the hypothesis.

#### **IN-TEXT QUESTIONS**

- 1. Hypothesis is a:
  - a. Tentative solution to a problem
  - b. Partial solution to a problem
  - c. Tested solution to a problem
  - d. Solution to a problem
- 2. A statement that to be tested in research is called \_
- 3. Hypothesis is a tentative explanation of the relationship between two variables . True / False
- 4. State any three Characteristics of Hypothesis.

# **1.4 SIGNIFICANCE AND IMPORTANCE OF HYPOTHESIS**

Hypothesis has a very important place in research, although it occupies very small space in the body of thesis. The importance of hypothesis can be more specifically stated as under:

1. It gives direction to research. It assures the collection of data necessary to answer the question posed in the statement of the problem.



- 2. It directs the investigator to certain aspects of the situation, which are relevant from the standpoint of the problem at hand. It prevents the research from engaging in fruitless research.
- 3. It serves as a guide to the thinking and discovering processes. Without hypotheses, research would be haphazard and aimless.
- 4. It prevents blind research. It avoids indiscrimate gathering of data which may later turn our to be irrelevant.
- 5. It directs the researcher's attention to facts and situations that would otherwise be neglected.
- 6. It places clear and specific goal before. These clear and specific goals provide the investigator with a basis for selecting samples and research procedures to meet these goals.
- 7. It serves the function of linking together related facts and information and organizing them into one comprehensible whole.

# **1.5** Types of Hypothesis

pp<sup>cf</sup>, of

There are many kinds of hypotheses the social researcher has to be working with. One type of hypotheses asserts that something is the case in a given instance; that a particular object, person or situation has a particular characteristic. Another type of hypotheses deals with the frequency of occurrences or of association among variables. Hypotheses can be classified in a variety of ways. Some of the common hypothesis identified by Powel and Connaway (2004) are:

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**Working hypothesis-** The working hypothesis, also known as the research hypothesis or scientific hypothesis. It is the hypothesis with which a research investigation starts. It aid in defining and directing the research. Research hypothesis is a formal affirmative statement that predicts the tentative explanation of the relationship between two or more variables. For Example: "There is a difference between the learning styles of boys and girls".

**Final hypothesis**- is a hypothesis that corresponds to the research findings. It probably has a lot in common with the ultimate result of the research.

**Particular hypothesis**- a hypothesis that just describes a certain incident or circumstance, for example "not all college students are skilled library users". (Powell, )

**Causal hypothesis**- claim that there is a casual relationship between two or more variables (i.e., that a particular factor or condition determines or affects another factor or condition).

Alternative hypothesis- an alternative hypothesis offers a feasible and reasonable solution for the problem (i.e., a different explanation of the same facts). Sometimes, the

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terms "minor" and "secondary" are used interchangeably, although the latter, which contains meanings that are less widely recognized, appears to imply something completely distinct.

**Null hypothesis-** suggests there is no substantial relationship between the variables in question. It is the idea that something that can be seen happened by chance instead of because of a clear cause. This is a neutral type of hypothesis which is primarily used for the purposes of statistical testing. By rejecting or accepting null hypothesis, one arrives at the conclusions about the research hypothesis.

Ex: There will be no significance difference in the level of satisfaction with reference service between UG and PG students.

**Inductive hypothesis**- a hypothesis that expands from the specific to the general, or a generalization that is supported by observations.

**Deductive hypothesis**- a hypothesis that moves from the general to the specific or a hypothesis that is formed from an existing theory.

**Nondirectional hypothesis-** a hypothesis that merely suggests the existence of a relationship or difference. It does not specify the kind of relationship. For example "There is a difference in the academic achievement of B.Ed. students enrolled in open and conventional universities". Although the hypothesis stipulate that there is a difference in the academic achievement, the direction of the difference is not specified.

**Directional hypothesis**- a hypothesis that describes the nature of relationship between or among variables. For example,

- It could logically be hypothesized that the assignment of term papers results in more library use by certain students.
- High quality of LIS education lead to high quality of LIS practice skills.
- There is positive relationship between the academic achievement and study habit of students

**Multivariate hypothesis**- a hypothesis proposing a relationship among more than two phenomena.

Bivariate hypothesis- a hypothesis proposing a relationship between two phenomena.

**Univariate hypothesis**- a hypothesis concerned with only one phenomenon or variable. In that no relationship is involved, one could argue that this kind of statement does not meet the minimal criteria for a hypothesis. It might better be termed a research question.



### **IN-TEXT QUESTIONS**

- 5. Hypothesis that is tested for its rejection is:
- a. Null
- b. Alternative
- c. Statistical Inference
- d. None of the Above
- 6. \_\_\_\_\_ Hypothesis moves from General to Specific.
- 7. Directional Hypothesis does not specify the kind of relationship between variables. True / False

## **1.6 FORMULATION OF HYPOTHESIS**

The task of deriving adequate hypothesis is essentially parallel to that of selecting suitable problems. The derivation of a good hypothesis demands characteristics of experience and creativity. Success in an investigation depends on the considerable time and effort spent in tracing and stating tentative hypothesis. A good investigator must have not only an alert mind capable of deriving relevant hypothesis, but also a critical mind capable of rejecting faulty hypothesis.

#### **1.6.1 Sources of Hypotheses:**

The specific sources of Hypothesis are Discussed below:



Fig. 1.3 Sources of Hypotheses

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1. General Culture : In the investigations for solving problems of Indian Education, the hypothesis cannot lose sight of the broad culture to which we belong. While formulating such hypothesis we cannot ignore religious or moral bias in Indian Education; typical role of family in Indian Education; the educational interests of Indian children; the state of women education in India and so on. Our cultural heritage a great source of idea, theories, tentative theories and provisional propositions.

2. **Scientific Theory** : There are various scientific laws or theories which are transferable to the field of educational researchers. For example, we have theories like-sound mind in a sound body, handicapped children face adjustment problems, rest relieves fatigue etc.

3. **Personal Experience**- We have emphasized above that a good hypothesis can come only from experience. Some of an experiences may be directly changed into research hypotheses for example : Teachers character and personality are imbibed by the students good study habits improve achievement, library reading enhances interest in knowledge etc.

4.**Analogies:** Although reasoning by analogy generally is considered unacceptable, as a source of proof, it is a fertile source of hypotheses. It is the process of framing hypothesis from the likenesses and similarities. It is assumed that the existence of similarities between two situations is not accidental, but that it is the result of the operational of some law common to two situations. For example, If our problem is similar in nature to a problem studied in a foreign land, we may frame our hypothesis in the same manner.

**5**. **Observation**: Observation is important in the consideration and undertaking of a research issue. A good hypothesis is developed through the compilation of previous facts and current facts relevant to the problem.

#### 1.6.2 Difficulties in formulating the Hypotheses

According to Goode and Hatt three main difficulties in formulating hypotheses are:

- 1. Inability to phrase the hypothesis properly.
- 2. Absence of clear theoretical framework or knowledge of theoretical framework, e.g., awareness of rights among women depends upon personality, environment (education and family and aspirations).
- 3. Lack of ability to utilise the theoretical framework logically, e.g. workers commitment and role skills and role learning.

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#### **IN-TEXT QUESTIONS**

- 8. The Source of Hypothesis is:
  - a. Interview
  - b. General Culture
  - c. Genealogy
  - d. Questionnaire

# **1.7 TESTING OF HYPOTHESIS**

A knowledge or a fact could be accepted only when it has validity. The validity of such knowledge could be accepted only when it is tested with regard to its usefulness or truth. Hence, to accept hypotheses, which are merely munches or guesses, as facts, they are to be used. Testing hypothesis subjecting them to some sort of empirical scrutiny to determine if they are supported or refuted by what the researcher observes.

Robert Baes states that the following questions should be asked hypothesis before they are tested:

- 1. Are the terms empirically specific, so that the concepts or variables can be distinguished in concrete situations?
- 2. Is the relationship between variables such that, it could be verified or nullified by means of empirical operations?
- 3. Is there any prior evidence as to the truth or falseness of the relationship?
- 4. Can an appropriate study design be devised?
- 5. Are the variables context bound (example: restricted to play group or gang) or could they be equally well applied to other interaction situation (example work group or family)?
- 6. Are the generalisations "culture bound" or can they also be applied realistically to other cultures?
- 7. If other relevant factors are subject to change in the course of the observations, are they adequately specified and enumerated, so the that the observer can ascertain whether they have changed during period of observation?

8. Is the generalisation a part of the theoretical system from which is could be deduced as well as being verified by the proposed empirical induction?

#### **1.7.1 Steps in Hypothesis Testing**

The procedure for hypothesis testing is as follows:

**Step 1: Making formal statement**: In this step, the nature of a hypothesis is clearly stated, which could be either null hypothesis or alternate hypothesis. Stating a problem in hypothesis



testing is of utmost importance, which should be done with proper care, keeping in mind the object and nature of the problem.

Null Hypothesis and Alternative Hypothesis: In the context of statistical analysis, the following concepts or assumptions are taken into consideration

**Null hypothesis:** While comparing two different methods in terms of their superiority, wherein the assumption is that both the methods are equally good is called null hypothesis. It is also known as statistical hypothesis and is symbolised as  $H_0$ .

Alternate hypothesis: While comparing two different methods, regarding their superiority, wherein, stating a particular method to be good or bad as compared to the other one is called alternate hypothesis. It is symbolised as  $H_a$ .

**Step 2: Comparison of Null Hypothesis with Alternate Hypothesis**: Following are the points of comparison between null hypothesis and alternate hypothesis:

- Null hypothesis is always specific, while alternate hypothesis gives an approximate value.
- The rejection of null hypothesis involves great risk, which is not in the case of alternate hypothesis.
- Null hypothesis is more frequently used in statistics than alternate hypothesis because it is specific and is not based on probabilities.

**Step 3: Choosing a significance level:** In this step, a hypothesis is tested on the basis of a present significance level, which has to be adequate in terms of nature and purpose of the problem. Significance level is the maximum value of the probability of rejecting a null hypothesis ( $H_0$ ) when it is true. For example, if you assume significance level to be 5 %, it means that the researcher is ready to take 5% risk to reject the null hypothesis when it happens to be true.

**Step 4: Decision Rule:** In this concept of hypothesis, you will formulate a rule provided both null hypothesis and alternate hypothesis are given. Formulating a decision means either accepting null hypothesis and rejecting alternate hypothesis or rejecting null hypothesis and accepting alternate hypothesis. It can be easily understood with the help of an example, wherein you test 20 items and formulate a decision on the basis of a rule, which states that a null hypothesis will be accepted if out of those 20 items, either none is defective or only 5 is defective otherwise alternate hypothesis will be accepted.

#### 1.7.1.1 Two-tailed and One-tailed Tests

The two-tailed test rejects the null hypothesis if the sample mean is either more or less than the hypothesised value of the mean of the population. It is considered to be apt when null hypothesis is of some specific value whereas; alternate hypothesis is not equal to the value of null hypothesis. In a two-tailed curve, there are two rejection regions, which are also called critical regions.

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Figure 4.1 shows the two-tailed curve with its critical regions on each side.



Fig 1.4. Two tailed Curve with its critical region on both sides Source: Shetgovekar (2021)

**Conditions for the Occurrence of One-tailed Test:** When the population mean is either lower or higher than some hypothesised value, one-tailed test is considered to be appropriate where the rejection is only on the left tail of the curve. This is known as left-tailed test.



Fig. 1.5. One tailed Curve with its critical region

Source: Shetgovekar (2021)

# 1.7.1.2 Errors in Hypothesis Testing

You have already learned that hypotheses are assumptions that may be prove to be either correct or incorrect. It is possible to arrive at an incorrect conclusion about a hypothesis for the various reasons if :

- Sampling procedure adopted is faulty;
- Data collection method is inaccurate;
- Study design selected is faulty;
- Inappropriate statistical methods used;
- Conclusions drawn are incorrect.

The common errors that might occur when testing a hypothesis are as follows:

# Table 1.5.1: Type I and Type II Error



Condition	Null Hypothesis is true	Null hypothesis is false
Null Hypothesis is Rejected	Type I error	Decision is correct
Null Hypothesis is Accepted	Decision is correct	Type II error

There are two types of errors in statistical hypothesis, which are as follows:

Type I error: In this type of error, you may reject a null hypothesis when it is true. It means rejection of a hypothesis, which should have been accepted. It is denoted by  $\alpha$  (alpha) and is also known as alpha error.

Type II error: In this type of error, you are supposed to accept a null hypothesis when it is not true. It means accepting a hypothesis, which should have been rejected. It is denoted by  $\beta$  (beta) and is also known as beta error.

Type I error can be controlled by fixing it at a lower level. For example, if you fix it at 2 per cent, then the maximum probability to commit Type I error is 0.02. But reducing Type I error has a disadvantage when the sample size is fixed, as it increases the chances of Type II error. In other words, it can be said that both types of errors cannot be reduced simultaneously. The only solution of this problem is to set an appropriate level by considering the costs and penalties attached to them or to strike a proper balance between both types of errors.





## 1.8 SUMMARY

Hypothesis is tentative solution or an intelligent guess about a research problem under study. It is not simply an educated guess, rather it is based on past research where the researcher gathers the evidence to advance a hypothesized relationship between variables. The researchers use hypotheses in their research implicitly or explicitly. The greatest advantage is that they not only guide in goals of research but help, in concentrating on the important aspects of the research topic by avoiding less significant issues.

In formulating a hypothesis it is important to ensure that it is simple, specific and conceptually clear; is able to be verified; is rooted in an existing body of knowledge; and is capable to be operational used. There are various types of Hypotheses but for statistical testing only Null Hypothesis and Alternate Hypothesis are used.

Important concepts involved in the process of hypothesis testing e.g., One tailed; two tailed tests, type I error, type II error of a test were also explained.

## **1.9 GLOSSARY**

**Hypothesis :** a hypothesis is a tentative statement asserting a relationship between certain facts

**Null hypothesis :** The hypothesis that is of no scientific interest; sometimes the hypothesis of no difference.

Alternative hypothesis : Statistical term for research hypothesis that specifies values that researcher believes to hold true.

**One-tailed test :** A one-tailed test looks for an "increase" or "decrease" in the parameter two-tailed test: A two-tailed test looks for a "change" (increased or decreased) in the parameter.

Type I error – Rejection of a null hypothesis when it is true. Type II error - Acceptance of a null hypothesis when it is false.

## 1.10 ANSWERS TO IN-TEXT QUESTIONS

1.	a Tentative solution to a problem	8. b General Culture
2.	Hypothesis	9. b H0
3.	True	10. Null Hypothesis.
4.	i. Clear and Precise	11. b Rejection Value
	ii. Testable	12. a We reject H0 if it is true
	iii. Specific	-
4.	i. Clear and Precise ii. Testable iii. Specific	<ul><li>11. b Rejection Value</li><li>12. a We reject H0 if it is true</li></ul>

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- 5. a Null
- 6. Deductive Hypothesis
- 7. False

# 1.11 SELF-ASSESSMENT QUESTIONS

- 1. What are the characteristics of hypothesis?
- 2. Explain the different types of Hypotheses?
- 3. What is the procedure for hypothesis testing?

## 1.12 REFERENCES

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# **1.13 SUGGESTED READINGS**

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## **UNIT II: Types of Research Methods**

# **LESSON 1**

## Historical, Survey, and Experimental Research

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Historical Research Method
  - 1.3.1 Conceptual Meaning and Definitions
  - 1.3.2 Purposes/Usefulness
  - 1.3.3 Sources used in Historical research
- 1.4 Evaluation of Historical Sources
- 1.5 Basics Steps of Historical Research
- 1.6 Survey Research Method
- 1.7 Types of Survey Methods
- 1.8 Basic steps involved in Survey Method
- 1.9 Application of Survey Research in Library and Information Science
  - 1.9.1 Advantages
  - 1.9.2 Limitations
- 1.10 Experimental Research Method
  - 1.10.1 Basic Understanding of Experimental Research
  - 1.10.2 Definitions of Experimental Research
  - 1.10.3 Areas of Application
- 1.11 Types of Experimental Research
  - 1.11.1 Types of Experiment
  - 1.11.2 Experimental Design
  - 1.11.3 Classical Experimental Design
  - 1.11.4 Advantages of Experimental Research
  - 1.11.5 Limitations/Criticism
  - 1.11.6 Difference between Experimental approach and other approaches
- 1.12 Elements involved in Experimental Research

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- 1.13 Steps in Experimental Research
- 1.14 Summary
- 1.15 Glossary
- 1.16 Answers to In-text Questions
- 1.17 Self-Assessment Questions
- 1.18 References
- 1.19 Suggested Readings

### 1.1 LEARNING OBJECTIVES

In this lesson, the students will study the concept of Historical, Survey and Experimental Research Methods. This lesson will help the students to develop the necessary skills to conduct rigorous and basic research. After reading this lesson, the students will be able to explain the difference between the types of research methods: Historical, Survey and Experimental Research. The students will also study the basic steps involved in all the three types of research methods with the advantages and limitations of all the three methods of research.

## **1.2 INTRODUCTION**

Once the research problem has been identified, a theory has been built and a hypothesis has been formulated, the researcher is ready to select the methodology for his or her study. One of the essential benefits from the study of research methods is the ability to conduct research. For many librarians, especially in academic settings, research activities are not only desirable but necessary. A library's involvement in research can even improve staff morale and enhance the library's status in its community. Thus, this chapter gives a detailed introduction of a few research methods, namely Historical, Survey and Experimental, which will prove beneficial for the researcher to successfully conduct his or her research study.

## **1.3 HISTORICAL RESEARCH METHOD**

### **1.3.1** Conceptual Meaning and Definitions

Before understanding historical research, we should understand the term 'history'. History means the search for knowledge and the truth "a searching to find out". History is an integrated narrative or description of past events or facts written in a spirit of critical enquiry for the whole truth.

e.g. Biography becomes history when the individual is considered in relation to the society of his time but is not history when limited to single life in isolation.



So, historical research does not mean mere chronological narration of facts related to the past. Simple encyclopaedic listing of events does not constitute historical research.

Historical Research is "concerned with critical description and analysis of past events mainly to gain a better understanding of the present (Verma and Breard).

(Travers) it involves a procedure supplementary to observation, a process by which the historian seeks to test the truthfulness of the reports of observation made by others.

It has mainly two important dimensions time (which take into account when was event occurred). **N**ei

Space (related with where the event occurred).

#### Historical Research/Approach should have the following criteria:

- Greater attention should be paid to data interpretation and giving meaning to the events being described, rather than mere encyclopedic testing of events.
- A good historical research involves a thorough study of all the available sources by the researcher, culminating in new insights and conclusions.
- A historian should see to it that his conclusion are based on verifiable data as gathered by him. It is in this context that he puts his claim to scholarship.

#### **1.3.2 Purposes/Usefulness**

- > Clear perspective of the present: The most crucial purpose of historical research is to obtain a clear perspective of past which would help the libertarian to have clear perspective of the present based on past events and trends. A clear perspective of present of will enable the librarians to:
- > Increase the understanding on how, when and why of the past events occurred concerning librarianship. Consequently, a person will be able to acquire a better application of these past events.
- > To have a clear understanding of the functions of modern libraries in the historical context leading to better communication between libraries. This leads to better approach of modern librarianship.
- Understand the present-day problems i.e. lack of library development in India) is due to:
  - Lack of political interest in library development
  - Lack of library legislation in most of the states
  - Viability of the national library to play its expected role.

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- Provides hypotheses for solving present-day problems faced by libraries/Documentation officers/specialists.
- Get a greater appreciation of the role that libraries: play in the programs of the society.
- Helps in avoiding repetition of past mistakes: An understanding of the historical background of librarianship would enable librarians to avoid repetition of the same mistakes. One should recognize old facts from being considered as new ideas. These ideas might have been tried earlier but might have failed. Thus, historical research can serve as a control on policy-making decisions.
- Help in predicting the direction of future development: Knowledge about the past can assist a researcher in predicting about the direction of future developments with a certain degree of confidence.
- Accurate account of the past: Sometimes, a scholar may be interested in the accurate account of the past due to a simple scholarly desire. Thus, he may be interested in reaching the truth and as a scholar, the desire may be to find out what happened, how it happened and why it occurred.
- Interpretation of data: Generally, a historian is not satisfied with the Discovery of the truth, he would like to interpret data to link the past to the present and future.
- Addition to body of knowledge: The research in LIS can add to the body of knowledge constituting history in LIS, thereby advancing librarianship. Historical research can also help librarians build up on the past, more effective and efficient libraries.

### 1.3.3. Sources used in Historical research

The data gathered in historical research mainly come from Primary source of evidence and Secondary source of evidence:

### > Primary Sources of Evidence:

Primary sources are the original documents or remains, which consist of first-hand information containing data from actual witnesses to the incident being studied. These are considered of fundamental importance and form the foundation of historical research. They are of two kinds:

#### **Consciously Transmitted Information:**

It may take the form of oral or written testimony or the records kept and written by the actual participants or witnesses of an event. These include official records, memoirs, diaries, letters, genealogies, constitutions, const decisions, wills etc.



**Unconscious Testimony:** It takes the form of remains or relies upon. It includes tools, furnishing, weapons, household articles, clothing, building, etc.

#### Secondary Sources of Evidence:

Secondary sources contain information transmitted by a person who has neither a participant nor an eyewitness to an actual event. Thus, secondary sources are contained second-hand information. For e.g. history textbooks encyclopedia, and Bibliographies. A good historian should rely upon primary sources as far as possible. He would use secondary sources to fill up the gap in the primary sources.

### Historical Research Considered to be Scientifically Different from Survey Approach

**Some historians have argued that** historical research cannot be considered Scientific Research answer to this is diff. but we can conclude that, history is different from natural sc. in the sense that it is not based upon experimentation. But upon reports of observations. It is the interest that makes it impossible for the historian to take advantage of experimentation; he cannot confer up the figures of the past and cause them to reproduce the famous scenes of history. historical research can be set if the data has been critically evaluated internally and externally in a careful manner.

But ideally, it cannot be 100% correct because it lacks the reliability and validity which are the two most essential elements of Scientific research. In this research control and measurement is not possible so historical research can be scientific up to a certain extent only.

**Limitations:** Collection of facts relating to very old events is a problem, as sufficient data may not be available in such cases, e.g., It is difficult to prove the existence of Ramayana and Mahabharata events due to the non-availability of sufficient data of that period.

- Historical events took place in the past occur only once and cannot be reproduced or created for experimentation. For e.g. battle of panipat cannot be repeated or artificially created for observation.
- Historical writings may be biased or prejudiced normally every writer has more or less prejudices of some kind or the order for e.g. a patriotic Indian may fully blame the British or General Dayer for the 'Jallianwala Bagh' incident, but a British writer may describe the incident otherwise and through Blame on Indians.
- Historical monuments are repaired from time to time in order to maintain them. This may destroy their historical value and their observation may sometimes lead to faulty concussions

#### Conclusion

We are really in need of Historical Research in LIS as there is vast scope of Historical Research into the role of prominent Librarian, Library Reference Resources, methods

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techniques etc. at different centre. A good Historical Researcher is a rare peer with an insight, able to encompass all the known information and interrelate it. He should aim to overcome pre-existing notions is hereby he can bring out ab new Rxl or explain or find, if it exists in the data. Thus, Historical Research is not as easy as it would appear to be. It is a task, which requires a high level of patience and objectivity.

## 1.4 EVALUATION OF HISTORICAL SOURCES

After collecting data or evidence, the next step is criticism of collected data which consists of two parts external criticism and internal criticism.

**External criticism:** External criticism of records concerns the genuineness of the document itself, whether it was actually written and distributed at the time and place listed on the document, whether it is true to the original or if it is a copy.

Author Bestor states, "The Historians must satisfy himself that he know when, where under what circumstances, and by whom the words were written or printed or incised upon a paper or the tablet that he holds in hands."

Gorraghon divides external criticism into four inquiries

- When was the source written, produced (date).
- Where was it produced (localization).
- By whom was it produced (authorship).
- From what pre-existing maternal was it produced (analysis).
- R.J. Shafer said that : "External criticism is merely saving us from using false evidence

. Interestingly, the genuineness of the document or remain the problems of external criticism involve the question of authorship, production of the document such as time, place, purpose and circumstances of composition and what part of the document is true to the original. The following points should be taken care.

- Who was the author? Not merely what is his name but what were his personality, character, position and so forth.
- What were his general qualifications as a reporter.
  - How was he interested in the events related?
  - How was he situated for observation of the events?
- How so and after the events were the documents written?



- How as document written, from memory, after consultation with others, after checking the facts a by combining earlier trial drafts.
- How the documents related to other documents.

#### **Internal Criticism**

After question of authorship, time, place and genuineness have been answered it remains for internal criticism to determine the accuracy and value of the statement made. The shift of emphasis is from the document as such to statement with in the document. Proof of the genuineness of a document by external criticism does not guarantee that it tells the truth.

Internal criticism is a process used to judge the value of a document's contents. It is concerned with whether the testimony contained in documents is factual. A useful guideline to the reliability of statements contained in documents is the prior knowledge about the subject of that inquiry that the Historians brings to a selected area for investigation. If a piece of information contained in a record is quite different from what the historians already knows or believes to be true, care is to be taken not to use the data until they have been verified in other sources. Steps should be taken to determine whether the information was recorded in good faith or with the intention of deliberately falsifying or distorting truth.

R.J. Shafter said that – If criticism has other information of telling as how to use authenticated evidences. It is also known as textual criticism.

Following points to be taken care of while doing Internal criticism.

- What did the author mean by this particular statement? What is its real meaning as distinguished from its very literal meaning.
- was the statement made in good faith?
  - Was the author under pressure to tell an untruth.
  - Was he influenced by sympathy or antipathy to tell an untruth?
  - Was he inf by public opinion?

Was the statement accurate or more particularly

- Was the author a poor observer because of a mental defect or abnormality?
- Was the author poorly situated in time and place to observe?

In other words, external criticism deals with data relating to form and appearance rather than the meaning of contents, whereas Internal criticism weight the testimony of the document in relation to the myth.



In order to establish the genuineness of authorship or age of documents, one may have to use intricate tests of signature, hand writing, typescript, spelling, language etc.

# 1.5 BASIC STEPS OF HISTORICAL RESEARCH

### **STEPS IN HISTORICAL RESEARCH**

**Identification and Definition of a Problem:** Most important step, here the research choose the area for research and defines the problem for study. The problem chosen should have historical and current significance. It is essential that adequate data must be available relating to it so that research can be pursued fruitfully. The selection of a topic depends on the researcher's intelligence, caliber, still, aptitude, interest, training, and deep knowledge of the subject.

**Collection of Data:** After defining the problem, the next step is the collection of background inf. to understand the subject thoroughly. For collecting data, the researcher uses the tools as primary and secondary sources. Collection of data may involve anything from digging up ancient ruins to searching for old documents, such as old manuscripts, letters, diaries, reports etc. The majority of sources consists of documents meant specifically for information transmission, usually written ones.

**Formulation of Hypothesis:** This step occasionally occurs in historical research because the researcher has not solid base for making predictions usually and researcher has to build up the case himself. It tentatively describes the relationship between historical factors.

Ex. Margaret Erwin examined the role of women in Library associations hypothesis-wise.

- Offices of leadership held by librarians between 1876 and 1923 in national associations were not proportionate to male/female ratio of the profession
- . Although women held leadership positions in local and state associations in proportion to their professional representation, they did not hold an equal proportion on the national level.

### Historical Criticisms of Data Collected

The researcher must recognize the limitations of historical data collected by him for directing truth. He is required to determine the validity and reliability of the data. For this purpose, he must carefully analyse data and see the relevant data and segregate it from irrelevant, false, misleading, and insignificant data. The process involved in the appraisal of data used for deriving relevance, truth and significant data is called 'historical criticism'. It consists of two parts:



- External and Internal Criticism (as discussed above). These are procedures evolved by the historian to evaluate historical data.

**Interpretation of Historical data**: Here, the researcher has to deal with historical causation. Historical causation is concerned with establishing cause and effect relations. Under this step, researcher interprets the data and draw conclusions i.e. it is not merely to establish facts but also to find out the trends as suggested by data and also to arrive at generalizations derived from the data. A mere listing of historical events does not constitute research, so the interpretation of data consists of synthesis, and interpretation rather than a mere summation.

## **1.6 SURVEY RESEARCH METHOD**

Survey research is one of the most common forms of research engaged in by library science researchers. It involves library science researchers asking a large group of people questions about a particular topic or issue. This asking of question, all related to the issue of interest, is called a survey. Survey can provide data on attitudes, feelings, beliefs, past and intended behaviors, knowledge, ownership, personal characteristics, and other descriptive items.

The practice of conducting surveys owes back to at least the 11<sup>th</sup> century. The use of survey has become widespread in many disciplines in 20th century? Survey approach is present-oriented research. It concerns "the art and science of asking questions and/or observing behaviors to obtain information. It is suitable for those problems where the researcher believes that the data required for the solution of the research question does not exist at present. However, the settings do exist for generating the needed data.

A Survey research can take various forms; it can be done through personal Interviews, mailed questionnaires, personal discussions, etc. However, there are certain elements common to these. The common elements or characteristics of survey research are:

1. Methods of gathering information are always systematic. Information is collected from a group of people to describe some aspects or characteristics (such as ability, opinions, attitudes, beliefs, and/or knowledge) of the population of which that group is a part.

2. There is always a population of interest may be small or large represented by a sample or occasionally by a census of respondents.



3. It does not aspire to develop an organized body of scientific laws but provides information useful to solve local problems. It may, however, provide data to form the basis of research of a more fundamental nature.

4. Survey research is always concern with the behavior of the members of the population of interest and finally the main way in which information is collected is through asking questions, the answers to these questions by the members of the group constitute the data of the study.

The purpose of survey research is to achieve understanding or making prediction about some aspect (s) of the behavior of a population being studied or both) In view of the above, Tull and Albam define survey research as "the systematic gathering of information, from (a sample of) respondents for understanding and/or predicting some aspects of the behavior of the population of interest". Survey research techniques are used to obtain three broad classes of data:

a) information about incidents and developments (data about events in a given period);

b) information about distributions and frequencies (data concerning the possessions or characteristics of each member of a subject group); and

c) information about generally known rules and statuses (data about institutional norms and conditions).

### ASSUMPTION

Survey research can work well by resorting to sampling practices. If survey research is also called as sample Survey research, it will not be inappropriate. Survey research as a matter of fact has developed as a research activity along with the development of sampling theory and its diverse procedures.

# 1.7 TYPES OF SURVEYS

Two major types of surveys can be conducted- a cross-sectional survey and a longitudinal survey.

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1) A Cross-Sectional Survey- collects information from a sample drawn from a predetermined population. Furthermore, the information is collected at just one point in time, although the time it takes to collect all of the data desired may take anywhere from a day to a week or more in Lime.

**2)** Longitudinal surveys- A Longitudinal surveys, on the other hand, collects information at different points in time in order to study changes over time. Three longitudinal designs are commonly employed in survey research; trend, cohort, and panel.

- i. **In a trend study**, different samples from the same population are surveyed at different times. Then researcher examines and compares responses received in different periods to see if any trends are apparent.
- ii. **In a cohort study**, a specific population is followed over a period of time. Whereas a trend study samples a population whose member's changes over a time, a cohort study samples a particular population whose members do not change throughout the survey.
- iii. In a phase study, on the other hand, the researcher selects a sample right at the beginning of his study. He then surveys the same individuals at different times during the course of the survey. Since the researcher is studying the same individuals, he can note changes in their characteristics or behavior and explore the reasons for their changes. Loss of individuals is a frequent problem in panel studies, particularly if the studies extend over a fairly long period.

Besides these types, Professor Krishan Kumar recognizes the following three major types of surveys:-

- 1. Descriptive survey
- 2. Comparative survey
- 3. Evaluative survey

**1. Descriptive survey:** The descriptive survey is content to enumerate and describe a specific phenomenon at a given point of time. It is a compendium of information, but does not attempt to do anything very clever with the datacollected. The Library Associations: A survey of Libraries 1936-1937 is a classic example of a very large descriptive survey; full of information but with very few statistics. The descriptive survey can be used to test theories or to find answers to research questions. It covers both descriptions and conclusions.



**2. Comparative survey:** A Comparative survey aims to compare two or more research situations based on criteria. It indicates strong or weak point of the research situations concerned. It covers descriptions, comparisons and conclusions.

**3. Evaluative survey:** An evaluative survey aims to evaluate certain aspect of a research situation on the basis of criteria laid for the purpose. It covers description, evaluation and conclusions. Example: Effectiveness of case study as a method of teaching library administration.

### The other kinds of surveys are exploratory surveys and analytical surveys:

- Exploratory Surveys: For qualitative research study, an exploratory survey is often conducted which increases the researcher's familiarity with the phenomenon in question. An exploratory survey helps to clarify the concepts and can be used to establish the priorities for the future research. It identifies the new problem area, and this type of survey can be used to collect the information with practical applications. The e.g. of exploratory research surveys include Literature Surveys, Experience Surveys etc.
- Analytical Surveys: Leedy describes the analytical survey method as "appropriate for data that are quantitative in nature and that need statistical assistance to extract their meaning". In practice, however, most researchers seem to consider an analytical survey essentially as a kind of descriptive survey, and do not distinguish between the two (Powell and Connaway). But unlike a descriptive survey, analytical survey, does not rest content with collecting and arranging data. It attempts to relate one piece of data to another, to probe beneath the figures to underlying factors and patterns. Descriptive surveys are library-oriented, whereas analytical surveys are subject-oriented.

It should be kept in view that different types of surveys are not mutually exclusive. A research study can involve any two or even more than two types.

## **1.8 BASIC STEPS INVOLVED IN SURVEY METHOD**

The survey research methods mainly involves the following Steps:



#### 1. Identification of the problem area.

**2. Formulation of the specific problem to be investigated or research questions to be answered.** The problem to be investigated by means of survey should be sufficiently interesting, important enough to motivate the individuals surveyed to respond.

**3. Formulation of Objectives:** The objectives must be based on the problem to be investigated or the questions to be answered.(Library Science) researchers need to define clearly their objectives in conducting a survey. Each question should relate to one or more of the survey's objectives.

**4. Selection of appropriate research approach in terms of time and intent dimensions:** In the selection of research approach (for example survey, historical and experimental) one must keep in view it must ensure that the data to be collected will be relevant to the problem in hand or the questions to be answered.

5. Formulation of hypothesis, if any: Many studies do not have a hypothesis.

6. Selection of data gathering method(s): These include observation, measurement and questioning.

**7. Selection of data gathering technique (s):** After selecting the method (survey, experimental or Historical), the next logical step is selecting or designing the specific techniques to collect the required data. The most commonly used techniques for data collection are observation, interviews, questionnaires, check-lists etc.

**8. Identification of the target population:** The group of persons (objects, institutions and so on) that is the focus of the study is called the target population. It must be well-defined and clear so that one can clearly state who is or is not a member of this population.

**9. Selecting the Sample:** Due attention must be given to the sample selection, as this is a crucial step. The sample to be surveyed should be selected randomly if possible. Findings based on the sample must provide a reasonably accurate picture of the population so that generalization can become acceptable.

**10. Collection of the data:** There are four basic steps to collect data in survey, administering the survey instrument "live" to a group; by mail; by telephone or through face-to-face

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interviews. The most common types used in survey research are the questionnaire and interview schedule.

The collection of data basically depends upon the scope of theresearch/survey. If the survey is a large one, it would be necessary to employ field worker (s). They must be well trained in the techniques of data collection and instruments to be used for the purpose. Their work must be supervised; checks must be established to ensure that they collect accurate and unbiased data. After collecting the data, the data should be checked for completeness, authenticity, reliability, and comprehensibility. This step is generally referred to as 'cleaning' of the data. Cleaning the data may involve anything from simply reading the results, looking for surprising responses and unexpected patterns, to verifying or checking the coding of the data etc.

**11. Analysis of the Data:** Analysis of data is concerned with (a) coding the responses or entering of each item in the relevant category, (b) tabulation of data, and (c) carrying out of statistical computations. In order to take care of errors, the investigator must check the reliability of the coders, accuracy of tabulations and statistical computations.

**12. Interpretation of the Findings:** It involves drawing of conclusions from the data collected and analyzed. Interpretation of the findings is a difficult task, requiring a high degree of skill and experience.

### 13. Arriving at Generalizations

### 14. Writing a Report

## 1.9 APPLICATION OF SURVEY RESEARCH IN LIBRARY AND INFORMATION SCIENCE

Since, last many decades, the Survey approach has been used in library and Information Science research areas for conducting various studies including user studies, and library performance evaluation etc.

Librarians have long conducted "surveys." Community surveys and library surveys are associated with attempts to gather information about many aspects of libraries in whatever



setting these institutions might be located (e.g. ', in cities, schools, etc). The community survey is conducted to gather recorded and unrecorded data about the library's community's various social, political, and economic facets so that more intelligent decisions can be made concerning the planning, development, and conduct of services. Library surveys are systematic, in-depth examinations of libraries, library systems, or networks of libraries. Typically, comparisons are made in these surveys among various libraries, or units thereof, and established professional standards. Several publications in the literature of librarianship are concerned in whole or in part with the library survey, including the following: McDiarmid's The Library Survey, Line's Library Surveys: An Introduction to Their Use, Planning, Procedure and Presentation', Proceedings of the 1967 Conference on Library Surveys, held at Columbia University Erickson's College and University Library Surveys, 1938-1952; and Tauber's Survey Method in Approaching Library Problems" in Library Trends.

Within librarianship, survey research methods are the most suitable techniques presently available with which to discern:

- 1. Whether library users (or nonusers) are pleased with a library collection or services.
- 2. The amount of public information about a library's collection or services.
- 3. The kinds of information needed by library users and nonusers, as well as the sources on which people most commonly rely (books, periodicals, newspapers, radio, television, etc.)
- 4. Attitudes and opinions of librarians about their profession (statues, practices, standards, and policies).
- 5. What librarians think about their status within the profession (salary adequacy, perceived influence, sex discrimination in employment,etc.).
- 6. Students' attitudes toward library school curricula and education for librarianship in general.
- 7. How well library schools have prepared former students to meet the demand of actual library employment



8. The degree to which trends, new developments, and innovations are anticipated, accepted, and utilized by librarians.

These questions are only limited examples of some of the research tasks in the field of librarianship that can be effectively accomplished utilizing survey research.

Many of the surveys conducted by librarians could be classed as status surveys because they merely assay conditions in a library, such as collection size, kinds of facilities and services available, amount of financial support, use and nonuse of the library, and the composition of the library's staff.

Some of these surveys are routinely conducted by state and federal library agencies; local, regional, or national library associations; school districts; commercial surveying firms; and library consultants. In general, many of these surveys have been fact-gathering in nature: they were conducted to record the status quo rather than to determine relationships between variables or to test hypotheses. Public opinion polls conducted by commercial polling agencies such as the American Institute of Public Opinion (Gallup Poll), the Roper Poll, and the Harris Poll are examples of the application of surveys research techniques, as well as the use of data collected in surveys. Although these types of studies can be effective tools or vehicles for making improvements in libraries, they are not designed for testing hypotheses or for careful examination of relationships between variables.

### 1.9.1 Advantages

- 1. The advantage of survey research is that it links sample investigations with populations and there by offers an easy opportunity for studying population behavior through sample survey research assessments.
- 2. It makes a valuable contribution to social sciences research methodology. Social and behavioral scientists have one great advantage over natural scientists that they can ask questions as well as observe whereas natural scientists can only observe.
- 3. It has directly helped in the improvement of sampling procedures and their applicability to real world situations besides also suggesting improvements in resolving the complex situations.



- 4. The survey research also has the advantage of greater scope in thesense that a large volume of information (geographically scattered) can be controlled from a huge population. Surveys research, no doubt is more expensive, but the amount and quality of information that is collected makes, such investigation very economical. This information is also accurate, of course with in the range of sampling errors because trained and technically knowledgeable personnel are employed for the job.
- 5. Surveys research technique can save time and money without sacrificing efficiency, accuracy, and information adequacy in the research process.
- 6. Survey research has a unique advantage among social scientific methods: it is often possible to check the validity of survey data. Some of the respondents can be interviewed again, and the results of both interviewers checked against each other.
- Moreover, as a social survey is conducted by a large number of people, the chances of subjectivity are also lessened,

### **1.9.2 Limitations**

This research, however, suffers from some limitations which could be listed as follows:-

- 1. It is charged that surveys information touches only the surface of the research field and does not make a deeper thrust into it.
- 2. It is also charged with demanding of more time, effort and money. In an extensive survey, it may be months before a single hypothesis can be tested. Sampling and the development of good schedules are the major operations. Interviews require skill, time and money. Surveys on a smaller scale can avoid these problems to some extent, even though it is generally true that survey research demands large investments of time, energy, and money. (When compared to the census, however, surveys are relatively inexpensive).
- 3. Survey on a larger scale requires trained investigators and field-workers and when large numbers of people are sent to the field, there can be no uniformity in data collection. Everyone engaged in the collection of data may give his own interpretation to the terms used in the data collecting device, and where there is no



uniformity; the results are bound to variant. Moreover, everyone engaged in data collection may lend his own bias in the study. It becomes very difficult to find out the extent of bias, and great efforts are needed to minimize the bias so that its effect on net results becomes negligible.

- 4. In survey researches to have a dependable and reliable data two conditions have to be met: (i) trained investigators with a sense of responsibility, integrity and dedication to duty must be engaged; and(ii) the respondents must be cooperative. But both these pre-requisites are difficult to attain.
- 5. Sometimes, if sample information has not been collected verycarefully, the magnitude of sampling error may be too large to render the sample results reasonably accurate.
- 6. Since the sample research is based on the respondent's interviews, the problems of personal inhibitions, indifference, and unawareness of the nature and purpose of the investigation readers survey information valid or at least imprecise.
- 7. A potential rather than an actual weakness of this method is that the survey interview can temporarily lift the respondent out of his own social context, which may make the results of the survey invalid. The interview is a special event in the ordinary life of the respondent. This apartness may affect the respondent so he talks to, and interacts with, the interviewer in an unnatural manner. He is not himself to speak. It is possible for interviewers to limit the effects of lifting respondents out of his social context by skilled handling, especially by one's manner and carefully phrasing and asking of questions.
- 8. Survey is either to generalize or to localize. If survey is conducted of a local area only, then, the results would be applicable to that area only and cannot be generalized. If the survey is spread to a vast area, then the results are too general to be useful. Thus in both cases, the survey has its own limitations.
- 9. Survey research also requires a good depth of research knowledge and sophistication. The competent survey investigator must know sampling, question and schedule construction, interviewing, the analysis of data, and other technical aspects of the survey.



#### Conclusion

Despite the weakness mentioned above, the survey is a significant and widely used type of empirical research. Surveys research has been used extensively in the social and behavioral sciences. Many studies in librarianship have also relied upon the survey approach. These surveys have followed scholars to obtain current data about the attitudes and opinions of librarians, the utilization of library services and collections, the role of librarians in all types of libraries, and many other kinds of information relating to various facets of the profession.

#### **IN-TEXT QUESTIONS**

- 1. Historical research is concerned with \_\_\_\_\_\_and analysis of past events mainly to gain a better understanding of the present.
- 2. A good historical research involves a thorough study of all the available sources by the researcher, culminating in new insights and conclusions. True/False
- 3. \_\_\_\_\_are the original documents or remains, which consists of first-hand information containing data provided by actual witnesses to the incident being studied.
- 4. \_\_\_\_\_\_is a process used to judge the value of a document's contents.
- 5. \_\_\_\_\_aims to evaluate certain aspect of a research situation on the basis of criteria laid for the purpose.

### 1.10 EXPERIMENTAL RESEARCH METHOD

#### **1.10.1 Basic Understanding of Experimental Research**

The experimental approach is the most sophisticated, exacting and powerful method for discovering and developing an organized body of knowledge. An experiment usually involves making an event occurs, under known conditions. If we do something new and different, or carry out some changes in the present conditions, then we are performing an



experiment. Such an approach is called an experimental approach because we are trying to establish an experimental (or trial) basis for a new situation.

The experimental approach is oriented to the future because or researcher is seeking to establish a research situation (new teaching programme, new curriculum, news issues method on) that never existed and does not exist now. He must create the situation or conditions so that he can study it.

In this kind of research, elements are manipulated, and the effects observed can be controlled. Experimenters manipulate certain stimuli, treatments or environmental conditions and observe how conditions or behavior of the object is offered or changed. Their manipulation is deliberate and systematic.

#### An experiment is designed to :

- 1) Test hypothesis: After experiments define a problem, they propose a tentative answer, or hypothesis. They test the hypothesis and confirm it in light of the observed controlled variable relationship. It is important to note that the confirmation or rejection of the hypothesis is stated in terms of probability rather than certainity.
- 2) Test theories.
- 3) Test principles
- 4) Identify causal relationships between variables.
- 5) Study operation of variables,  $\neg$
- 6) Determine a solution to the problem.
- 7) Establish some kind of truth.
- 8) Establish an effect.

### **1.10.2. Definitions of Experimental Research**

- 1. In experimentation: The investigator controls (manipulates or changes). Certain independent variables and observes the changes which take place in the form of dependent variables.
- 2. An experiment is proof of a hypothesis that seeks to look up two factors into a causal relationship through the study of contrasting situations which have been controlled on all factors except the one of the interest, the latter being either the hypothetical cause or the hypothetical effect (E. Greenwood).



- 3. Experimental research is in which at least one independent variable is manipulated, other relevant variables are controlled, and the effect on one or more dependent variables is observed. This method is considered the best method for testing casual relationships.
- 4. The essence of all these definitions is that experimentation is regarded as observation and an organisation of data. Experimental studies are concerned with testing the casual hypothesis. This method helps the experiments to test the reality of the problem under controlled conditions or variables.

#### 1.10.3 Areas of Application

Experimentation is an important approach in most branches of science but at the same time it is to be kept in view that it is not appropriate for certain types of research or fields of research such it is not used in the field of descriptive biology, observational ecology, clinical research in medicine etc. Because in this kinds of fields, hypotheses are tested with data collected from the phenomena occurring naturally. However, in experimental approach, data is collected from the phenomena that is made to occur under experimental conditions.

### In Context of Library and Information Science:

Whenever a library does something new or different, it is creating a situation or conditions for the conduct of an experiment therefore it would then that experimental approach has tremendous scope in LIS. It can be used on LIS for the following.

- (a) To identify causal relationships between variables.
- (b) To test hypothesis (e.g., installation of adequate guides in a stack hall in a college library will decrease the number of queries regarding the location of documents on the shelf).

(c) To test Theory

(d) To test Principles.

(e) To test new techniques for acquiring, classifying, storing and retrieving of documents/information.



- (f) To test new library and information service.
- (g) To identify a previously unmated or ill-defined library and information phenomenon. One can after identify this with experimental approach.
- (h) To explore conditions under which a library and information phenomenon occurs.
- (i) To satisfy the curiosity of researches for a library and information phenomenon. ofDell
- (j) To test a new LIS education programme.
- (k) To test a new LIS curriculum.
- (l) To test a new method for organizing classes.

Though, experimental research can be used in LIS for the above mentioned purpose but in practice, the use of experimental method in LIS is much more complicated. In LIS, it is difficult to devise and conduct an experiment due to the reason that the situation keeps on changing. In the library, study of human behavior i.e. user and staff is an area of our main concern but human behavior is not only unpredictable but also uncontrollable.

There are other practical difficulties like to random sampling, losses of cases and shrinkage in numbers in each group (i.e. controlled group and experimental group) during the period of observation, and limitations connected with applications of probability tests as a means of estimating the significance of the research. Due to these difficulties, this method is least used in LIS.

## 1.11 TYPES OF EXPERIMENTAL RESEARCH

# **1.11.1 Types of Experiments**

E. Greenwood, in his work research method in behavioral sciences projects five types of experiments based on the types of setting, maturity and extent of control exercised, and the techniques adopted for manipulating the variables. These five types of experiments are:

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(1) **Trial and Error Experiment:** In this method, the experimenter does not pre-plan his study; it is likely to be modified in light of experiences gained. This method lacks scientific methodology and then is much probability of labor and time going to waste.

(2) Controlled Observational Study: In this method, a stimulus is provided to the subject, and charges are observed to determine the causal effect of the stimulus. This observation of the phenomenon under controlled conditions takes this method never to laboratory-type experiment.

(3) Natural experiment: It is also called field experiment because the experimenter conducts his experiment in a natural setting. But it is a different form of field study or field observation because the variables are manipulated. In contrast, in the case of field study, the researcher simply observes the phenomena silently without manipulation.

(4) **Ex-post Facto techniques:** This technique also called Field study which is helpful in studying the varying influence of his identical factors. This technique makes it from cause to effect and from present to future, but it becomes difficult to locate the subjects of study after sufficient time.

(5) Laboratory Experiment: According to Neon Festinger, a Laboratory experiment is "one in which the investigator creates a situation with the exact conditions he wants to have and in which he controls some and manipulates other variables." The experimenter operates under the basic assumption that the research situation he wishes to evaluate has never existed and does not exist. He, therefore, must create it to be able to study it.

The laboratory experiment is different from field experiment in that the latter is studied in the natural setting with control over independent variables. In contrast, in the former the setting is artificially created. For instance, if an experimenter does an experiment with the existing classes in the school, it would be a field experiment. However, if he develops a classroom and experiments upon it, it will be a laboratory experiment. In short, in a laboratory experiment, the phenomenon is artificially created and subjected to greater control and manipulation Control in the essential ingredients of the experimental method. The main purpose of an experiment is to arrange a situation in which the effect of variables can be measured.

## 1.11.2 Experimental Design

An experiment design is to the researcher what a blueprint is to an architect. It enables him to test the hypothesis by reaching valid conclusions about the relationship between independent variables and dependent variables. Selection of a peculiar design is based upon the purpose of the experiment, the type of variables to be manipulated, and the conditions of limiting factors under which it is conducted. The design deals with such practical problems as how subjects are to be assigned to experimental and control groups, the way variables, are to be manipulated and controlled, the way extraneous variables are to be controlled, show



observations are to be made, and the type of statistical analysis is to be employed in interpreting data relationships.

There are various types of experimental designs which are as follows:

- (1) True experimental designs
  - 1. The pre-test post-test control group design. university of Delhi
  - 2. The Solomon Four Group design.
  - 3. The post-test only control group design.
  - 4. Factorial designs.
- (2) Pre-experimental design
  - 1. The one-Short case study.
  - 2. The one group pretest posttest design
  - 3. The static group comparison.
- (3) Quasi Experimental design
  - 1. The time series design.
  - 2. The equivalent time samples design,
  - 3. The pretest-posttest non-equivalent control group design.
  - 4. The multiple time series design.
- (4) Ex-Post Facto Design

### **1.11.3 Classical Experimental Design**

The way in which the experiment is performed or conducted is called classical experimental design. In this design there are two groups which are exposed to identical conditions. One group is called the experimental group, and the other is called the control group. The experimental group is subject to experiment, it is the group that receives the treatment, and the comparison group or control group receives no treatment. So, in other words, the experimental group is exposed to the influence of the factor under consideration, the control group is not. The control here means that extra influences are prevented or checked to the extent possible. The researchers then, makes observations to determine what differences appear or what charges or modification occurs in the experimental groups contrasted with the control group. The experiment is carried out with the help of some predetermined methods to observe the influence of independent variables on the experimental group and the results of the observation and the measurement of the two groups. The causative factors in the



experimental group are recognized and accepted as the results of the variables responsible for the changes.

The steps involved are as follows:

- (1) Selection of Samples: The first step is the select sample or subject which would be appropriate to the type of research. Subject here refers to human beings respondents to the research. The researcher can select subject/sample according to the model he wants to develop or on the population he want to work with.
- (2) Give an explanation to the sample: The things need to be explained to the samples.
  - (i) Why researcher is doing this research?
  - (ii) Procedural part of the research.
- (3) Randomization of subject : Randomization means randomly dividing subjects into experimental and control groups. In random procedures, every member of a population has an equal chance of being selected. It is a scientific method of eliminating systematic bias. The principle is based upon the assumption that through random assignments, differences between groups research only form the operation of probability or chance. These differences are known as sampling error or error variance and their magnitude can be established by the researcher.
- (4) Ensuring simplest objects that they should be exposed to equivalent conditions. In such type of experiment, both the groups should be equaled as nearly as possible in order to control the effect of extraneous variables that might otherwise interfere in the test. So the control group and experimental group should be kept equivalent, they should be exposed to similar kinds of situations.
- (5) Protesting: Pretesting is done after a similar kind of exposure is given to the groups. At this stage, subject of the both group are pre-tested and the researcher notes down their percentage and this could be regarded as baseline.
- (6) Induction of treatment: Now, at this stage, treatment is given to the experimental group and not to the control group.
- (7) Post-testing: At this stage, the researcher measures the effect of treatment on the experimental group and not the percentage of change.
- (8) Making a comparison: The researcher then compared the baseline recorded at the pretesting with the result researcher obtained after post-testing. He can proceed with the experiment if positive research results are obtained. Thus, the difference that the researcher obtained is regarded as the result of experimental research.

### 1.11.4 Advantages of Experimental Research



- (1) This approach is more rigorous. It has the advantage of scientific and mathematical logic in it as the entire piece of research work is based on a well-founded model.
- (2) It offers formal procedures for holding the effect of a variable and observing the effect over a span of time.
- (3) It permits the determination of 'Cause and effect' relationship more precisely and compared to other methods.
- (4) It is the best method for testing a hypothesis. Testing of a hypothesis requires a study of relationship under various conditions, which is possible only under this method.
- (5) This method can create the condition necessary for observation rather than searching in a natural setting.
- (6) Researcher has the liberty to work in an area where more and more controls can be applied.
- (7) Researcher also has the opportunity to vary the treatment systematically to arrive at precise findings.

Experimental methods can be used to examine the questions such as the effect of certain types of resources on the success of reference transactions, the effect of changes in facilities on user behavior, and user's reactions to specific characteristics of reference staff.

### 1.11.5 Limitations/Criticism

The method of experimental research is not free from limitations. These may be mentioned as follows:

- (1) Experimental studies have been criticized for being articulated and not reflecting real life situations, affecting our naturalness.
- (2) Experimental biomass unintentionally influence of researcher's behavior on the result.
- (3) Some independent variables are not available to manipulation like the study of the effect of damage and pilferage in library collection does not allow a researcher to damage more books. So these kind of independent variables cannot be manipulated.
- (4) There are many difficulties connected with the selection of setting, getting a representative sample, in eliciting cooperation from the respondents and controlling the variables created by complexity of social phenomena its dynamic nature and independence of human behavior.
- (5) The unit of study in this method is so short and the approach is so segmented that the chances of its application are relatively remote. The degree of manipulation of independent variable pre-supposes that the unit of study must be small and the experiment must be confined to a short period. In those cases where the time span is



long, cases may be lost through moving or at least modified. The more highly developed sciences are not time-bound. Difficulty in practical application is also caused by the segmented approach of this method. Human behavior is not governed by many social causes.

- (6) There are also practical difficulties concerning random sampling, loss of cases and shrinkage in numbers in each group during the period of observation and limitations connected with application of probability tools as a means of estimating the significance of the result.
- (7) This approach is also weak in dealing with historical experiences because in experimental approach research, establish a research situation which never existed and does not exist now, where as in case of historical experiences gone cannot lead them happen again in lab condition.

#### **1.11.6** Difference between Experimental approach and other approaches

Experimental approach differs from other research approaches blog in an experiment, the observed phenomenon is controlled to varying elegance by the experimenter. Most of the experimenter are carried out under conditions that are known. An experimenter attempts to eliminate as many intermixing variables as could be possible.

Unlike other approaches, the experimental approach can be used to study causal relationships. Above all, an experimental approach is generally considered the most rigorous (strict, severe, hard) of all the three research approaches.

#### Conclusion

In conclusion, it could be said that, in spite of various limitations, this approach/research is regarded as the most useful and powerful one. But in context of LIS, through review of LIS literature, it was revealed that this approach is the least used one. It is impossible to have experiments in LIS in the sense that physical sciences use the term. In LIS studies, user is the crucial factor. In dealing with complex human beings, it is unlikely that all variables can be successfully controlled, leading to less precise results. We may take on the example of library catalog by reference staff: use is going to be affected by variables such as competence is using the catalog, enthusiasm of the staff member, etc.

So based on above explanation, it could be said that experimental research is the most rigorous of all research methods, but it is the least used in LIS.

## 1.12 ELEMENTS INVOLVED IN EXPERIMENTAL RESEARCH

#### Causality

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In simple terms causality suggests that a single event (the cause) always leads to another single event (the effect). In social sciences, normally there are a variety of determining factors, which increase the probability of a certain event occurring, rather than on a single factor.

### The Conditions For Causality

In an attempt to confirm causality in a relationship, one must consider the conditions or factors that may exist for casuality.

For example, if a library catalogue were a necessary condition for the effective use of a large library, than the latter would never occur unless library catalogue had been made available (of ir library instructions were a necessary condition of effective use of library, then the latter would never occur unless library instruction had been provided.

#### Variables/Controlling the variables

Variables are the conditions or characteristics that the experimenter manipulates, controls, or observes. In all research approaches, one is required to measure variables, but in experimental research, it is also necessary to control and manipulate certain variables. Also, there should be variable variation in different conditions, and should have at least two values; otherwise, they can not be considered variables.

**Independent Variables:** It is the variable that the researcher manipulates, controls, or observes in his or her attempt to ascertain their relationship to observed phenomena.

**Dependent Variable:** It may be defined as the condition or characteristics that appear, disappear, or change as the experimenter introduces or removes changes independent variables, so it is "caused" or at least affected by the independent variable.

In case, the subjects going into the experiment are not completely equivalent, then extraneous variables may be controlled statistically at the data analysis stage. This technique is considered less reliable than the other because control mechanisms are carried out ex-post facto (i.e. after the experiment has been completed).

Using, random assignment or randomization technique (not to be confused with random sampling or selection) one can assume that the groups are equivalent only within a certain probability level. However, equaling of experimental and comparison groups is essential for making causal references about the effects of the experimental treatment. It improves the external validity, i.e., generalizability, of the experiment and its internal validity, as the dependability of the results. There are certain other methods, such as manipulation, observation and replication for controlling variables. Variables that are not of direct interest to the research that are not of direct interest to researcher may be controlled by eliminating them altogether. But in case, if a researcher finds that in an experiment, extraneous variables



are insufficiently controlled to true as a valid test of the independent variable, then the experiment must be abandoned.

## 1.13 STEPS IN EXPERIMENTAL RESEARCH

The following are the major steps involved in Experimental Approach:

- (1) Identifying of the problem area: The research problem must be stated in clear, precise and conceptual terms.
- (2) Review of related literature: The researcher must review the related literature available.
- (3) Formulation of the Research problem
- (4) Determination of whether or not the experimental approach is appropriate for the solution of the problems.
- (5) Specification of variables:
  - (a) Independent variables along with levels,
  - (b) The range of dependable variables, and
  - (c) potential intervening variables.

One must include thus dependent variables, which will help in achieving reasonable test of Independent variables. At this step, we must find out whether or not measures of dependent variables are readily available. In case, these are not available then these would have to be developed.

- (6) Formulation of Research hypotheses: Research hypothesis serves as a light regarding the data gathering plan design. These also enable a researcher to determine the usefulness of such a plan.
- (7) Design of the experiment to test the hypotheses:
  - The design must adequately implement the necessary conditions to control intervening variables.
  - it should aim at control of bias.
  - It is provided for testing of hypotheses.
  - Required to establish levels of IV (s).
  - it should provide for the collection of data as dependent variables.

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- It should be such that it is possible to reproduce the experiment.
- (8) Limitations of the potential conclusions and underlying assumptions in the design: Limitations are with regard to lack of control of intervening variables, the existence of certain biases, and non-implementation of certain aspects of independent variables.
- (9) Estimate excess potential of proposed experiments success potential is estimated in terms of goals and needs of research; validity of the test of IV(1) with reasonable control of intervening variables.
- (10) Conduct of the experiment : Once, the investigator feels satisfied about the success potential, then he takes steps to conduct the experiment. It involves the collection of data utilizing predetermined measures; the introduction of experimental and control conditions. While the experiment is going on, a periodic verification is done to determine whether or not the integrity of the experiment is being maintained. After post-test measures have been implemented, the experiment comes to an end.
- (11) Analysis of Data: To test the hypothesis
- (12) Interpretation of results
- (13) Writing of a report which contains the following:
  - ➢ Title page
  - Acknowledgement
  - > Table of contents
  - ➢ List of tables
  - List of Figures
  - Introduction : (i) Statement of responsibility, (ii) Hypothesis to be tested (iii) Significance of the problem (iv) Objectives of the study, v) Assumptions and limitations (vi) Definitions of important terms.
  - Review of related literature
  - > Design of the study
  - Findings of the experiment
  - Smarmy and conclusions
  - References
  - Bibliography
  - > Appendices

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### **IN-TEXT QUESTIONS**

- 6. In\_\_\_\_\_, a stimulus is provided to the subject and charges are observed to find out the causal effect of the stimulus.
- 7. \_\_\_\_\_are the conditions or characteristics that the experimental manipulates, controls, or observes.
- 8. \_\_\_\_\_have been criticized for being article and of not reflecting real life situations; so it affects our naturalness.

## 1.14 SUMMARY

An awareness of the research methods and design also proves helpful for those preparing research proposals in order to obtain financial support for their research activities. In addition, it has been found that the study of various research methods can improve one's ability to think critically and analytically. Once it has been decided that the research will be primarily basic or applied, the researcher must determine whether it will be quantitative or qualitative in nature.

## 1.15 GLOSSARY

**Casualty:** a person or thing badly affected by an event or situation.

Criticism: the analysis and judgement of the merits and faults of a literary or artistic work.

**Evidence:** the available body of facts or information indicating whether a belief or proposition is true or valid.

**Experiment:** a scientific procedure is undertaken to make a discovery, test a hypothesis, or demonstrate a known fact.

**History:** all the events of the past.

**Primary Source:** A primary source is an original object or document - the raw material or first-hand information, source material closest to what is being studied.

**Secondary Source:** a secondary source of information is one that was created later by someone who did not experience first-hand or participate in the events or conditions you're

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researching. For a historical research project, secondary sources are generally scholarly books and articles.

Survey: a study of the opinions, behavior, etc. of a group of people.

Variable: not staying the same; often changing.

# 1.16 ANSWERS TO IN-TEXT QUESTIONS

1. Critical description5. An Evaluative survey2. True6. Controlled Observational Study3. Primary sources7. Variables4. Internal Criticism8. Experimental Studies

## 1.17 SELF-ASSESSMENT QUESTIONS

- 1. Explain Historical Research Method in detail. What are the criteria for evaluating the Historical Sources? Give a brief description.
- 2. What are the basic steps involved in Historical Research? Write a brief note.
- 3. What do you understand by Survey Research Methods? Explain the various types of Survey Methods used for conducting the research.
- 4. What are the steps involved in Survey Research Methods? What are the major Advantages and Limitations of this kind of method?
- 5. What is Experimental Research Method? Elaborate by giving suitable examples.
- 6. What are the basic steps involved in Experimental Research Methods? List and briefly explain the types of Experimental Designs.
- 7. What are the essential steps involved in Experimental Research Methods?
- 8. Differentiate between Historical, Survey, and Experimental Research by giving suitable examples.
- 9. List the basic steps involved in the Historical, Survey and Experimental Research Methods.
- 10. Write a brief note on External and Internal Criticism in Historical Research.

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M-105- RESEARCH METHODOLOGY

## **UNIT II: Types of Research Methods**

## **LESSON 2**

### **Case Study**

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## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Case Study
  - 1.3.1 Conceptual Meaning
  - 1.3.2 Types of Case Studies
  - 1.3.3 Sources of Data
- 1.4 Objectives of Case Study
- 1.5 Limitations of Case Study
- 1.6 Summary
- 1.5 Glossary
- 1.6 Answers to In-text Questions
- 1.7 Self-Assessment Questions
- 1.8 References
- 1.9 Suggested Readings

## 1.1 LEARNING OBJECTIVES

In this lesson, the students will study the concept of Case study research method. After reading this lesson, the students will have in-depth knowledge of the case studies, and they will be easily able to differentiate this research method from other qualitative and quantitative research methods. The students will also study the application and limitations of Case studies in this lesson.

# **1.2 INTRODUCTION**

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# M-105- RESEARCH METHODOLOGY



The case study method is a form of qualitative analysis which involves a careful and complete observation or investigation of an individual, a situation or an institution etc. It is a method of in-depth study of something rather than an overview or superficial study. In the Case study method, a researcher can take one single element or multiple elements for the research study, and even a situation can be taken for comprehensive study purposes.

In this method, more emphasis is on the exhaustive study or analysis of a limited number of events or conditions and the study of their inter-relations. The case study deals with the processes, activities, or situations and their interrelationship. Therefore, the case study is an intensive investigation of the particular topic or subject under consideration. In this method, the behavior pattern of the subject taken for research is studied directly and avoids indirect and abstract approaches.

## **1.3 CASE STUDY**

### 1.3.1 Conceptual Meaning and Definitions

The case study is a specific field or qualitative research method and thus is an investigation "of phenomena as they occur without any significant intervention of the investigators". It seems to be appropriate for investigating phenomena when:

1. A large variety of factors and relationships are included,

2. No basic laws exist to determine which factors and relationships are essential, and

3. When the factors and relationships can be directly observed.

**Yin defines** a case study as an empirical inquiry that investigates a contemporary phenomenon in the context of a real-life situation when the boundaries between phenomenon and context are not apparent; and which involves using multiple sources of evidence.

**Leedy and Ormrod define** case study research as " a type of qualitative research in which in-depth data are gathered relative to a single individual, program, or event to learn more about an unknown or poorly understood situation".

**Harrison** also recommends the case study method for investigating organizational structure and functions or performance.

It is the study of a particular event, are institution in depth, comprehensive study. It helps to understand the whole life. Cycle of focus for which it is done. Anthropologists first carried it. Therefore, Anthropologists and biologists are examples who carry general case studies. It is a method to know in detail everything about something.

The case study is often useful as an exploratory technique. It deals with the peculiarity of the particular case. It gives insight of typical and particular cases. It is an important method of social science research.


A case study design usually involves qualitative research methods, but it also uses quantitative methods. Case studies are good for describing, comparing, evaluating, and understanding different aspects of a research problem.

#### Case Study Method in Library Science

The case study method can be seen as useful in Library Science Research from two aspects:

1. To establish a relationship between investigation and practical aspects.

2. To act as a bridge so that persons in the professional practice sphere may come closer to research results in a certain way that these can prove useful for them.

The usefulness of the 'Case Study' has been found in the following three areas of Library and Information Science:

- i. Digital Libraries: The case study method is a fine choice to establish a relationship between research and the empirical component. To begin the study of different situations, there is a need to confront the theories which have emerged from the research on digital libraries.
- **ii. Information Policies:** A case study has been employed as an adequate method for performing micro-level research studies on information policies in specific countries that represent social, cultural, and psychological reality for establishing and implementing different types of information policies.
- **iii. Bibliographic Organization:** Case studies performed in the area of bibliographic organization during the first decade of the 20th century are descriptive, interpret patterns, and constitute studies aimed at interpretational schemes development. The case study method is required for generalization and theorization in this area, so achievements may go beyond simple description. E.g. Case studies have proved beneficial for planning the development of several information systems, such as the library catalog (Vargas et al., 2016).

Busha and Harter highlight that the case study is most appropriate for the extensive data gathering and collection about a single research element which allows focused attention on a single event and the utilization of various data collection techniques. Various data collection tools and techniques like questionnaires, schedule and interviews, including observation methods are employed to collect the varied data in case studies. Case studies have often proven useful in studying the institution like Academic library, to assess the contributions of the employees in the growth and development of the organization or library.

#### When Case Study can be done?



A case study is a proper blueprint of research study when you want to gain actual insight and real understanding and a comprehensive knowledge about a specific real-life situation. Case studies can be used in a thesis or dissertation work. Case studies keep the research focused and manageable when there is a time constraint for a researcher to collect the resources for conducting a large-scale research. One can use just one complex case studies to compare and illuminate different aspects of his/her research problem.

### 1.3.2 Types of Case Studies

There are four types of case studies which are commonly known in the research literature i.e.

- **i. Illustrative case studies:** These are descriptive studies. They utilize one or two events to show actually to represent the situation. It serves primarily to uncover the unfamiliar to become easily amicable and provides researchers an introductory language about the topic that is under consideration for research study.
- **ii. Exploratory case studies:** Exploratory case studies are used to identify research questions and methods for a large scale study. The main purpose of an exploratory case study is to help identify real life situations for the further research.
- **iii.** Cumulative case studies: These studies complete the information located at some places and collected at different times. The collection of past studies allows the researcher to generalize past events without putting additional cost or time on repetitive studies.
- **iv.** Critical instance case studies: Lastly, critical instance case studies are used to determine the cause and consequence of a particular situation.

Example of Case Study: Hypothesis about the particular specific, small unit.

#### **1.3.3 Sources of Data**

The Case studies are not limited to any single source of data rather they employ several sources as per the need of the study. The most commonly used sources of information for the case study method include the following:

- i. Observations
- ii. Life histories
- iii. Personal records/Diaries
- iv. Personal Interviews
- v. Personal documents
- vi. Personal letters
- vii. Written Confessions
- viii. Personal Biographies

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# **1.4 OBJECTIVES OF CASE STUDY**

#### The objectives of Case Study are:

- Intensive, in-depth study which provides clues and ideas for further research which are ignored by another method.
- It examines complex factors in a given situation to identify causable factors. It is a serious study involving historical research methods, questionnaires, checklists etc.
- It is not a valuable method for diagnostic, therapeutic and administrative purposes.
- It derives ideals leading to conclusions/hypotheses to be tested.
- It covers a single gray particular activity.
- Finding of survey can't be generalized and case study.
- General survey: Testing hypothesis about large local aggregates.

# 1.5 LIMITATIONS OF CASE STUDY

There are certain limitations of Case Study Method which are as follows:

- Generalization can't be done.
- Usually much more time-consuming and costly in some cases.
- Case study alone is inadequate for the analysis of a micro-problem and other research methods are also required for detailed (information) study.
- Collected subjective data is not helpful for quantitative verification of the data.
- Danger of investigators' biasness due to spending more time with person Institution, community etc. leading to error of perception, judgement throughout judgement.



#### **IN-TEXT QUESTIONS**

- 1. Case Study is a method of \_\_\_\_\_\_ of something rather than overview or superficial study.
- 2. Exploratory case studies are mostly being used to identify questions and selected types of measurement before the investigation begins. True/False
- 3. A case study is a proper \_\_\_\_\_\_when you want to gain actual insight and real understanding and comprehensive knowledge about a specific real-life situation.
- 4. \_\_\_\_\_\_serve to complete the information located at some places and collected at different times.
- 5. \_\_\_\_\_case studies intended to examine one or more sites for the purpose of assessing a particular situation. This method can be useful for answering cause-and-effect questions.
- 6. Case study alone is not adequate for analysis is of a \_\_\_\_\_and other research methods are also required for detailed (information) study.

### 1.6 SUMMARY

In contrast to most survey research, case studies involve intensive analyses of a small number of subjects rather than gathering data from a large sample or population. Several data collection techniques are usually employed in case studies. For example, an investigation of staff burnout in a reference department might utilize questionnaires, interviews, observation, and the analysis of the documents. Most researchers consider the case studies to be relatively low in internal and external validity, but it certainly has the potential to be a valuable research tool. Also, it is found that the detailed observations that case studies provide are instrumental in documenting phenomena occurring over a period of time or whose implications are complex.

# 1.7 GLOSSARY

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Biasness: an inclination of temperament or outlook.

**Case Study:** a process or record of research into the development of a particular person, group, or situation over a period of time.

**Empirical:** based on, concerned with, or verifiable by observation or experience rather than theory or pure logic.

Exploratory: done in order to discover more about something.

Generalization: a general statement or concept obtained by inference from specific cases.

**Qualitative Research:** Qualitative research is a process of naturalistic inquiry that seeks an in-depth understanding of social phenomena within their natural setting. It focuses on the "why" rather than the "what" of social phenomena and relies on the direct experiences of human beings as meaning-making agents in their every day lives.

# **1.8 ANSWERS TO IN-TEXT QUESTIONS**

- 1. In-depth study
- 2. True
- 3. Blue print of research study

4. Cumulative Case Studies

5. Critical Instance

6. Micro-problem

### **1.9 SELF-ASSESSMENT QUESTIONS**

- 1. What is Case Study? Give some standard definitions along with suitable examples.
- 2. What are the objectives of a Case Study Method? Write a brief note.
- 3. What are the limitations of 'Case Study Method'? Explain briefly.

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M-105- RESEARCH METHODOLOGY

# **UNIT II: Types of Research Methods**

# **LESSON 3**

# Scientific Research and Statistical Research

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Scientific Method
  - 1.3.1 Conceptual Meaning and Definitions
  - 1.3.2 Spiral of Scientific Method
- 1.4 Steps in Scientific Method
- 1.5 Characteristics of Scientific Method
- 1.6 Statistical Research
  - 1.6.1 Concept of Statistics
  - 1.6.2 Purpose of Statistical Analysis
- 1.7 Steps involved in Statistical Analysis
- 1.8 Summary
- 1.9 Glossary
- 1.10 Answers to In-text Questions
- 1.11 Self-Assessment Questions
- 1.12 References
- 1.13 Suggested Readings

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# **1.1 LEARNING OBJECTIVES**

In this lesson, the students will study the concept of the Scientific Method of Inquiry and various Statistical Research Methods/Techniques available today for the analysis of data. This lesson will help the students to develop the necessary skills to begin and conduct the research. After reading this lesson, the students will be able to explain the important



characteristics of the scientific method of inquiry. The students will also study the important steps involved in the Statistical Analysis of the data for drawing necessary conclusions.

### **1.2 INTRODUCTION**

All the methods used in modern research are based upon a general approach to human problems commonly referred to as the scientific method or scientific enquiry. This may be considered as a particular system of thinking. Inductive reasoning contributed to the development of what is known as the scientific method or the scientific method of inquiry (SMI). Thisdiscovering discovery of knowledge has long beeidered to be the "most valid method for problem solving and the resolution of unanswered questions".

### **1.3 SCIENTIFIC METHOD**

#### **1.3.1** Conceptual Meaning and Definitions

According to John Dewey, Scientific Method is an "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of grounds that support it and the further conclusion to which it ends. Scientific method in its simplest form "Consisting of working inductively from experience to hypothesis, which are elaborated deductively for implications based on which they can be tested.

'Scientific Method' refers to methods and procedures that a scientist would accept as adequate, provided that the same results could always be obtained under like conditions, the explanation being based on appropriate observations. This method is often used in everyday life for solving day-to-day problems.

The scientific method may be described as a rigorously organized, systematic and meticulous method of research based on observation and experimentation, which accepts only such conclusions as are provable by all available facts.

Leedy describes the scientific method of inquiry as a means by which insight into an undiscovered truth is sought by:

- a) Identifying the problem that will provide the goal of the research,
- b) Gathering the data needed to resolve the problem,
- c) Developing a Tentative Hypothesis, and
- d) Empirically testing the hypothesis by analyzing the data.

Depending upon the research phase, Babbie summarizes the basic steps of the scientific method as:

- a) Theory Construction,
- b) Derivation of Theoretical Hypotheses,

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- c) Operationalization of concepts, and
- d) Testing of Hypotheses

### 1.3.2 Spiral of Scientific Method

A never-ending spiral of scientific method characterizes scientific method. Each of the cycles moves amidst the spiral assign believe. Experimentation and Observation are performed with the help of sensory experience. This leads to the facts of experience and facts are cumulated.

### **1.4 STEPS IN SCIENTIFIC METHOD**

Scientific Research requires a logical approach consisting of various steps:

- Formulation of specific research problem
- Thorough critical review of relevant literacy.
- Collection of previously known facts about the research problem.
- Formulation of research hypotheses or exploratory questions.
- Designing of experiment or other studies to test hypothesis or find answers to questions.
- Conduct of experiments or studies to collect data.
- Analysis and interpretation of collected data, to arrive at relevant conclusions
- Writing of the research report.

# **1.5 CHARACTERISTICS OF SCIENTIFIC METHOD**

Scientific method is characterized by the use of induction. It involves the application of direct observation of the phenomenon and reaching a concussion by means of evidence obtained through observing many individual cases. Thus, induction is concerned with the formulation of a general principle from a number of special individual cases. The scientific method of inquiry have the following important characteristics:

1. Induction–Deduction: Charles Darwin developed the modern combination of inductive and deductive methods. An integration of relevant aspects of both methods, serve as a useful method for the acquisition of reliable and significant knowledge. In this method, one starts with universal law and the same is applied to the interpretation of a particular phenomenon. We proceed from generalization to particularization. Darwin made observations in this literature. He formulated a hypothesis, and tested it



by making deductions from it. Further, he collected facts, which confined his hypothesis and thus drawing certain conclusions.

2. Measurement: Scientific method requires that data should be susceptible to measurement. Observation and recording of phenomena constitute measurement. With the help of induction (Inductive logic) stated analysis, empirical laws are deduced from vast fact of experiment.

- With the help of intuition, fundamental laws are sublimated from the vast cumulated empirical law.
- With the help of deduction, we are able to infer deduced laws (lancers principles etc. from the fundamental laws.
- Observe of the would of facts is done for confirmation of the deduced laws or for their denial.
- Reconciliation of deduced laws and the observed facts in the case of nonconformity, by the elimination of any possible flaw in the logic on the one side and the observations and experimental technique as the other.
- Preparation of new data, if a crisis is created by the unabridged gulf between deed laws of observation facts.
- Formulate new empirical law in the light of newly observed facts.
- Repetition of the above cycle.
- **3. Stages of Experimental Research:** Measurement is comparatively easier to achieve in natural science, including physical sciences than in social services and thematics. In Social Science and thematic, we use more of comparative and subjective judgments. Measurement is seldom precise in these fields.

The educational process does not produce anything which could be measured objectively. This is because educationist have not been able to measure this apart in objective terms. The problem here is to assure that measurements of input and output obtained under augmentation conditions can be compared to similar measurements obtained under control conditions without augmentation.

**4. Observation Carefully made and Record:** Systematic observation constitutes an important aspect of the application of Scientific method which involves the use of rigorous control i.e. observations are carefully made and recorded observe made are based on manipulation senses as well as through the extension of these senses using instruments of different kinds. The data obtained can the basis of observations are recorded, published and disseminated is other for critical examination and for further use.



**5. Measuring Devices (Instruments):** The devices (such as pencils, paper tests, questionnaires are rating scales) used by the library science researcher are called measuring devices of the treatment. The whole process of collecting state is called instrumentation. An instrument used by the library science researcher must draw an accurate conclusion. a Valid instrument is that measures what it is supposed to measure.

In simple words, a test is a device used to gather data. All library science researcher wants instruments that permit them to draw valid conclusions about the characteristics (ability, achievement, attitudes, and so on of the individuals they study. Some examples of data collection instruments: Schedules, questionnaires, rating scales, attitude scales, performance tests, flow charts etc.

A rating scale is a measured judgment of some sort. A tally short records the frequency of student behaviors, activities or remarks.

**6. Quantification:** The quantitative approach is undoubtedly the most dependable scientific approach. However, quantification is not equally applicable to all sciences. Here we study the quantity "How much" of any variable present, for e.g. the amount of more spent by the university library for the library automatic \. Here variable is the amount of money spent). Quantity will be how much.

7. Controlled Experiment: Pure Science uses a controlled experiment, considered the best way to perform an experiment. When a phenomena cannot be adequately observed and measured in naturalistic settings, the scientists often carry out experimentation. The experimental changes in the phenomenon are observed and recorded as various variables are manipulated or suppressed under controlled conditions. The great advantage of controlled experiment is that it makes it possible to achieve direct measure of diff aspects of needed data.

**8. Research Report:** In Scientific research, researcher results are recorded, published as a report and disseminated. The report givens complete description about research done, basic objective, research analysis, findings and conclusions so that newly acquired insights and knowledge can be communicated to other researchers for critical examination and use.

**9. Generalization:** Scientific method enables one to reach a generalization that correlates all the known facts, providing a satisfactory explanation for all relevant known data. There is lack of generalizability in the LIS field. Generally, it is possible if conclusions are universal. We are today in need of the generalized truths. Librarians have been able to achieve intrusion practical experience. Many of these experiences and have also been recorded. As a result, we possess a reasonable amount of raw data about devices (cost, character limitation).

**10. Verifiable Data:** The method adopted to collect data must be objective. This will lead to objectively verifiable truth. This requires evidence instead of testimony photographs, tape-recording and video recording can be considered as evidence. But personal obs is testimony.



**11. Reliability:** It refers to the accuracy of data in the sense of stability, repeatability or precision. It should give identical data under the same circumstances.

Universality: This means that the study should be researchable by any competent researcher. A qualified researcher should be able to conduct the study based on the same design, obtaining essentially the same results as the original researchers.

**12. Control:** In the scientific method, control is one of the most important characteristics. Control is highly applicable in experimental methods because when we try to establish causality between variables, other factors are ruled out as rival explanations. Such factors could invalidate the inference that the variables are causally related. So, control is important parameter or we can say that indicator for our research study. After applying control for the study, we control the effect of many variables that might interfere with the test of hypothesis. Control makes a rigorous approach towards our study and with the help of control we get the repeatable result.

Let's say for example; we consider the following hypothesis that high school students who study a unit of instruction in library skills in conjunction with coursework in other subjects such as physics, chemistry, math (i.e. as integrated approach) learn library skills more effectively than high school students who study an equivalent unit independently of other school subjects. So, to test this hypothesis, certain variables need to be controlled.

Such as, two groups of students should be roughly equivalent in level of motivation, intelligence, socio-economic status, age and perhaps other qualities. These variables are controlled and thus the effect should be the same for both groups.

#### For Example:

#### • Information seeking behavior of the faculty member of Delhi.

Here, Certain variables can be controlled i.e. faculty member should be from social science department only, they should be female, their age vary in between 35-40 yrs, they have at least 2-3 yrs experience etc

#### • Effect of online reference service on user ship.

So for this study we may apply specific control, that is, what kind of software used for providing reference, speed of internet access, no. of terminals, extent of information providing. We apply control to get a rigorous approach and get generalized result and we arrive to exactness.

Therefore, Control is one of the important parameters of a research study. It facilitates in isolating the critical factors and achievement of replication.

**13. Controlled Experiment:** Actually, controlled experiment is purely applicable in the field of pure sciences because science we conduct an experiment under known condition and all



kind of manipulation is done by the experimenter In a controlled experiment, we proceed very systematically and every change which are occurred during the experiment is carefully observed and systematically recorded and so that we reached out at the dependable solution.

Controlled experiment is slightly applicable in the library and information science or social sciences because both the fields dealing with human nature and human nature may affect natural and hereditary factors. But today in changing environment, when librarian wants something new or changes in an older one, he may apply the experimental approach.

#### For Example:

- If a library is going to shift into a new building then the librarian request the users to fill up the questionnaire that came into the old building. So that he come to know what kind of shortcomings were occurring in old building and with the help of questionnaire librarian come to know what sort of facilities requires in new building for the users.
- In the library, books are classified by DDC and CC, and arrange them on the selves to determine the reaction of the users.

Thus, with the help of controlled experimental, we systematically proceed towards our generalized result.

**14. Replication:** Even if the research is successful and the findings of the research confirm the hypothesis, it is often advisable to repeat the study to demonstrate the findings are not an accident or mere coincidence. If the study is repeated, especially with a different sample, a second confirmation of the findings will further support the contention that the hypothesis can not be rejected. This exact repetition of a study is called replication.

Replication is related to the criterion of universality. It means that research study is repeatable. Not only should another competent researcher be able to conduct the study and get essentially the same results, but he or she should also be able to do so repeatedly. Scientific studies are repeated numerous times before accepting the results as correct. Thus, the researcher must design his study so that it can be replicated by himself or someone else. Otherwise, the findings will not be as convincing as they would if others could check them through repetition of the study.

However, the ability to reproduce or repeat is almost impossible in Library and Information Science because we are often involved with relatively unpredictable and uncontrollable individuals. We need to apply rigorous controls for getting replication in Library and Information Science.

#### For Example:

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1. Suppose if a researcher is conducting the study "The impact of OPAC on usership" and he hypothesized that if it is introduced in libraries, then it would lead to an increase in user ship, and he confirmed this hypothesis by collecting relevant data on the basis of his observation.

The other researcher can replicate this study with a different sample. However, he should follow the same design, same methodology and same control those of the original researcher to accept his findings.

2. Suppose if researcher is conducting the study "Information seeking behavior of faculty members of Department of Political Science, University of Delhi." and he hypothesized that most of the faculty members of Department of Political Science, University of Delhi locate information by using personal searching. He confirmed this hypothesis by collecting relevant data based on his research.

The other researcher can replicate this study with a different sample (like Department of History). However, he should follow the same design, same methodology and same controls those of the original researcher to accept his findings.

Replication means that the research study is repeatable. A competent researcher other than the original researcher should be able to conduct the study, essentially obtaining the same result repeatedly. Thus, replication is related to the characteristic of universality.

**15.** Universality: Universality means that the study should be researchable by any other qualified investigator. In other words, another researcher should be able to conduct the study as designed and get essentially the similar results as the original researcher would have obtained and should be able to generalize the results to comparable solutions.

In the scientific method, we try to search for truth based on facts available, and then we try to generalize through a process of induction, deduction, and verification. The scientific method of inquiry leads to laws or principles that may be applied with confidence under similar conditions in the future. It enables one to reach at universal conclusions. But for reaching at a universal conclusion, research study should be based on the same design, follow same methodology and apply the same controls; then only another researcher will be able to obtain the same results those of the original researcher.

### For Example:-

1. In the library and information science field, we have Five Laws of Library Science given by Prof. S.R. Ranganathan. These five laws are fundamental laws; they are universal in nature and truly applicable in library and information science field.

2. Bibliometric Laws:- These are used to study and quantify the process of written communication. These are scientific laws applicable in various library and information science areas. Like, through the application of Bradford's law of scattering and citation analysis, one can identify core periodicals in different disciplines etc.



# 1.6 STATISTICAL RESEARCH

#### **1.6.1 Concept of Statistics:**

The word 'statistics' refers to method of dealing with quantitative information. The methods by which statistical data are analysed and presented are called statistical methods. Statistics is synonymous with figures. Different authors or even the same author define the statistics differently on different occasions.

Quantitative information may be found almost in all sections of the library. It is probably more commonly referred to as data in quantitative form, which is referred to as statistical data. A mere collection of numbers will not constitute statistics.

Webster defines statistics as "the classified facts representing the condition of the people in a state, especially those facts which can be stated in numbers or in tables of numbers or is any tabular or classified arrangement".

The above definition is too narrow as it restricts the scope to the importance of statistics and to facts and figures which relate to the conditions of the people in a state.

#### **1.6.2 Purpose of Statistical Analysis**

The basic purpose of statistical analysis is to summarize observations or data so that they provide answers to the hypothesis or research questions. Statistics facilitate drawing general conclusions based on specific data. Statistics are necessary for most quantitative data research studies and are particularly crucial at the sampling and analysis stages. The analysis process should be planned well in advance in order to anticipate problems that may be encountered. In fact, the analysis of a study is shaped to a considerable extent, before the data collection. The anticipation of the analysis process determines what kinds of data will be needed.

### 1.7 STEPS INVOLVED IN STATISTICAL ANALYSIS

Regardless of the techniques or tests employed, certain basic steps are common to virtually all statistical analyses.

1. The Establishment of Categories: To organize and analyze the data collected for a study, it is necessary to place them in categories. The identification or establishment of catgories should occur before the data are gathered. The data's actual categorization occurs during or after the collection process.



- 2. Coding the Data: Once the categories have been established and data "assigned" to them, it is necessary to convert the new data or responses into a numerical code for tabulation purposes. These codes are assigned to specified locations in data files, particularly if computer data analysis is planned. One of the most critical considerations in coding is reliability. The problems of reliability in coding can result from inadequacies in the data. For e.g. a poorly worded questionnaire item may not produce enough relevant information for study.
- **3.** Analyzing the Data by Descriptive and Inferential Statistics: Once the data is ready for analysis, the researcher can choose to utilize the descriptive or inferential statistics method individually or both methods per the requirement.
  - **Descriptive Statistics:** It has been found by researchers in library and information science that descriptive analysis can perform the six basic functions:
    - i. The statistical analysis can indicate how many persons, objects, scores or whatever achieved each value for every measured variable. These calculations, known as frequency distributions, include simple or absolute, cumulative, percentage and grouped distributions.
    - ii. When it is difficult to grasp the overall meaning of frequency distribution tables, pictorial representations can be used to portray various characteristics of the cases or individuals concerning the variables or variables measured. This process involves using one or more data displays, such as **bar graphs or charts, pie charts, histograms and frequency polygons.** Graphs are especially useful for displaying the findings of a research study with many cases. The design of such devices has become easier with the widespread availability and use of word processing and spreadsheet programs.
    - **iii.** Descriptive statistics can characterize what is typical in a group of cases. Such statistics referred to as measures of central tendency, commonly include the mean, the median and the mode. The mean is what is commonly called the average. It is the sum of the scores divided by the total number of cases involved. The median is the value of the middle item when the scores are arranged according to size. The mode refers to the category that occurs most frequently.
    - **iv.** Descriptive statistics can indicate how widely cases in a group vary. These statistics are known as measures of dispersion or variability. The examples include the range of scores (the highest score minus the lowest score), their mean deviation (the arithmetic mean of the absolute differences of each score from the mean), the standard deviation and the variance (the mean squared deviation).

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- v. Descriptive statistics can measure the relationship between or among the different variables in the data. These are generally referred to as correlational or associational statistics. They can allow the prediction of one variable based on another, but they cannot be used to establish casual relationships.
- vi. The sixth primary function that descriptive statistics can perform is to describe the difference between two or more groups of individuals.
- Inferential Statistics: Compared to descriptive statistics, which simply summarize and describe the data, inferential statistics can perform certain more sophisticated functions. They are most commonly used to predict or estimate population parameters or characteristics based on random sample statistics and to test hypotheses using tests of statistical significance to determine if observed differences between groups or variables are "real" or merely due to chance. In simple words, inferential statistics help the researcher to make inferences and judgments about what exists based on only partial evidence. Inferential statistics are of two basic types:
  - i. Parametric Statistics or Tests: These statistics require a normal population or distribution assumption. Parametric tests are relatively powerful and are likely to detect a difference between groups if a difference really exists. Some examples of frequently used parametric tests inclues Z-test, ANOVA (Analysis of Variance), Tukey's HSD (Honestly Significant Difference), Student's T-Test, Pearson's Product-moment correlation coefficient. and Regression etc.
  - **ii. Nonparametric Statistics or Tests:** In contrast to Parametric tests, nonparametric statistics are considered distribution-free. It means they do not require the assumption of an average population and are often used with smaller samples. As they involve weaker assumptions, they are less potent than the parametric tests and require larger samples to yield the same significance level. These tests are usually but not always used with ordinal level data and five common e.g. are: Chi-Square Test, Mann-Whitney U-Test, Wilcoxon Sign Test, Spearman Rank-order correlation and Kruskal-Wallis Test.
- **4. Selecting the Appropriate Statistical Test:** A researcher should consider the primary purpose of research in choosing statistics, wehter it is descriptive or analytical. An appropriate statistical test may be selected as per the requirement which may meet the certain essential conditions required for that test to be performed.



- **5. Testing the Hypothesis:** In using statistics to test the hypotheses, a researcher must always remember that statistical inferences are based on probability, and one can never rely on statistical evidence alone to judge whether a hypothesis is true. Such a decision must also be based on the presuppositions or conceptual basis of the research.
- 6. Computer-aided Statistical Analysis: In today's digital environment, the quantitative analysis is almost always done by computer programs using statistical softwares like SPSS, STATA and MicroCase respectively. It is an efficient technique for analyzing large amounts of data. An example of such a statistical package is BMDP (Biomedical Computer Programs). It can be used for various statistical analyses and is not limited to medical research. Another comprehensive computer system for data analysis is known as SAS or Statistical Analysis System. It tends to be used most frequently by researchers in technical fields but the system can be used for virtually all kinds of data. MINITAB is a relatively easy-to-use statistical and graphical analysis, and data management system, was developed for social science researchers. The most widely available mainframe statistical package is SPSS (Statistical Package for the Social Sciences).
- 7. Analysis of Non-Quantified Data: It is worth to be noted that not all the research data are susceptible to quantification, and such data do not lend themselves to statistical analysis. However, they may still have a significant contribution to the analysis and interpretation of the results of a study and should not be dismissed perfunctorily. Qualitative data analysis differs from quantitative data analysis, not only like the data but also the process. One of the significant objectives of qualitative data analysis is the generation of concepts. One of the critical activities of qualitative analysis is the coding of data. Coding, similar to indexing, is a critical process since it organizes the raw information that has been collected and represents the first step in the conceptualization of the data.



### **IN-TEXT QUESTIONS**

- 1. \_\_\_\_\_may be described as a rigorously organized, systematic and meticulous method of research based on observation and experimentation.
- 2. Scientific method is characterized by a never ending\_\_\_\_\_
- 3. Systematic observation constitutes an important aspect of the application of Scientific method which involves the use of \_\_\_\_\_\_.
- 4. \_\_\_\_\_refers to accuracy of data in the sense of stability, repeatability or precision.
- 5. Replication is related to the criterion of universality. It means that research study is repeatable. True/False
- 6. \_\_\_\_\_means that the study should be researchable by any other qualified investigator.
- 7. The basic purpose of \_\_\_\_\_\_\_ is to summarize observations or data in such a manner that they provide answers to the hypothesis or research questions.
- 8. Parametric tests are relatively robust and are likely to detect a difference between groups if a difference really exists. True/False

# 1.8 SUMMARY

The Landmark contribution of science to developing knowledge is the scientific method. It may be defined as a rigorously organized, systematic and meticulous method of research based on observation and experimentation which accepts only such conclusions as are provable by all available facts or evidence.

Statistical methods are generally used for descriptive purposes and for statistical inference. Descriptive statistics deal with the tabulation of data; their presentation in tabular, graphical or pictorial form and the calculation of descriptive measures. Inferential statistics are used for making inductive generalizations about populations based on sample data and for testing hypotheses. Both types of statistics permit interpreting quantitative data in such a way that the reliability of conclusions based on the data may be evaluated objectively utilizing



probability statements. The investigator must only make the final interpretation of the analysis as statistics can only facilitate the process.

# 1.9 GLOSSARY

**ANOVA:** ANOVA stands for Analysis of Variance. ANOVA tells if there are any statistical differences between the means of three or more independent groups.

**Controlled Experiment:** In a controlled experiment, all variables other than the independent variable are controlled or held constant so they do not influence the dependent variable. Controlling variables can involve: holding variables at a constant or restricted level (e.g., keeping room temperature fixed).

Generalization: a general statement or concept obtained by inference from specific cases.

**Hypothesis:** a supposition or proposed explanation made based on limited evidence as a starting point for further investigation.

Reliability: the quality of being trustworthy or of performing consistently well.

**Replication:** the action of copying or reproducing something.

**Scientific Method:** a method of procedure that has characterized natural science since the 17th century, consisting in systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses.

**Statistical Analysis:** It is the science of collecting, exploring and presenting large amounts of data to discover underlying patterns and trends.

**Statistical Methods:** Statistical methods are mathematical formulas, models, and techniques used in the statistical analysis of raw research data.

**Universality:** the quality of being involved or shared by all people or things in the world or a particular group.

# 1.10 ANSWERS TO IN-TEXT QUESTIONS

5. True
6. Universality
7. Statistical analysis
8. True

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# 1.11 SELF-ASSESSMENT QUESTIONS

- 1. What is Scientific Method of Research? Explain briefly along with definitons?
- 2. What are the basic steps involved in the Scientific Method of Research? Write a brief note.
- 3. Explain in detail the main characteristics of the scientific method of inquiry.
- 4. What is Statistics and what are the Statistical Research Techniques/Methods?
- 5. Give a detailed description of the Steps involved in Statistical Analysis.

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University



# UNIT-III

# **RESEARCH TECHNIQUES**

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Tools & Techniques for Data Collection
  - 1.3.1 Questionnaire Method
  - 1.3.2 Observation Method
  - 1.3.3 Interview Method
  - 1.3.4 Checklist
  - 1.3.5 Rating Scales
- 1.4 Summary
- 1.5 Glossary
- 1.6 Answer to In-text Questions)
- 1.7 Self-Assessment Questions
- 1.8 References
- 1.9 Suggested Readings

# **1.1 LEARNING OBJECTIVES**

On the completion of this unit, your learning outcomes will be:

- > Introduced to various types of data collection tools
- > Define and describe a questionnaire and its different types.
- > Discuss the advantages and limitations of the questionnaire
- Define the interview method and explain its types, advantages, and limitations.
- Define the observation method and discuss its types, advantages, and limitations.
- > Define rating scales and attitude scales and discuss the use and limitations.

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# **1.2 INTRODUCTION**

Once a research problem has been formulated and the research design has been planned, which was covered in the preceding chapters, the researcher must begin the work of data collecting to get relevant and adequate data.

We will talk about various methods or tools for acquiring data in this chapter. The researcher should consider the type of data, such as primary or secondary data, before choosing the techniques of data collecting for the study. The primary data will provide first-hand information, which is current data. As a result, this type of data is original. In contrast, secondary data have already undergone some analysis after being gathered by someone. The researcher must now choose the information he will utilize for the study and, in turn, the data collection methods he will employ. The complexity, application, interpretation, design, and management of tools always vary as per the nature of the research study. The data collection tools that have proven helpful in educational research, e.g., psychological tests and inventories, questionnaires, checklists, rating scales, and techniques, namely, observation, interview, content analysis, etc.

We have tried to familiarize you in this unit with a few popular, widely used data collection tools& techniques. This unit will also cover some of the most used research tools' characteristics, types, uses, and limitations.

### **1.3 TOOLS& TECHNIQUES FOR DATA COLLECTION**

For

acquiring the required data, many tools have been developed. Now the researcher would have to decide which sort of data he would be using for his study. The researcher can select one or combinations of data collection tools for the study. Some tools are designed to record qualitative data, and some to get quantitative data. In this unit, we will discuss some data collection tools.

### **1.3.1 Questionnaire Method:**

A questionnaire consists of a list of questions related to the study. It can be printed or designed as an online form to share with respondents through emails. The questionnaire method can be defined as:

A list of written questions carefully formulated to be administered to a selected group of people for the purpose of gathering information (feedback) in survey research. In libraries, patrons are sometimes asked to fill out a questionnaire designed to assess the perceived quality and usefulness of services and resources. The results are then compiled and analyzed for use in self-assessment and planning.

> Reitz, Joan M. 2 | Page





"A questionnaire is a systematic compilation of questions that are submitted to a sampling of population from which information is desired."

#### **Barr, Davis & Johnson**

#### **Types of Questionnaires**

The questionnaire can be categorized in different ways. A few of them are discussed below:

#### a. Structured Questionnaire:

Structured questionnaires ask concrete, direct and closed questions. A structured questionnaire is the primary measuring instrument in survey research. Structured questionnaire always falls under quantitative research. It is always prepared in advance, not extempore. It consists mainly of closed-ended questions, which means the answers are already given as options, and respondents only need to select from the given options. Suppose respondents want to provide a response that is not covered under any options. In that case, there will be one free text option as "Any other, please specify," which offers flexibility to elaborate.

#### b. Un-Structured Questionnaire:

In an Unstructured questionnaire, most of the questions are open-ended, and the answers are not given as an option or predetermined. Hence the respondent can provide whatever response he would like to these questions. Though in an unstructured questionnaire, all questions are open-ended, the sequence of the questions follows an order. The researcher predetermines this sequence. Open responses are always more reliable, but it is difficult to measure, and applying the data requires comprehension.

#### c. Semi-Structured Questionnaire:

This type of questionnaire includes mixed kinds of questions. In this questionnaire, the researcher can consist of open-ended and close-ended questions related to the study. It generally has a hybrid approach.

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	Master of Library and Information Science-Ist Semester
Self	-Assessment Questions: 1) What is Questionnaire method?
	<ul> <li>2) What are the three types of questionnaires?</li> </ul>

#### **Type of Questions**

In a questionnaire, selecting questions play an important role in fitting the study's purpose. Hence the main options are:

• **Closed-ended Questions-** These questions have pre-assigned responses or 'Yes' or 'No'. It always limits the choice of the response for the respondents.

Example for Close-ended Question

Which credit card do you use for shopping?

- a) Visa
- b) Mastercard
- c) RuPay
- d) Dinersclub
- e) Any Other (Please specify.....)

In closed-ended questions, the researcher may also use response scales in the questionnaire. Some important scales that are often used:

Likert Scale: To record agreement/disagreement of respondents with a set of choices
 Guttman Scales: Attitude-wise statement is arranged

> Thurstone Scales: forced choices, Agree/Disagree

• **Open-ended Questions-** It is a free-form question that allows respondents to respond to their views based on their knowledge, feeling, and understanding. It means that the questions don't have a pre-defined set of options.



#### **Example for Open-ended Question**

Tell us your experience working with this organization so far.

.....

#### Characteristics of a good questionnaire

- 1. A good questionnaire must serve two purposes. First, it must translate the objectives of an investigation into specific questions. It must motivate respondents to communicate the required information. And it must include a courteous and carefully constructed covering letter to explain the purpose and importance of the study.
- 2. The language of the good questionnaire should be simple, concise, and easy to understand. The researcher should avoid ambiguous phrases and expressions while designing the questionnaire. Technical terminology will be included in the questionnaire if it is directed to specific groups; otherwise, it should be avoided.
- 3. A questionnaire should not be lengthy if not necessary. Suppose it includes too many questions, then there is a possibility the subject will be tired and not able to respond correctly.
- 4. The sequence of questions in a questionnaire should receive special attention as it should be logical to the subject. The easiest questions should come first, which makes the subject comfortable responding and will place the complex questions later.
- 5. Combining different questions in a questionnaire is always better to record the subject's response. Questions requiring an answer in 'Yes' or 'No' tend to be least biased, and responses are easily tabulated. However, they don't always provide enough data about the issue being researched. The use of multiple-choice answers is preferable in certain circumstances. When the respondent is given a limited number of clear options, questions with multiple choice answers work well.

#### Merits of Questionnaire

- 1. The questionnaire is one of the best data collection tools if adequately used.
- 2. It is very economical in terms of time, effort, and cost.
- 3. It is easy to plan, formulate and administer.
- 4. If the study covers a vast geographical region, it is the better tool as it permits
- national and international coverage.
- 5. It allows time for the subject to respond to questions, which leads to less pressure on the subject.
- 6. In some instances, responses given by the subjects are available in their language.
- 7. For an in-depth study, the questionnaire can be a primary tool, and later other methods can be used.
- 8. The questionnaire can be used to collect data quickly for the study.



9. Any statistical software package can analyze the questionnaire, which are structured by nature.

#### **Limitations of Questionnaire**

- 1. A questionnaire will not be the apt tool to record the response for specific groups like children/illitrates.
- 2. It gives a biased sample, and the non-response is the biggest concern in the case of the questionnaire method.
- 3. If the subject does not understand the question's context or gives an incomplete response, nothing can be done.
- 4. Some respondents resist putting forth their views on controversial issues in writing.
- 5. The subjects' feelings, emotions, behavior, and reactions are unnoticed.
- 6. Processing and analyzing data collected through large samples are very timeconsuming.

#### **1.3.2** Observation Method:

An observation method is a research tool used mainly in social and behavioral sciences. This method helps to understand the social, economic, and cultural changes. All social research begins and ends with observation. The most important advantage of observation is that it examines the phenomenon directly, allowing the behavior to be observed as it occurs. Observation has become a scientific tool and one of the data collection tools if it serves a formulated research purpose.

"Observation employs relatively more visual and senses than audio and vocal organs."

#### C.A. Mourse

Observation is a way to figure out what people think and do by watching how they behave in different places and situations.

#### **Types of Observation**

#### Controlled Observation and Uncontrolled Observation (or, Structured and Un-Structured Observation)

Suppose the observation is characterized by careful definitions of the units to be observed and recorded under standardized conditions with a selection of pertinent observation data. Then the observation is called "Structured/controlled observation."

Whereas, when the observation takes place without considering the abovementioned characteristics well in advance, it is termed "Uncontrolled/un-structured observations." In an exploratory study, most of the observations are unstructured by nature.

#### > Participant and Non-Participant Observation



In research, particularly in the social sciences, we frequently discuss participant and non-participant types of observation. This distinction is determined by whether the observer shares the life of the group he observes. Suppose the observer observes by imitating a member of the group he is observing to experience what the members of the group experience; the observation is known as "participant observation." However, non-participant observation occurs when the observer observes as a detached delegate without attempting to experience what others feel through participation.

#### **Advantages of Observation**

- Observation as a research method is getting better and more accurate to the point where it could make a big difference in descriptive research.
- Rather than interviews and questionnaires, the best way to study essential parts of a person's personality that show up in their behavior and attitude is to watch them.
- We get first-hand information by using this method
- The record of observation is available immediately.
- It is a comprehensive method of data collection.

#### Limitations of Observation

- Since not all occurrences can be immediately observed, its application is limited.
- More extended time requirements and costly procedure
- Impact of Observer on the subject or group: When an observer is present, the subject becomes aware, which changes how they behave.
- The environment in which the observation is done is limited and all data collected are limited to that study environment.
- It is useless if the action is covert and cannot be seen.
- The observer needs to have expertise and training.

### **1.3.3 Interview Method:**

An interview is a data collection method widely used for social research. This method is beneficial in cases where there is a need to attain personalized data. An interview is always a two-way communication between interviewer and interviewee to exchange ideas and express views on the research topic.

"The interview constitutes a social situation between two persons, the psychological process involved requiring both individuals mutually respond though the social research purpose of the interview call for a varied response from the two parties concerned."

#### Vivien Palmar

#### **Types of Interviews**

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There are several different interviews. The most common types of interviews are:

- Personal Interviews/ Structured Interviews
- Unstructured Interviews
- Semi-Structured Interviews
- Focused Interviews

#### **Personal Interviews/ Structured Interview**

This interview requires a person known as the interviewer to ask questions to the other person or persons in face-to-face contact. (Occasionally, the interviewee will ask questions, and the interviewer will respond, but the interviewer usually initiates the interview and collects the information.).

Personal or structured interviews can be either direct personal investigation or indirect oral investigation. In the case of direct personal investigation, the interviewer must personally collect information from the sources involved. He must be on the spot and meet people from whom data must be collected. This method is best suited for in-depth investigations. However, in some cases, contact the people involved directly, or the direct personal investigation technique may not be used due to the broad scope of the investigation. In such cases, an indirect oral examination can be conducted. The interviewer must crossexamine other people presumed to know something about the problem under investigation, and the information obtained is recorded.

This method is used by most of the commissions and committees appointed by the government to conduct investigations. Personal interviews are usually conducted in a structured manner to gather information. As a result, we refer to the interviews as structured interviews. Such interviews entail the use of a set of predetermined questions as well as highly standardized recording techniques.

#### **Unstructured Interviews**

A flexible questioning strategy characterizes the unstructured interviews. Unstructured interviews do not adhere to a system of predetermined questions and standardized information recording processes. In a non-structured interview, the interviewer has a great deal more freedom to ask supplemental questions if necessary or to ignore specific topics if the situation so warrants. He may even alter the order of the questions. During recording the responses, he has considerably greater latitude to include or exclude some features. This flexibility, however, renders interviews incomparable, and the analysis of unstructured responses is far more complex and time-consuming than that of structured responses acquired from structured interviews.

Unstructured interviews also necessitate a high level of expertise and understanding on the interviewer's part. In exploratory or formative research investigations, however, unstructured interviews serve as the primary data collection method. In contrast, a structured



interview approach is frequently employed for descriptive research since it ismore costeffective, provides a secure basis for generalization, and requires comparatively less skill from the interviewer.

#### **Semi-Structured Interviews**

The SSI is based on a list of questions that must be covered during the interview. But they also enable discussion of emerging areas of interest throughout the interview. Interviews that are semi-structured when consequently employed to obtain information from a person or small group discussion on predetermined subjects, while at the same period allowing for the emergence of new questions during conversations.

They may be conducted with people or groups. Semi-structured interviews are distinct from traditional interviews and generate formal survey data with these questions. In SSI, questions are not always asked in the same sequence and manner in each interview. Questions can be added or removed as desired.

During semi-structured interviews, respondents are frequently asked open-ended questions and encouraged to provide instances or comment on various aspects of things that interest them or seem to be of interest to them or significant to them. It can lead to vital concerns being overlooked.

#### **Focused Interviews**

The purpose of a focused interview is to focus on the respondent's provided experience and its repercussions. Under this method, the interviewer has the freedom to determine the technique and order of questioning and inquire into the candidate's motivations. The primary responsibility of the interviewer in a focused interview is to constrain the respondent to a discussion of the topics on which he wishes to dialogue. Such interviews are commonly employed in creating hypotheses and represent the most prevalent sort of unstructured interview.

#### **Advantages of Interview**

- > It is an apt data collection tool when dealing with young children, illitrates, etc.
- > This data collection tool is used for practical purposes rather than for gathering data.
- It will be used for counselling, placement, guidance, etc.
- The interviewer can assure the candidate that the shared information will be used properly.
- In an interview, the interviewer can create a friendly atmosphere to get the desired information related to the study.
- > It permits to exchange the of ideas and information from both sides.
- > The data collected through the interview is quite reliable.
- > In other methods, bad handwriting, poor expressions, etc., can be avoided.

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> There is always a possibility of cross-questioning and adding supplementary questions during the course of action.

#### **Limitations of Interviews**

- > The technique is more time-consuming and challenging to employ successfully.
- It can be not very objective
- Interviewer objectivity and sensitivity play a very crucial role during the interview. This procedure requires a level of expertise.
- A person with many tasks can fill the questionnaire in their leisure time rather than be part of a lengthy interview.
- > Recording data from the interview is the most challenging part.
- Using technology to record the interviews is not a cost-effective option.
- It will not work well if the respondent is shy, deaf, and mad

	IN-TEXT QUESTIONS
3.	Define the observation and Interview methods.
4.	Discuss different types of observation &Interviews.

### 1.3.4 Checklist

The checklists include a list of things or behaviors, with a space designated for a checkbox or a "yes" or "no" mark. The primary objective of the checklist is to ensure that no significant part of an item or circumstance is ignored by drawing attention to the multiplicity of components that make up either. It is a straightforward apparatus in the form of a To-Do-list, consisting of a pre-prepared list of goods. It is a type of questionnaire that takes the form of a list of categories with checkboxes for the respondent to select. Recording the existence or absence of the phenomenon being studied is one of its primary functions.

#### How to construct a checklist

One can construct a checklist by using the following way.



- One of the arrangements calls for each component of a given scenario to be examined.For instance, a topic might be requested to evaluate the situation by filling in the blank next to each activity carried out in a class (with the letter "P"), for example.
  - Cleanliness in the class()
  - Availability of projectors()
  - sufficient Tables and Chairs for students ()
- In the second form, the respondent is prompted to indicate whether they agree or disagree by marking yes or no on a checkbox. They are requested to either circle or underline the appropriate response to the item provided.
- In the third form, every item is a positive statement with a checkbox (P) to indicate that it has been verified.
- > The items are provided in sentences in the fourth format, and the suitableresponse from the submitted responses is either checked off, highlighted, or encircled.

#### 1.3.5 Rating Scales

Rating is a term used to express one's opinion or judgement about a situation, object, or character. Rating techniques are devices that allow such judgments to be quantified. Opinions are typically expressed on a scale of values.

"Rating is an essence and direct observation."

#### **Ruth Strong**

"A rating scale ascertains the degree, intensity and frequency of a variable."

#### **Von Dallen**

When it comes to evaluating quality, the rating scale is an extremely helpful tool, particularly in situations where it can be challenging to quantify quality in an objective manner, such as in extension and development programmes.

Example: How impactful is India's "Swach Bharat Abhiyaan" initiative?

The above question is difficult to respond to in an objective manner. In the context of this discussion, rating scales and test scales measure or order entities with respect to the quantitative characteristics or characteristics of the aforementioned programme. While some rating scales provide for the assessment of magnitudes of the programme on a scale, other systems just provide for the relative ordering of the items to be ranked.



### **Types of Rating Scales**

Rating scales are various types, some of the most common rating scales are mentioned below:

- Numerical Scales
- Descriptive Scales
- Graphic Scales
- Itemized Scales
- Forced Choice Scales
- Rating by cumulative points

#### **Numerical Scales**

The numerical scale employs numbers to indicate the degree to which an individual is thought to exhibit certain characteristics or types of behavior. One of the most basic types of rating scales is one in which the rater checks a number to indicate the extent to which a characteristic exists. Typically, each number in a series is given a verbal description that remains consistent from one characteristic to the next. This scale is useful when the characteristic to be rated can be divided into small categories.

Example of the behavior of the sales staff in a supermarket on the rating scale

Directions: As you rate the sales staff on each of the following items. Circle 1 forinferior, 2 for below average 3 for average. 4 for above average and 5 for superior.

a)	Cooperates with customers		1	2	3	4	5
b)	Cooperates with procurement te	eam	1	2	3	4	5

### **Descriptive Scales**

On this particular rating form, the points on the graphical scale are denoted by a series of descriptive sentences. The descriptions illustrate, in terms of behavioral characteristics, what the individuals are like at various points along the scale. It is also known as the "Behavioural Statement Scale."

### Graphic Scales

A horizontal line attached to each attribute at the end of the graphic rating scale sets it apart from other rating systems. The rating is denoted by the placement of a checkmark or a cross on a line to indicate the existence or absence of a particular characteristic.

### Example:

How effective lecture delivered by the professor in the class

Very Effective Slightly Effective Average Slightly Ineffective Very Ineffective

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reth



There are many advantages to the use of graphic scales. It is very simple and easy to formulate.

#### **Itemized Scales**

In some cases, it is also known as the special category scale. When using this scale, the respondent chooses the option that most accurately depicts the action or quality of the thing being scored. Imagine that the conduct of delegates at the conference is being evaluated. One of the attributes that may have been assessed highly is attentiveness, while another may be ity of Delh imaginativeness.

It can be depicted as "How attentive he/she is in the lecture."

- Very Alert
- Alert
- Less Alert
- Not at all alert •

#### **Forced Choice Scales**

When using 'forced-choice rating' methods, the rater is asked not to say whether the ratee possesses a particular trait or how much of it the ratee possesses, but rather to say, in essence, whether he or she possesses some or one trait or another of a pair. In other words, the rater is asked to choose between two options. For instance, rather than determining whether an individual's leadership qualities are exceptional or above average, it may be preferable to inquire as to whether the individual has a significant influence on his or her colleagues, can motivate others to take action, and is assertive while attending functions.

#### **Rating by cumulative points**

Rating by cumulative points is unique and distinctive because it has a wide range of applicability and is simple to score. A rating score can be calculated by adding all the weighted or unweighted points awarded to an attribute, object, or individual. This grading classification includes the "checklist approach" and the "guess-who technique." "Checklist methods" are appropriate in the context of evaluating the performance of individuals in a job. Every positive and negative trait, characteristic, or attribute is given a weight of 1, and the individual's score is calculated by adding up all of the individual's weights.

#### **Advantages of Rating Scales**

- The raters find rating methods highly engaging, mainly when graphic rating methods are applied.
- > There is no restriction to use the number of triggers that can be presented to a rater at once while using rating scales.
- > Rating scales can be used with little training and complete understanding of the purpose
- Rating scales have a wide range of applicability, it can be used to assess appraisal systems, the performance of the group, personality rating, teaching rating, etc.

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#### **Limitations of Rating Scales**

Rating scales have many limitations as well. Some of them are mentioned below:

- Error of Leniency- The raters frequently give those they are familiar with greater ratings than they ought to. The term "leniency error" describes a widespread and constant inclination for raters to provide an incorrect rating, regardless of the justification.
- Error of Central Tendency- The majority of the raters are hesitant to assign ratings to individuals on the extremes of the scales; as a result, they typically assign ratings to those somewhere in the middle of the scale. The outcomes are impacted as a result.
- Halo-effect-Halo-effect is a mistake that hides the patterns of a person's traits. The rater develops an overall view of the person's merit, and this impression significantly impacts how the rater rates certain features. The attributes that are scored show an erroneous positive connection as a result.
- The logical error- Because judges tend to rate features similarly when they believe they are logically related, this logical fallacy exists.
- The Contrast Error- The contrast error is caused when a rater tends to rate the individuals in the opposite direction (contrasting) from himself or herself in a trait being measured.
- The Proximity Error- Adjacent qualities on a rating scale tend to inter-correlate more than remote ones, although having identical similarities. Similar qualities can be placed farther apart and dissimilar ones to offset this mistake.

#### Attitude Scales

By summing up the numerical scores that researchers assign to people's responses to sets of statements that explore dimensions of an underlying theme, attitude scales can provide a quantitative measurement of attitudes, opinions, or values. This is accomplished through the use of attitude surveys.

#### **Types of Attitude Scales**

Providing individuals with a list of words or descriptors and asking them to answer each sentence or adjective in accordance with their genuine feelings is the method that is used the most frequently when attempting to measure individuals' attitudes. These kinds of lists are referred to as "Scales." Several different "scaling"methods' have resulted in various



scales for measuring distinct attitudes. The Likert scale, the Guttman scale, the Thurstone scale, and the Semantic Differential scale are the ones that are used the most commonly.

#### Likert Scale

The Likert Scale, which consists of five degrees of agreement and disagreement, is the type of attitude scale used most frequently. Although many of its construction rules are frequently ignored, its strict format requires an extensive list of statements (around 100) from a much larger list of 'possible,' as well as rigorous testing for internal consistency.

These scales make it possible to determine the extent of respondents' agreement or disagreement with a statement. The Likert scale assumes that the degree to which something is experienced and its intensity is linear. As a result, it shifts from total assent to total opposition, presuming that attitudes may be evaluated in some way.





#### Guttman Scale

The Guttman scale comprises a series of statements relating to an individual's perspective on a particular topic or item. The Guttman scale has two distinguishing features:

First, the statements included on such a scale reflect increasingly positive feelings in relation to an attitude toward an object; the scale itself has a specific name. Second, the endorsement of any statement constitutes an endorsement of all statements, even those with a less positive connotation.

#### **Thurstone Scale**

The method developed by Thurstone is sometimes referred to as the technique of equal seeming intervals. Suppose one accepts that attitude is a unidimensional linear continuum. In


that case, Thurstone's suggestion that it be measured by statements that are scaled using the method of equal-appearing intervals would be applicable.

#### Semantic Differential Scale

It is a technique for evaluating different facets of the meaning of various concepts. As a method to assess attitude, it sees the widespread application. It is made up of a collection of seven-point bipolar scales as well as a collection of concepts. On each scale, each concept is given a rating.



## 1.4 SUMMARY

This chapter provides information on the various tools and data collection techniques. The definitions of the questionnaire, rating scale, attitude scale, checklist, interview, and observation were all discussed. In addition to explaining the purpose of each of them, we also went over their various applications, advantages, and disadvantages. It is recommended to utilize multiple ways to complement one with others to fight bias and provide more acceptable data. Because each data-gathering device has its limits, it is recommended to use various methods.

## 1.5 GLOSSARY

Attitude: attitude, in social psychology, is a cognition, often with some degree of aversion or attraction (emotional valence), that reflects the classification and evaluation of objects and events. While attitudes logically are hypothetical constructs

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Attitude Scales: a measure of the relative quantity of an attitude possessed by an individual as contrasted with a reference group.

Qualitative Data:Qualitative data describes qualities or characteristics. It is collected using questionnaires, interviews, or observation and frequently appears in narrative form.((All Guides: Data Module #1: What Is Research Data?: Qualitative vs. Quantitative, 2021)

Quantitative Data: Quantitative data are used when a researcher is trying to quantify a problem or address the "what" or "how many" aspects of a research question. It is data that can either be counted or compared on a numeric scale.(All Guides: Data Module #1: What Is Research Data?: Qualitative vs. Quantitative, 2021)

**Rating Scales:** It is the qualitative description of a limited number of aspects of a thing or traits of a person. The classifications may be set up in five to seven categories.

### **1.6 ANSWER TO IN-TEXT QUESTIONS**

- 1. The researcher creates a list of questions to gather factual data on the subject of research called the questionnaire method.
- 2. The three types of the questionnaire are:
  - Structured Questionnaire
  - Unstructured Questionnaire
  - Semi-Structured Questionnaire
- 3. Interview- An interview is a technique to gather data with an interviewee face-to-face or get a response orally.

Observation- is a method of immediately gathering data by observing an individual's activities in various environments.

- 4. Types of Interviews:
  - Personal Interviews/ Structured Interviews
  - Unstructured Interviews
  - Semi-Structured Interviews
  - Focused Interviews

Types of Observation:

- > Controlled and Uncontrolled Observations
- Participant and Non-Participant Observations

5. Attitude Scale- The most common method of assessing attitude involves giving people a list of statements and asking them to answer to each one in line with their actual emotions.

**Checklist-** A checklist is a list of statements that describe the characteristics and performance of the subject.

- 6. Types of Attitude Scale:
  - Likert Scale
  - Guttman Scale

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- Thurstone Scale
- Semantic Differential Scale

### 1.7 SELF-ASSESSMENT QUESTIONS

- 1. What is the advantage of the Questionnaire method?
- 2. What is a checklist? Prepare a sample checklist to evaluate the performance of the supermarket.
- 3. What are rating scales? Describe types of rating scales with their limitations.

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# LESSON 1 LIBRARY RECORDS

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- 1.1 Learning Objectives
- 1.2 Introduction
  - 1.2.1 Purpose of the Library Records
- 1.3 Area and Type of Library Records
  - 1.3.1 Types of Records
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- 1.8 Summary
- 1.9 Glossary
- 1.10 Answers to In-text Questions
- 1.11 Self-Assessment Questions
- 1.12 References
- 1.13 Suggested Readings

After completing this lesson, you will be able to:

- identify various types of library records;
- explain the importance of records for carrying out library routines on periodic basis;
- list various records required for each division of the library;
- categorize records of the library
- specify the advantages of computerized library records; *C*
- explain the records for accreditation of NAAC and IQAC;
- explain the role of records in library developmental plans.

We expect that you would have some idea of working in a library before studying this program. Let us start this course by understanding the records which are kept in a library.

Based on established norms, libraries maintain various types of records to keep track of their routine work. Some records are created before the period of operation of the library and others are created and captured during operations and services of the library. Being a student of library science you should learn and understand about the nature and types of such records and their functions in the context of library work. In this chapter, we will discuss the meaning, need, importance, type of records and role of records in different sections of Libraries.

A record is information created or received and maintained by an organization that is used to control, support or document the organization's activities and transactions, regardless of the media.

A library record is defined as "any recorded information generated or required in the course of any library activity and which must be maintained to meet fiscal, legal, historical or administrative needs of the organization." The purpose of library records is to help in planning library activities, to know readers' requirements, allocation of budget and for monitoring progress of a library. Records are also a valuable tool to access the workload in the library.



Records may be any written, photographic, machine-readable, books, letters, documents, printouts, photographs, film, tapes, microfiche, microfilm, photostats, sound recordings, maps, drawings, and voice, data or video representations or other recorded information created or obtained by or on behalf of the Organization kept in computer memory. These records are maintained for administrative, financial, historical or legal reasons. (The Texas a&M System)

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Following examples may be considered as library records:

- Databases and tables
- Electronic media, tapes, disks, hard drives, and portable storage devices
- Electronic messages, including email, IM, and voicemail
- Financial transactions
- General correspondence and administrative records ersity
- Metadata associated with records
- Personnel and employment documentation
- Significant working papers, drafts, and versions
- Student and class documentation
- Web sites

Records could be on paper as files and registers or as data in a computer, or on a disc. The records are evidence of the work done in a library. For example, increase or decrease in the number of members in a library can be ascertained only through records. Library is also a storehouse that houses books, non-book material, equipment, and furniture. Records of all these items are maintained in the library. These records help to justify the financial support received by the library and are, thus, essential for planning and maintenance.

#### **1.2.1 Purpose of Records**

The control records are maintained in a library to:

- Bring about uniformity in carrying out routines in a department/section by staff, which may change from time to time,
- Meet the audit (or checking) requirements for the financial transactions carried out by a library,
- Serve as proper inventory of library stocks and equipments,
- Serve as an aid to verify details about the date, price, source of supply, etc. of library and equipment, furniture and
- Assist stock verification of books, furniture, equipment, etc.

The statistical records are maintained to:

- Serve as an indicator of workload, department-wise and staffwise,
- Add authenticity to the annual report of the library, Provide useful data for planning of the activities of a library, such as opening hours, type of readers' services, etc. in its various departments,
- Support proposals for staff requirements in a library,



- Work out rational distribution of work-load among staff,
- Provide guidelines for collection development as per readers' preference, and
- Justify utility and desirability of library services.

#### Records are kept and maintain in the following sections of the library:

- a) Acquisition Section
- b) Technical/ Processing Section
- c) Circulation Section
- d) Periodicals/ Serials Control Section
- e) Reference Section
- f) Maintenance Section
- g) Administration and Management Section

Let's learn about the control type and statistical type records in various sections of a library.

#### 1.3.1 Types of Records

Records are developed to have;

- a) Uniform system in day-to-day activities of its various departments and sections, and
- b) Planning its budgetary requirements, staff needs and modernization of its functioning.

Records of libraries fall under two broad categories:

- Control records
- Statistical records

#### 1.3.2 Control Records

The control records are developed and maintained in each department/section of a library in the form of ledger, register, files and cards or slips, etc. depending upon the nature of activities to facilitate its working in a systematic manner. Most of these are common to all types of libraries, though their size and scale may vary from library to library, e.g., accession record, shelf list, etc.

#### 1.3.3 Statistical Records

Statistical records are described in quantitative terms, and may be called secondary records as they are derived from control records. These records present the volume of library routines of the various departments/sections in quantitative terms. Statistical records are maintained department-wise and are tabulated in consolidated form month-wise and year-wise as per library needs in the administration department of the library.

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Let us first know about the control type records that are maintained in various sections or sections of a library.

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#### **1.4.1 Acquisition Section**

The primary function of the Acquisition Section is to build up a collection of reading materials in a library. This section acquires books through purchase, exchange and gifts. At any given time, some books are on order with vendors, some have been received and are awaiting checking and accessioning. While others are ready for transfer to the processing section.

The Section is expected to purchase books as per amount earmarked in the library budget for a subject discipline and/or in a specific language. In acquisition work, precaution is taken to avoid unwanted duplication. Bills cleared for payment are properly scrutinized to check publishers price and conversion of foreign currency price at approved conversion rate, etc. The Acquisition Section has to maintain various forms of control type records to fulfill these obligations.

Some conventional control records for acquisition work are:

- *a)* **Budget allocation register:** To record and keep track of expenditure incurred under various heads for acquisition of reading materials such as books, periodicals, online and digital (both in printed form as well as, on line), binding, furniture and equipment, etc.
- b) **Bill register:** To record bills received in the library for materials supplied.
- c) Directory of institutions: To record name and address of institutions and

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organizations having exchange relations with the library.

- *d) Accession Register:* To accession all the books and periodicals acquired by the library.
- *e) Cards for books on order:* These are kept in alphabetical order by author name to avoid duplication while ordering books.
- f) Cards of books awaiting accessioning: As Above
- g) Cards of books suggested for acquisition
- *h*) File containing suggestions lists for acquisition received from the authorities/ users community.
- *i*) Acquisition policy file

#### 1.4.2 Technical/ Processing Section

The Processing Section of the library, also known as Technical Section, carries out-

- a) the task of assigning call number to a book and
- b) prepares its corresponding catalogue cards and enters data in LMS (Library Management Software) to meet all the approaches of library users.

The universe of knowledge is an ever-changing phenomenon. The scheme of classification adopted in a library often necessitates certain local preferences for representing a subject or its subordinate classes. To maintain consistency in such local variations must be recorded in a file for guidance of new entrants to the Section. Similarly, modifications or extent of bibliographical details to be provided in the catalogue card, number of readers' approaches decided to be satisfied through a catalogue also needs recording to ensure consistency.

The Technical Section, therefore, maintains:

- *Authority file for classification:* To record modifications in classification schedule of the approved scheme of classification.
- *Authority file for cataloguing:* To record decisions regarding bibliographical details to be provided and number of added entries to be constructed.
- Authority file for filing cards in the alphabetical part of the catalogue. Some libraries also maintain a duplicate shelf-list/shelf card for the use of the library staff to save them from frequent visits to the public catalogue. An authority file for recording policy for filing cards in alphabetical/dictionary catalogue is also maintained in some libraries.

#### 1.4.3 Circulation Section

The Circulation Section is concerned with charging and discharging reading material for home reading. Some libraries may add to this activity the service of providing books obtained on inter-library loan from other libraries. To regulate the circulation work so as to provide all readers equal opportunity to read library books, the Circulation Section accepts reservation for a title already on loan. It also issues reminders to recall books from members for over holding a title. Punitive measures such as imposing fine or withdrawing borrowing privilege as per library-policy, are also taken by this department. Records related to all the above are maintained by this section.



- Enrollment of new members, controlling entry to libraries, replacing used books and rectification of shelves also come within the purview of the circulation section in small libraries.
- Large libraries may have separate sections for membership and for maintenance of stacks.

#### The following Control-type records are associated with Circulation Section:

- *Library membership record:* In the form of cards in a tray or formsina file containing personal data and address of the member.
- Books on loan record: Book cards along with borrowers' cards.
- Record of overdue charges collected and deposited with the accounts office.
- Inter-library loan record
- **Record of temporarily** removed books from the collection for binding/repair or other administrative reasons. Some of these records are in files, some in register, some in electronic form and still others in card form.

#### **1.4.4 Periodicals Section**

Periodicals, also known as "journals" or in certain countries "serials", are an important component of library collection in libraries of colleges and universities and research institutions. Their acquisition and preservation present more problems than those of books. Their operation is thus organized in a separate section. Payment for periodicals is made on an annual basis and in advance. Some periodicals are procured directly from publishing agencies. But most of them are procured through a vendor, selected and appointed by the library. Titles selected for acquisition once are generally acquired year after year. Research journals often split into two or more journals and sometimes two titles merge together to become one journal. Often old titles are dropped and replaced by new titles. All these call for alertness on the part of the Periodicals Section. Once a volume is complete, it has to be bound and sent for accessioning and processing.

All these activities call for maintenance of various types of control records. The actual number and format of these records may vary from library to library. These records are maintained in the form of a register, files and cards, or electronic form depending on their nature and use.

In major libraries, the following records are associated with Periodical section:

- Registration record
- Lists of periodicals received and each one arranged by title; vendor; subject and by mode of procurement, i.e., subscription, exchange or gift.
- Bill register: To record bills received, processed and passed for payment
- List of periodicals sent for binding.
- Budget allocation register (Department/Subject-wise): To keep the expenditure on subscription, within the allocated amount.



#### **1.4.5 Maintenance Section**

Maintenance operation involves keeping the library collection in proper order to ensure efficient retrieval of materials. The Maintenance Section carries out annual stock verification. The routine of the Maintenance Section does not require much control-type records as the jobs carried out are mostly to maintain order in collection. However, it does maintain shelf-list or shelf-register to ensure annual stock verification. Another record maintained in file or register form or electronic form relates to books sent for binding and/or withdrawn from circulation where such records are maintained by circulation section.

In some libraries, maintenance and repair of building, furniture and equipment also falls within the purview of the Maintenance Section. In that case, it has to maintain an inventory register of movable items.

#### 1.4.6 Administration and Management Section

The Administration Section, as is commonly understood, is concerned with organizing the manpower and material resources of the library.

The Section has a considerable amount of control type records related to human resources, financial resources, furniture and equipment and reading material. The Section draws up plans to organize its resources and activities so as to fulfill the main objectives of supporting the activities of its parent organization. In order to make the optimum utilization of resources allocated, it has to develop records relating to:

- Manpower available-quantity, quality and time span
- Financial resources-for books, furniture, equipment, preservation materials such chemicals, etc.
- Inventory of furniture and equipment.
- Records of policy decisions (Proceedings of Library Committee Meetings)
- Records of activities of the library (year-wise annual reports)
- Staff deployment chart
- Record of staff attendance on a given day.
- Maintaining of office files, diaries and remittances
- Stock Register
- Miscellaneous records: taking care of fittings of library building, furniture, equipment, water and electrical equipment.



As we have discussed earlier, statistics of library activities are collected, in broad terms, to serve as a guide for planning, or improving already planned activities of the library. They assist in carrying out cost-benefit analysis, better deployment of manpower and proper utilization of financial resources of a library. Effective deployment of manpower depends upon availability of data about workload and manpower resources available in various sections of the library.

The format of recording statistics in various departments/sections of the library varies from library to library. Let us learn about the types of statistics generally maintained in various departments/sections of a library.

#### **1.5.1 Acquisition Section**

The Section is concerned with acquiring recommended/suggested books, accessioning them and transferring them to the Technical Section. Statistics maintained in the Section relate to:

- Number of book accessioned
- Number of book selection slips prepared, checked and filed
- Number of bills processed and passed for payment
- Number of orders placed with the vendors and number of reminders issued.

These statistics serve as an objective index of the level of efficiency of the Department, when these are compared with standards developed for these routines.

#### 1.5.2 Technical/Processing Section

The Processing Section is concerned with assigning call numbers and preparing catalogue cards to meet various approaches of users in identifying books of their need. Before a book is classified and catalogued, it is to be checked with the catalogue to see if:

- It is altogether new book or
- It is an additional copy of a book already in the library, or
- A new volume in a multi-volume title

#### Statistical records in Processing Section include statistics for:

- Number of titles checked with the catalogue
- Number of titles classified
- Number of books catalogued
- Number of catalogue cards filed
- Number of books prepared for processing (pasting due date slip, tag library label, etc.)
- Number of books prepared for release (writing call number at various places in a book and on catalogue cards)

These statistics are collected on a daily basis and are accumulated at monthly intervals.

#### 1.5.3 Circulation Section



The statistical records in Circulation Section are kept in tabular form to show daily routines relating to number of:

- Books issued, total number as well as subject-wise
- Books returned
- Reminders written for overdue books
- Intimation letters for reserved books
- Titles obtained on inter-library
- Visitors/footfalls to the library

#### **Circulation Statistics**

Subject-wise statistical records of loaned books is an important indicator of preference of library users. This information is also helpful in collection development. Registration of new users is also the responsibility of the Circulation Section in many libraries. Statistical records of members enrolled or membership cancelled are also maintained. The chief statistical data collected by this section is the number of daily visitors to the library and number of books consulted in a day. In larger libraries, there are usually separate sections for membership and maintenance, where statistics regarding these operations are recorded.

#### 1.5.4 Maintenance Section

Maintenance work of a library is indirectly related to the use of library collection. In large libraries, statistical record of activities is usually the responsibility of an independent department, separate from the Circulation Section. In small libraries maintenance work is overseen by the Circulation Section. Statistical records of the following activities by users are maintained by the Maintenance Section:

- Books consulted in the library reading room
- Books shelved
- Shelves rectified
- Books identified for binding and for repair work
- Misplaced books traced

These statistics help to plan details related to access to the library, a period during which the library should remain open every day and reflect preference of users regarding books borrowed and consulted.

#### **1.5.6 Periodical Section**

As periodical issues are received every day in the library, these must be entered in relevant control type records on a daily basis. Follow up of missing issues of periodicals and sending reminders are to be organized on a weekly basis.

Once a volume is complete, it has to be prepared for binding by putting title, index and content in the beginning of the volume and placed in safe custody till sent to the binder. Correspondence related to subscription of new titles, renewing subscription of already available titles, chasing missing issues, seeking clarification regarding bills received from vendors, etc. are some of the activities that fall within the purview of the Periodicals



Section. Statistics recording daily, weekly, monthly and ad hoc operations in the Section are usually kept in tabular.

#### **1.5.7 Reference Service Section**

There are few control records maintained in the Reference Service Section. Scholars' profile is one control record which is maintained by the Reference Service Section. The statistical records maintained in this section too are very limited. However, as the Reference Section extends its activities to include bibliographic and documentation services, the quantity of the statistical record increases. Notable statistical records in this Division include the number of:

- Reference queries (both long as well as short range) attended
- Index cards prepared
- Abstracts prepared
- Topical Bibliographies compiled
- SDI services provided
- Orientation programme for user community

In addition to the above statistical records, details related to subject categories, level of staff employed and queries answered from individual library's files are also maintained.

#### 1.5.8 Administration Section

Administration work is concerned with planning and organizing the overall library operations. A successful execution of the vision of a library depends upon regular monitoring of the activities in various sections in a library. Proper deployment of resources, both human and material, ensures achievement of the desired goals. The Section has, therefore, to maintain statistics and also collect statistical records from all the other sections in order to compile a unified statistical chart for its use. The collected data also serves as a basis for the library's annual report. Besides this, the statistics are used for drawing up various future plans and programmes for which it has to obtain approval of its parent body. Some of the statistical records collected in the Administration Section are:

- Daily record of staff in attendance/on leave
- Number of orientation programmes for staff organized
- Consolidated statistical records collected from individual section
- Correspondence parent body /with outside agencies.



It is the moral responsibility of the library staff to protect the privacy of the patrons of the library. According to the American Library Association Policy on Confidentiality of Library Records, "Confidentiality extends to information sought or received, and materials consulted, borrowed, acquired, and includes database search records, reference interviews, circulation records, interlibrary loan records, and other personally identifiable uses of library materials, facilities, or services."

This means that any library records which contain personal information of users should not be disclosed. Some of them are as follows:

- Circulation records
- Reference queries including SDI profile
- Personal information related to the users (phone number, address, etc.)
- Inter library loan transactions
  - Financial information (Bill, Overdue Charges etc.)
  - Acquisition requests
- Material consulted or borrowed
- Database search records
- Registration records



Implementation of ICT reduces the workload of the staff and increases the efficiency of the library. It involves the process of replacing traditional, paper-based systems with computers and software. It makes information more available and accessible in an easier way.

A library has to maintain and make use of various records in all sections of the library including the acquisition section. Manual management systems libraries face the problem of maintaining huge data, files, records and equipment records including routine work. An automated system is expected to perform all housekeeping functions and certain managerial functions apart from reducing the existing clerical functions, Such as budget allocation, detailed information about vendors, pre-order search, specially designed to avoid duplicate orders, creation of purchase orders, invoice processing etc.

IT enabled cataloging Libraries are able to trace the location of books, making catalogue cards, book search (through title, author, publisher, key words, series, ISBN, self list etc.), arrangement of books on shelves. The IT enabled cataloging package includes electronic formatting of catalogs and automated subscription details along with many other functions. Now libraries can share its catalogue to all library users through OPAC or WEB OPAC facility. Due to ICT implementation libraries can access the data of other libraries i.e OCLC, Library of congress ect.

Circulation is an important section of the library, which deals with the issue and return of library materials, reservation, statistics, sending reminders for overdue materials, etc. There is some possibility of error in manual circulation systems and takes more time to process the task. Some of the functions provided by an automatic circulation system are Breakdown of transactions subject–wise and category–wise, calculation rules and regulation, fines for overdue items, Inter Library Loan, Inventory and circulation status, Loans and reservations, Membership details, Number of transactions in an hour, in a day, in a week, in a month etc., Prioritized reservation queries, Bar-coding scanning for both the materials and patrons is a major advantage.

The serial section is one of the most important and complex features of the library. The manual system may be error-prone in managing records but the use of ICT ensures smooth and error-free ordering in libraries to manage various steps such as receiving quotes from vendors, title selection, placing new orders, invoices processing, renewing subscriptions, checking-In process handling, missing issues, cancellation of orders, Reminders, binding of journals, current status of journals etc. Further, a Union List of Serials holdings by libraries within a geographical region are useful and can be easily done by the ICT.

Other than above the following Library services are affected with the emergence of ICT:

• Current Awareness Service



- Retrospective searches
- Reference Services
- Interlibrary loan service
- Document Delivery Service
- Consortia membership

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Information communication technology management systems is a more effective and efficient way of locating library records and their access. Special software and databases have been developed for accessing library material which saves a lot of searching time, accuracy and paperwork. ICT helps to develop the report of the records and its faster circulation.

However, maintaining a backup of the electronic record system is very essential. With the application of ICT documentation and information services in large academic and research libraries have resulted in new records including to introduce new types of library services i.e E-Current Awareness Services (CAS), E-Selective Dissemination of Information (SDI) and Online literature search services etc.



In recent years, electronic information has gradually become a major and necessary tool to strengthen the overall information management in every university library. ICT lays emphasis on integrating, managing, better information, record tracking and quick access delivery to the authorities as well as management to help in the smooth functioning of the library.

Integration of ICT in libraries, Librarians can now have easy and quick access of the library records on daily, monthly or early basis. ICT enables library staff to manage all the daily based activity as per their need. The records of the library can be stored in a device safely and away from any calamity. ICT has affected all the record keeping process of the library for its easy access and circulation as and when required.

ICT has played a great and major role in the creation and distribution of records. This can be evidenced in the secure, quick retrieval and updating of records, accuracy in the dissemination of records and tracking of records through the use of databases and other measures. However, challenges still exist of having less skilled, untrained and other employees who are not ethical enough when dealing with users regarding record delivery.

CAS: Current Awareness Service.

**SDI:** Selective dissemination of information.

**ICT:** Information and Communication Technology.

9. Miscellaneous records
10. True
11. True
12. True
13. Web OPAC
14. True
15. True

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- 1. What is a library record? Discuss the area and types of records in the field of various sections of the library.
- 2. Confidentiality of library records is essential for libraries, why?
- 3. Explain the impact of Information and communication technology on library records?

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# LESSON 1 LIBRARY REPORTS

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- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 What is a Library Report?
  - 1.3.1 Report Stages
  - 1.3.2 Types of Library Report
  - 1.3.3 Characteristics of Report
- 1.4 Library Report Writing : Style and Structure
  - 1.4.1 Style of a Report
  - 1.4.2 Structure of a Report
- 1.5 Layout of the Report
- 1.6 Summary
- 1.7 Glossary
- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

Here we will discuss the library reports. Before going into details, there are some objectives which are as under:

- Library reports and their writing structure;
- Analysis of the types of reports with unique references, which are helpful to the library staff;
- Explain the style, structure and order of the report
- Explore some comprehensive tips on report writing;
- Use fewer relative clauses in your writing and speech; and

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• Prepare an internal investigation report.

It is a regular practice in every organisation to report on the progress and status of various activities for making sound decisions.

A report is a systematic presentation of facts and information about a specific objective to provide a direction to management for decision making and follow up action with findings and recommendations on particular issues. In other words, report is a non-fiction account that presents facts about a specific event, topic or issues. The main idea of report generation is that people unfamiliar with the subject can get everything they need to know from a good report. Reports make it easy for a person to grasp a topic quickly,

Reports are an essential part of job communication in any organisation, including libraries. As a librarian, we have to write different types of reports. These reports can be short in memos, letters or more comprehensive reports, which can be in manuscript form. Sometimes reports are prepared on the directions issued by senior officers within the organisation/library and submitted within the organization.

In this course material, let us discuss the different types of reports. We, as librarians, have to write in our day-to-day working environment. As such, several types of reports are used for internal and external audiences in brief and detailed reports i.e narrative, statistical, periodic, one-time reports, formal, informal, and Confidential are prepared.

ultimately comes from the *Latin reportāre*, meaning to carry. A report is a compilation of information sought, aggregated, filtered, organized and written to give a specific and clear message.

According to *Oxford English Dictionary*, a report is defined as "an account given on a particular matter, especially in the form of an official document, after thorough investigation or consideration by an appointed person or body.".

Although the term report is used to refer to hundreds of different types of written communications. Report writing comes in various sizes and styles depending on the requirements. Some reports have all the usual components of report writing, while others have only a few. Essentially, a report is a short, sharp, concise document and a factual paper that analyses and explains a situation to determine the problem and makes recommendations for future courses of action.

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Library reports are the reports which contain the data related to library administration, users, circulation, data processing, acquisition of material, and staff associated. For example, preparing a report of new arrivals in the library for display, report of enrolled users, a report of issued identity cards, annual report etc. The reports are prepared in a structured format i.e. title, purpose, utility etc.

Reports are playing a vital role in the communication needs of libraries and contribute to the decision-making process for improving library functions.

#### 1.3.1 REPORT STAGES IN LIBRARY

The following stages are involved in while us writing a report:

- **Planning your work:** Planning is a practical process of defining the vision, mission, objectives, strategies and actions of community groups and helping them to develop practical ways to progress
- **Collecting information**; Libraries collect a large amount of data from various resources, which is used to make major decisions about library anecdotes, past practice staffing and services.
- Organizing and structuring information: T organise the collected information in a structured way as per planning of a document prepared to fulfill the objectives of the report.
- Writing the first draft: Preparing a draft needs to know about the targeted audience background, need, what they know, what they want to know and how you can contribute more.
- Checking and re-drafting: Working with librarians and colleagues, you will typically receive feedback in the form of comments, queries, suggestions always etc. Before finalisation of the report you should have incorporated all the points raised by your fellow colleagues with solutions. This process will also be helpful to improve the writing skill.

#### **1.3.2 TYPES OF LIBRARY REPORTS**

Every organization prepares various types of reports as per requirements of the tasks. Some are regular and are produced frequently, while others are less general and more complex. Here we will describe the use of reports in every section of libraries

Acquisition Section: This section works as a knowledge container in the library. These containers may contain the information in print, non-print, electronic formats and audio and audio visual. The major function of this section is to select, order, receive supplies, make record entries in the stock register/ accession register and process the bills for making payment. There are three main check controls in the acquisition section for library material,

(a) Fund Availability,



- (b) Reading material use, and
- (c) Library users requirement.

On the basis of the section control the following reports may be generated in this section

- 1. Vendor registration/ empanelment,
- 2. Report on Requisitions received,
- 3. Report of approvals,
- 4. Invited quotations,
- 5. Report on invoicing process,
- 6. Report on budget estimates,
- 7. Annual data report,
- 8. Agreement report with vendors/agencies
- 9. Report on receiving books and
- 10. Maintaining the ordering process.
- **Technical Section:** The main function of this section in the library to process newly acquired books and prepared for library use. To fulfill the utility purposes these sections are classifying, catalogue, display on recks or stacks for easy access. This section prepares the following reports, which are helpful to develop the holding statistics in the library, for example
  - 1. No. of books received from acquisition,
  - 2. No. of books classified,
  - 3. No. of books catalogued,
  - 4. No. of books are shelved,
  - 5. No. of books processed by a staff member,
  - 6. No. of invoices processed,
  - 7. Report of new arrivals.
- **Circulation Section:** This Section deals with lending library material (books, serials, sound recordings, moving images, cartographic material, etc.) and user's registration and borrowing material. Library circulation includes checking library materials for library users, renewing borrowed items, making of library cards, reserving check out items for patrons, checking returned materials, checking materials for damage at the time of return, If found damaged it may be sent to the responsible person for repair or replacement if it is not repairable, material renewal, receiving payment of overdue charges or damaged books and other charges, maintaining order of book shelving or reshelving of material as per call number given on the books. This section also provides the basic search and reference services to library users and placement of information sources. The following reports are generated by the circulation Section: 1. How many users are registered in a particular year,
  - 2. How many students have taken No due from library,

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- 3. How many students have visited the library on a daily/monthly/yearly basis,
- 4. How many books were consulted by the users,
- 5. How many books were issued/returned in the library,
- 6. How much overdue charges were collected in a particular time,
- 7. How many books are reserved by the users,
- 8. How many books are reshelved in a day etc.
- **Reference Section:** The reference section occupies an important place in the library, where information-intensive resources such as encyclopedias, dictionaries, thesauri, atlases and reference books are kept. Reference shelves are arranged separately from other book cabinets. If you have any trouble finding them, ask the library staff to let you know. In this section the following reports are generated for smooth functioning of the library service:
  - 1. Total number of reference sources with titles,
  - 2. How many reference queries received,
  - 3. How many reference sources are consulted,
  - 5. How many new reference titles are added in a particular time,
  - 6. Prepared report of indexed documents in reference section,
  - 7. Report on current awareness service offered etc.
- Serials/Periodical Section: The periodical section is the most important part of any library, especially in higher education institutions. This section maintains all the subscribed collections of the library which are published from time to time. Periodic records (such as a journal, magazine, newspaper) are an administrative tool as well as a component of the information service that the library provides to its employees as well as readers for learning, teaching and research. Periodical section first receives the current issue of the volume of a periodical publication. Later, completed volumes can be bound and shelved. This section creates the following reports:
  - 1. report of subscribed periodicals,
  - 2. report of consulted resources,
  - 3. report on use of periodicals,
  - 4. report of bound periodicals.

# **1.3.3 CHARACTERISTICS OF LIBRARY REPORTS**

A good report is a mirror of the activities carried out in the library to fulfil the mission and vision.



## Figurer 1.2 Characteristics of a Good Report

On the basis of the above diagram, we will discuss some characteristics of the library reports.

- 1. Well Structure The structure of the report should be clear, logical and presentable which will help in thinking and acting. It will also help us to decide where to put each fact, information and idea.
- 2. Selectivity of the Vocabulary The word selection should be done carefully while preparing the report. Careful choice of words enables the meaning of the words to be conveyed correctly.
- **3. Conciseness** Conciseness is one of the core qualities of authoritative reporting. Conciseness means conveying complete information about a topic or idea in a few words. So, most of the official reports are smaller in size, maybe in a few pages
- **Accuracy** Accuracy refers to the correctness, truthfulness, and overall excellence and quality of the information. Accuracy means to tell as it is, to summarize and to tell everything. The report must be factually accurate. To summarize means to use quantitative rather than vague and precise descriptions. Do not hide anything, hence fact checking is necessary before preparing the report. There should be no place for misinformation except for accuracy.

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- **5.** Format of the Report There are some standard formats available for report preparation i.e Title page, Acknowledgements, Contents, Executive Summary or Abstract, Introduction, Methodology, Results/Findings and Discussion. But these standard formats can be modified as per the work requirement or preparing short reports i.e memo and the manuscript format.
- 6. Objective of the Report The objective of the report must be clear in content with proper justification of material based on collected data/information. The report must be helpful to fulfil the needs of the users as per their aspirations. The report should include the related problems, solutions, findings modalities of the structure etc.
- **7. Simplicity** The used language shall be as simple as possible so that a report should be easily understandable. Jargons and technical words should be avoided.
- 8. Clarity The report should be clear and concise and it should be enough to answer the questions in the minds of the reader. It is essential that when we write any report the purpose and the motto of the report should be to clarify the content. The language should be transparent and straight, and it's clearly expressing what is intended to be expressed. For that reason the report has to be written in correct and accurate form.
- **9. Presentation** A good report needs an attractive presentation. It depends on the quality of typing or printing as well as the quality of paper used. In this way, it is important that when we write any type of report, we should focus more and more on their presentation.
- **10.Punctuation** While we write any types of reports it's important that we be aware about using punctuation marks very carefully and correctly otherwise the meaning of the sentences may be misunderstood and misrepresented.
- **11.Evidence** One of the most important characteristics of report drafting is that it is based on evidence. Thus, when we write a report we must provide solid evidence that justifies our content. Don't base your analysis on weak evidence. Strong evidence-based recommendations and analyses are acceptable reasons only, otherwise not.

In the light of the above explanation we should find that the characteristics of a good report are the guidelines and rules which will help us to prepare a report in an accurate manner.



Report writing is an art. It's the presentation of facts and data in precisely well mannered. In this way, we will discuss the style, structure and order of a report which will help us for better understanding about report writing.

**1.4.1** Style of a Report:- the report should be concise, with concrete details and derogatory language must be avoided. If appropriate, the data can be presented in the form of charts, graphs or tables. Description of the report methodology should be in detail enough and clear to allow someone else to replicate them properly. The informational content of the report must be accurate and it must be factual, no fact should be omitted and conveyed concretely, analytical material should be objective, reasoned and supported with anecdotal evidence.

Sometimes all the qualities of a good report can not be accommodated in absolute terms. The terms used above are applicable on general reports irrespective of other factors. The most important fact in a report is that it should be sensitive to factors such as who initiates it.

There are some affecting variables of a report:-

- Who originates the report?
- Who receives the report?
- What is the subject matter of the report?
- Where is the report to be sent: within or outside the institution?
- Why is the report being prepared?
- How will the report be received?

In that way other three variables related with;

- Degree of formality
- organization of the report
- Order or presentation of the report

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**1.4.2 Structure of Report:** The structure of a report depends on several factors. A report has a base structure. It has many parts. Thus the following ten parts are prominent. Such as the purpose of the report, audience, whether they belong to the same institution or are external, are they exclusively internal or external, conventions followed by the institution, format prescribed by the institution, etc. the same structure of the report is used by the libraries. The general report has been divided into ten parts as given below.



Figure: - Structure of the Report Writing

- 1) Title Page –The title page of the report includes the name of the reporter who wrote it, their organizational details, and the date of the report. As such, the information that appears on the title page includes:
  - The details of title and subtitle if any properly.
  - The name of Organisation/department along with designation and name of the leading person who have prepared the report.
  - Date Month and year clearly be mentioned in the report
  - Name of the receiving organization/department and the designation of the person concerned.
- 2) Abstract An abstract is a brief informational summary of the entire report. So it should be written only after the report is written. The abstract includes the following;
  - one paragraph abbreviation
  - limit upto 300 words.

3) Content Page/ Table of Content - This page is known as table of content page aslo. This page is a list of all the headings of chapters/sections of the entire report with page number. It helps the reader to find specific information and indicates how the information is organized in the report. Which include:

- Table of contents
- List of Figures
- List of tables
- Specific location of the desired content in the report.



- 4) Executive Summary An executive summary is an overview of the main points of a larger report. It is often written and shared with individuals who do not have much time to review the entire report. So that the reader should be able to make a decision based on reading the executive summary. The executive summary is the glimpses report and covers more details in comparison to abstract and focused on purposes, findings, conclusions, results and recommendations.
- **5) Introduction** Introduction is the introductory and important section of the report which provides a platform to the reader. It refers to the report and generates the reader's interest in the report. The introduction should include too many details and give the reader an idea of where the report is going. The report introduction part covers Background, purpose and scope of the report in proper manner.
- 6) The body of the report This will be the longest and most important part of the report which includes the necessity, scope , purpose, subheadings, methodology, sample design, analysis of data, findings, recommendation, conclusion, comments in details and identify the intended audience of the report.
- **7)** Conclusions Based on the findings, each report has conclusions. Conclusions are always directly related to the problem statement. It should be shor, concise and specific. Conclusions should be listed in order of priority, with most important first and least important one last.
- 8) Recommendations The recommendation should be based on the data analysis collected by the report maker. This should be closely related to the aims and objectives of the report.
- **9) Bibliographical References -** This section of the report refers to all advisory reading materials used to prepare the report. This section must contain bibliographic details of the consultancy sources and documents used for the report. Reports have several writing styles for bibliographic references i.e ALA, MLA, Chicago etc. for citing the readings.
- **10)**Appendices -An appendix contains supplementary material that is not an essential part of the main body of the report but may be helpful in providing a more comprehensive understanding of the research problem and includes:
  - incidental information that is to the report;
  - evidence and raw data which supports the report;
  - too long technical data which supports the report;
  - folded diagrams, tables of results, letters, and maps are some examples.



**Report Layout** – layout means the outline of the report. The outline shows the order of the different subjects, the relative importance of each, and the relationship between the different parts. There are many ways to organize the different parts of a subject. Sometimes normal practice is to use one of the following two layout systems;

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- (i) Decimal numbering system or
- (ii) Alpha-Numeric numbering system

Once a system is selected, it is necessary to use the same system throughout and continuously.

#### (i) Decimal Numbering System

This is a very popular numbering system in report writing. The convention is to use the decimal system in the following way:

Level 2 Headings Main sections 1.0 2.0 3.0   Level 2 Headings Main divisions of sections 1.1 1.2 1.3   Level 3 Headings Sub-divisions of main divisions 1.1 1.1 1.1	Note: zero (0) can be omitted							
Level 2 HeadingsMain divisions of sections1.02.03.0		Level 3 Headings	Sub-divisions of main divisions	111	112	113	114	
Level i fieddings Wall sections 1.0 2.0 5.0		Level 2 Headings	Main divisions of sections	1.1	1.2	1.3	1.4	
Level 1 Headings Main sections 10 20 30		Level 1 Headings	Main sections	1.0	2.0	3.0	4.0	

#### (ii) Alpha-Numeric Numbering System



Thus, we have to use a combination of letters and numbers in defining the squares, where the main squares are represented by the same letter and the squares below it by numbers, as shown below:

Level 1 Headings	Main sections	А	В	С	D
Level 2 Headings	Main divisions of sections	A.1	A.2	A.3	A.4
Level 3 Headings	Sub-divisions of main divisions	A.1.1	A.1.2	A.1.3	A.1.4

#### Other Numbering Systems

Though the above mentioned two systems are popular to lay out the report, many report makers use other systems too. such as the use of roman numbering, small and big alphabets and their combinations and so on.

Such systems of numbering help the reader to get a strong indication of the relationship and relative importance of the parts and text in the report.

In this lesson, we have discussed the various aspects of a report. Reports play an important role to keep the records up to date in an organisation/library. In the above explanation it was found that library report writing is an essential part of library management. While preparing a report we must keep in mind about the audience as well as proper content, format, structure and order of the report. Many organisations have prepared prescribed formats for making reports and the writer must follow the structure/layout of the prescribed formats prepared by any organisation. If the organisation/library does not have prescribed formats, the employee can prepare his/her report by using the elements described in this unit. Even for internal purposes, one needs to understand and follow the type of format that is popularly used in the organisation. But the employee/writer must ensure that the used preform of the report is accurate in all respects and fulfil all the objectives of the work.



Accuracy : The quality or state of being correct or precise. It is the ability to do something without making mistakes.

Appendices : A section or table of subsidiary matter at the end of a book or document.

**Conciseness :** The quality of being short and clear, and expressing what needs to be said without unnecessary words.

Layout : Layout is the way where something is designed or arranged.

- 1. Latin Language
- 2. True
- 3. True
- 4. Circulation Section
- 5. Presentable
- 6. True
- 7. Scope
- 8. Style of the Report

- 9. APA and MLA
- 10. Citation of the document
- 11. True
- 12. Alpha-Numeric Numbering System
- 13. True
- 14. Roman Numbering System
- 15. True
- 1. Explain the concept of Report. Discuss their characteristics while writing a report for the library.
- 2. Discuss the various types of library reports with their suitable example.
- 3. Describe the style and structure of the report.

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https://www.librarianshipstudies.com/



# **UNIT – IV: Statistics and its Applications**

# **LESSON 1**

# **Descriptive Statistics and Inferential Statistics**

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1.9	Glossary	
1.8	Summary	
1.7	Hands-On through Statistical Software: SPSS	
	1.6.6 F-Test	
	1.6.5 Z-Test	
	1.6.4T-Test	
	1.6.3Chi-Square Test	
C	1.6.2Linear Regression	
	1.6.1Measures of Correlations	
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	1.5.2Measures of Dispersion	
	1.5.1Measures of Central Tendency	
1.5	Descriptive Statistics	
1.4.6	Hypothesis	
	1.4.5Data Interpretation: Meaning and Definition	
1.4.4	Types of Data	
	1.4.3Types of Data Analysis	
	1.4.2Phases of Data Analysis 🤝	
	1.4.1Data Analysis: Meaning and Definition	
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	1.3.2Functions of Statistics	
	1.3.1Meaning and Definition	
1.3	Statistics:	
1.2	Introduction	
	Learning Objectives	
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- 1.10 Answers to In-text Questions
- 1.11 Self-Assessment Questions
- 1.12 References
- 1.13 Suggested Readings

# 1.1 LEARNING OBJECTIVES

After completing the lesson, you will be able to:

- Understand the meaning of Statistics and its major functions
- Define the Data Analysis and Interpretation
- Know about Descriptive Statistics and Inferential Statistics and its various applications using different tests and measures.

.

• Get hands-on through commonly used statistical software SPSS

# **1.2 INTRODUCTION**

In this lesson, we are going to learn about Statistics and its application. The major focus of this lesson is on Descriptive Statistics and Inferential Statistics. You will learn the fundamental ideas behind data description through descriptive statistics. The fundamental characteristics of a dataset identified in a particular study are described, illustrated, and summarised using descriptive statistics. The summary provides details on the data sample and its measurements. It aids in better data comprehension for analysts. The available data sample is represented by descriptive statistics, which exclude hypotheses, judgments, probabilities, and conclusions. For inferential statistics, that is a task. Inferential statistics is a subfield of statistics that uses a variety of analytical techniques to infer information about the population from sample data. While descriptive statistics lists the characteristics of the data set, inferential statistics aids in drawing conclusions about the population. Inferential statistics helps to acquire a good understanding of the population data by studying the samples obtained from it. It aids in making generalisations about the population by employing various analytical tests and instruments.

# **1.3 STATISTICS**

#### **1.3.1 Meaning and Definition:**

Statistics is the discipline that concerns -

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# M-105 - RESEARCH METHODOLOGY

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- the collection
- organisation
- analysis
- interpretation,
- and presentation of data.

# **1.3.2 Functions of Statistics:**

#### Statistics two major functions-

- Organisation of numerical data(Descriptive Statistics).
- Interpretation of numerical data(Inferential Statistics).

# 1.4 DATA ANALYSIS AND INTERPRETATION

#### Data Analysis :

The word **analysis** means the categorizing, ordering and summarizing the data statistically to obtain answers to research questions.

In a way, **analysis of data**consist of putting all the factual information collected into an order and summary according to the variable studied, objectives drawn and the hypothesis stated.

#### **Interpretation** :

Interpretation means that you:

- study the results of the analysis,
- make inferences about its occurrences of relations,
- and draw conclusions about these relations.

Interpretation becomes easier, if you put the data into forms that are understandable.

**Data Analysis and Interpretation** is the process of assigning meaning to the collected information and determining the conclusions, significance, and implications of the findings. It enables the researcher to reduce, summarize, organize, evaluate, interpret and communicate numeric information in the descriptive form.

According to Francis Rummel, "the analysis and interpretation of data involve the objective

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material in the possession of the researcher and his subjective reaction and desires to derive from the data the inherent meaning in their relation to the problem. To avoid making conclusions or interpretations from insufficient or invalid data, the final analysis must be anticipated in detail when plans are being made for collecting information."

### 1.4.1 Data Analysis: Meaning and Definition

**Kaul** defines data analysis as, "Studying the organized material in order to discover inherent facts. The data are studied from as many angles as possible to explore the new facts."

In his book on research methodology, **C. R. Kothari** explains that the term analysis refers to the computation of certain measures along with searching for patterns of relationship that exist among data-groups. He quotes **G.B.Giles** to further elaborate the concept as "in the process of analysis, relationships or differences supporting or conflicting with original or new hypotheses should be subjected to statistical tests of significance to determine with what validity data can be said to indicate any conclusions"

Hence, whether it is a qualitative or quantitative research even if the data is sufficient and valid, it will not serve any purpose unless it is carefully processed and scientifically analyzed and interpreted.





# **1.4.3** Types of Data Analysis:



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#### Fig 1.1: Types of Data(Source: (Garth, 2008))

Typically only data from the last two types might be suitable for parametric methods, although as we'll see later it isn't always a completely straight forward decision and when documenting research it is reasonable to justify the choice of analysis to prevent the reader believing that the analysis that best supported the hypothesis was chosen rather than the one most appropriate to the data. The important thing in this decision, as I hope we'll see, is not to make unsupported assumptions about the data and apply methods assuming "better" data than you have(Garth, 2008).

#### **1.4.5Data Interpretation: Meaning and Definition**

The Data analysis is usually the first step taken towards data interpretation. Once the data has been processed and analyzed, the final step required in the research process is interpretation of the data.

**Data interpretation** is the process of reviewing data through some predefined processes which will help assign some meaning to the data and arrive at a relevant conclusion. It involves taking the result of data analysis.

**Interpretation** consists of conclusions that the researcher has reached after the data has been processed and analyzed. It is evident that the interpretation of data is very important, and as such needs to be done properly.

#### 1.4.6 Hypothesis

Hypothesis is an assumption which needs to be proved and once proved then it becomes a fact. *For example*, you might want to check the effectivity of a training program on the employees and you can apply t test for 2 samples or paired t test to test the effectivity. When you are evaluating a hypothesis, you need to account for both the variability in your sample and how large your sample is. Based on this information, you'd like to make an assessment of whether any differences you see are meaningful, or if they are likely just due to chance. This is formally done through a process called hypothesis testing. There are 2 important tests in Hypothesis testing : z test and t test and this course gives a great insights on both z test and t test. Lets discuss them briefly:

Five Steps in Hypothesis Testing: ("Tests of Hypothesis," n.d.)

1. Specify the Null Hypothesis



- 2. Specify the Alternative Hypothesis
- 3. Set the Significance Level which generally is take as 5%
- 4. Calculate the Test Statistic and Corresponding P-Value
- 5. Drawing a Conclusion

# **1.5 DESCRIPTIVE STATISTICS**

Descriptive analysis, also known as **descriptive analytics** or **descriptive statistics** 

Descriptive statistics can be useful in communicating the overall picture of your dataset. It is used to describe the situation or the event or whatever the property that you are measuring. It draws insights solely from past data, by manipulating in ways that make it more meaningful.

**For Example,** for discussing marks of students in the exam. Than you might be interested in "What is the average marks scored by the students" or "what is the spread or division of marks? Or you want to communicate what was the average age of the subject analyzed in the dataset or what percentage of subject are below a particular range.

# **1.5.1 Measures of Central Tendency:**

#### MEAN

The Mean is the average of all the scores in a discrete or continuous distribution.

Method of calculation of this mean is different for discrete distribution and the continuous distribution.

This average so calculated is called the Mean or mathematical average.

Use mean when data is continuous and normal.

# a) Mean for an ungrouped data:

$$M = Mean$$

 $\sum$  = Sum of

- X = Observations in a distribution
- N = Total number of observations.

$$M = \frac{\sum X}{N}$$

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### b) Mean for grouped data

M = Mean

AM = Assumed Mean

x' = [Midpoint score(x) - AM]/(length of the class interval)

 $\sum$  fx'= Sum of the products of frequencies and deviation of observations from the ersity of Delhi assumed mean.

i = Width of the class-interval

N = Total number of observation

$$\mathbf{M} = \mathbf{A}\mathbf{M} + \frac{\sum fx'}{N} \times i$$

#### **MEDIAN**

It is also called Positional average. It is the midpoint of a series of data.

Median is a value that divides your entire observation or value into two equal parts. Also to communicate the location of the score. Used in case of high dispersion data or non-normal data.

For non-parametric test we always use median.

Use median when data is continuous and non-normal.

a) Median for Ungrouped data : The middle score is determined by counting up half the value of N if the number of observation (N) is even. When the number of observations (N) is odd, the midobservation value is median.

#### b) Median for grouped data :

$$Mdn = l + \frac{N/2 - F}{f} \times i$$

Mdn = Median

1 = Exact lower limit of the class-interval upon which the median lies.

N/2 = One half of the total number of observations F = Sum of all frequencies below 1.

f = Frequency within the class-interval upon which the median lies.

i = Width of the class interval in which the median lies.



#### MODE

It is used to report a value which is most frequently occurred in a dataset.

It is possible that for a distribution with a discrete random variable can have more than one mode, especially if there are not many terms. A distribution with two modes is called bimodal. A distribution with three modes is called trimodal.

Use mode when data is in the format of frequencies.

a) Mode for Ungrouped Data : In a simple ungrouped series of measures, the crude or empirical orpei mode is that single measure which occurs most frequently.

b) Mode for grouped data :

$$Mode = l + \frac{fm - f_1}{2fm - f_1 - f_2} \times i$$

1 = Lower limit of the modal class i.e., the class interval having maximum frequency

fm = Frequency of the modal class.

f1 = Frequency of the class-interval preceding the modal class.

f2 = Frequency of the class-interval following the modal class.

i = Width of the modal class.

#### **1.5.2 Measures of Dispersion:**

#### STANDARD DEVIATION

Standard deviation is most widely used measure of dispersion of a series.

It refers to the deviation of scores from the mean.

Specifically, it shows you how much your data is spread out around the mean or average. For example, are all your scores close to the average? Or are lots of scores way above (or way below) the average score?

#### a) Standard Deviation for Ungrouped Data :

Standard Deviation 
$$= \sigma = \frac{\sqrt{N\sum X^2 - (\sum X)^2}}{N^2}$$

X = Raw score

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Delt



N = The number of scores in the distribution.

#### b) Standard Deviation for Grouped Data :

Standard Deviation = 
$$\frac{i^2}{N^2} \left[ \sqrt{N \sum fx'^2 - \left(\sum fx'^2\right)^2} \right]$$

i = Width of the class-interval

N = Total number of measures

f = Frequency of class-interval

x1 = Deviation of the raw measure from the assumed mean divided by the length of classinterval.

# VARIANCE

The term variance was used to describe the square of the standard deviation by R.A. Fisher in 1913.

Variance is so commonly used that it is also called dispersion.

Variance is a numerical value that describes the variability of observations from its arithmetic mean.

The variance is computed as the average squared deviation of each number from its mean.

# a) Variance for Ungrouped Data :

Variance 
$$= \sigma^2 = \frac{N \sum X^2 - (\sum X)^2}{N^2}$$

X = Raw score

N = The number of scores in the distribution.

# **b**) Variance for Grouped Data :

Variance = 
$$\sigma^2 = \frac{i^2}{N^2} \left[ N \sum fx^{'2} - \left( \sum fx^{'2} \right)^2 \right]$$

i = Width of the class-interval

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N = Total number of measures

f = Frequency of class-interval

x1 = Deviation of the raw measure from the assumed mean divided by the length of class-interval.

#### RANGE

Of all measures of dispersions, range is the simplest.

It is defined as the difference between the largest and the smallest observations.

Range(X) = Max(X) - Min(X)

#### STANDARD ERROR OF MEAN

Of allThe Standard error of mean measures the degree to which the mean is affected by the errors of measurement as well as by the errors of Sampling or Sampling fluctuations from one random sample to the other.

 $SE_{M} = \sigma_{M} = \frac{\sigma}{\sqrt{N}}$ 

 $\sigma$  = Standard deviation of the population and

N = The number of cases in the sample.

DDCE



#### **IN-TEXT QUESTIONS**

- 1. Range defined as the difference between the largest and the smallest observations.True / False
- 2. Descriptive analysis, also known as descriptive analytics or descriptive statistics. True / False
- 3. Hypothesis is an assumption which needs to be proved and once proved then it becomes a fact. True / False
- 4. Descriptive Statistics is related to the organisation of numerical data. True / False
- 5. Statistics is the discipline that concerns:
  - a) collectionc) analysis

b) organisationd) interpretation

e) All of these

# **1.6 INFERENTIAL STATISTICS**

As a researcher, we often use the Interpretation of numerical data. Also, call it **Interpretation/ inference.**The practical use of statistics is to draw inferences from the numerical data.

When it comes to drawing inferences, we have to go by two approaches and that depends upon the nature of our data.

So, we can have two types of approaches here, depending upon the shape of the distribution and certain assumptions whether our data fulfill them or not and we call these two approaches:

# 1) Parametric Statistics and

# 2) Non- Parametric Statistics

# **1.6.1** Measures of Correlations:

The most commonly used**correlation** is **Pearson Correlation**which measures the degree of linear relationship between two variables. By linear relationship we mean that the relationship can be well-characterized by a straight line.

Correlation ranges from -1.0 to +1.0

**Pearson correlation** is given by the letter "**r**". For Example, **r** = **.55** 

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You will never see a correlation of **1.2** value or above the range given in previous line. If your answer comes outside this range than there is something wrong.

#### There are three types of Relationships:

- 1. Positive: Higher scores on X are associated with higher scores on Y and vice versa.
- 2. Negative: Higher scores on X are associated with lower scores on Y and vice versa.
- 3. No relationship: there is no predictable relationship between X and Y.

#### 1.6.2 Linear Regression:

Linear regression is the next step up after correlation. It is used when we want to predict the value of a variable based on the value of another variable. The variable we want to predict is called the dependent variable (or sometimes, the outcome variable). The variable we are using to predict the other variable's value is called the independent variable (or sometimes, the predictor variable)("Linear Regression Analysis in SPSS Statistics - Procedure, Assumptions and Reporting the Output.," n.d.)

For example, you could use linear regression to understand whether exam performance can be predicted based on revision time; whether cigarette consumption can be predicted based on smoking duration; and so forth. If you have two or more independent variables, rather than just one, you need to use multiple regression.

In statistics, Linear Regression is a linear approach of modelling the relationship between a dependent and independent variable("Linear Regression," 2022)

Kumari, K., & Yadav, S. (2018) in their article defined linear regression as a statistical procedure for calculating the value of a dependent variable from an independent variable. Linear regression measures the association between two variables. It is a modelling technique where a dependent variable is predicted based on one or more independent variables. Linear regression analysis is the most widely used of all statistical techniques.

Before carrying out linear regression in SPSS, lets understand the different assumptions that your data must meet in order for linear regression to give you a valid result.

# Assumptions for Linear Regression

- Assumption 1: Your dependent variable should be measured at the continuous level (i.e., it is either an interval or ratio variable).
- Assumption2: Your independent variable should also be measured at the continuous level (i.e., it is either an interval or ratio variable).
- Assumption 3: There needs to be a linear relationship between the two variables.
- Assumption 4: There should be no significant outliers.



- Assumption 5: You should have independence of observations, which you can easily check using the Durbin-Watson statistic, which is a simple test to run using SPSS Statistics.
- Assumption 6: Your data needs to show homoscedasticity, which is where the variances along the line of best fit remain similar as you move along the line.
- Assumption 7: Finally, you need to check that the residuals (errors) of the regression line are approximately normally distributed.

# 1.6.3 Chi-Square Test:

A chi-squared test, also written as  $\chi^2$  test, is a <u>statistical hypothesis test</u>.

The **Chi-Square** statistic is commonly used for testing relationships between categorical variables.

The null hypothesis of the Chi-Square test is that no relationship exists on the categorical variables in the population; they are independent.

The Chi-square test is used for comparing experimentally obtained results with those to be expected.

#### **Types of Chi-Square Tests**

There are three types of Chi-square tests,

- 1. **Test of goodness of fit:** It is used to find out how the observed value of a given phenomena is significantly different from the expected value. Here the term goodness of fit is used in order to compare the observed sample distribution with the expected probability distribution
- 2. **Test of independence:** It looks for an association between two categorical variables within the same population. It is applied to test the relationship between variables. In this we test whether two variables are dependent or independent to each other.
- 3. **Test of homogeneity:** The test for homogeneity determines if the distribution of a variable is the same in each of several populations (thus allocating population itself as the second categorical variable).

All three tests also rely on the same formula to compute a test statistic.

#### **1.6.4 T-Test:**

# **One Sample T-Test**

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The reason we use one sample t-test here is that when we have one variable. The One Samples T-Test is a parametric test. One important thing in one sample t-test is to look at the test value box and put the value that we comparing our scores to.

#### **Independent Sample T-Test**

The Independent Samples t Test compares the means of two independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different. The Independent Samples T- Test is a parametric test.

#### **Dependent Sample T-Test**

In Dependent sample t-test, we do not have grouping variable rather we have only one group of people. So we do not have two separate groups or unrelated groups or independent groups. So these values are naturally dependent and related because same person producing them.

Dependent Sample t-test Known by different name like Dependent Sample t-test or Paired samples t-test or Related Samples t-test. It is a parametric test.

# 1.6.5 Z-Test:

Z-tests are the statistical tests that can be used to compare population averages to a sample's. The z-test will tell you how far, in standard deviations terms, a data point is from the average of a data set. A z-test will compare a sample to a defined population that is typically used for dealing with problems relating to large samples (i.e., n > 30) and are very useful when the standard deviation is known("Tests of Hypothesis," n.d.).

Z test is a statistical test that is conducted on data that approximately follows a normal distribution. The z test can be performed on one sample, two samples, or on proportions for hypothesis testing. It checks if the means of two large samples are different or not when the population variance is known.

A z test can further be classified into left-tailed, right-tailed, and two-tailed hypothesis tests depending upon the parameters of the data.

A z test is a test that is used to check if the means of two populations are different or not provided the data follows a normal distribution. For this purpose, the null hypothesis and the alternative hypothesis must be set up and the value of the z test statistic must be calculated. The decision criterion is based on the z critical value.

A z test is conducted on a population that follows a normal distribution with independent data points and has a sample size that is greater than or equal to 30. It is used to check whether the means of two populations are equal to each other when the population variance is known. The null hypothesis of a z test can be rejected if the z test statistic is statistically significant when compared with the critical value.

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The z test formula compares the z statistic with the z critical value to test whether there is a difference in the means of two populations. In hypothesis testing, the z critical value divides the distribution graph into the acceptance and the rejection regions. If the test statistic falls in the rejection region then the null hypothesis can be rejected otherwise it cannot be rejected.

z tests are a statistical way of testing a hypothesis when either:

- We know the population variance, or
- We do not know the population variance but our sample size is large  $n \ge 30$

If we have a sample size of less than 30 and do not know the population variance, then we must use a t-test(Meena, 2020)

# **One-Sample Z test**

We perform the One-Sample Z test when we want to compare a sample mean with the population mean.

#### Formula:



Two Sample Z Test

We perform a Two Sample Z test when we want to compare **the mean of two samples**.

# Formula:

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The term F-test is based on the fact that these tests use the F-values to test the hypotheses. An F-statistic is the ratio of two variances and it was named after Sir Ronald Fisher. Variances measure the dispersal of the data points around the mean. Higher variances occur when the individual data points tend to fall further from the mean(Frost, 2017)

F test can be defined as a test that uses the f test statistic to check whether the variances of two samples (or populations) are equal to the same value. To conduct an f test, the population should follow an f distribution and the samples must be independent events. On conducting the hypothesis test, if the results of the f test are statistically significant then the null hypothesis can be rejected otherwise it cannot be rejected("F Test - Formula, Definition, Examples, Meaning," n.d.).

Analysis of variance (ANOVA) uses F-tests to statistically assess the equality of means when you have three or more groups.

In One Way ANOVA, the one way stands for one independent variable. Itssimilar to independent sample t test and that is used to compare independent or unrelated groups. But Independent Sample t test is used to compare only two groups, whereas ANOVA can be used to compare two, three, four, five, six or more groups, as many as you need to test. There is two way ANOVA also.The two way stands for two independent variable, Like we could have volume, gender( males and females)( two independent variables) and then exam scores.



### **IN-TEXT QUESTIONS**

6. Correlation ranges from -1.0 to +1.0. True / False

\_\_\_\_•

- 7. ANOVAstands for \_\_\_\_\_
- 8. A chi-squared test, also written as \_\_\_\_\_
- 9. Linear Regression is a linear approach of modelling the relationship between a dependent and independent variable.True / False
- 10. Z test is a statistical test that is conducted on data that approximately follows a normal distribution. True / False

# **1.7 Hands-On Through Statistical Software: SPSS**

#### **1.7.1 Descriptive Statistics:**

	🙀 Frequencies: Statistics	×
	Percentile Values          Quartiles         Quartiles         Cut points for:         10       equal groups         Percentile(s):         Add         Change         Remove	Central Tendency
		Values are group midpoints
	Dispersion	Distribution
	🔲 Std. deviation 🕅 Minimum	Ske <u>w</u> ness
	🔲 Variance 📄 Maximum	🔲 <u>K</u> urtosis
$\bigcirc$	Range S.E. mean	
	Continue Cancel	Help

**Fig 1.1:** SPSS: Descriptive Statistics (*Source: SPSS - Statistical Package for the Social Sciences—Quick Overview. (n.d.). Retrieved June 13, 2021, from https://www.spss-tutorials.com/spss-what-is-it/*)

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Delhi



#### **Measures of Central Tendency**

#### **Calculating - Mean, Median and Mode**

# Statistics

# Marks obtained in the examinati

Ν	Valid	200
	Missing	0
Mean		69.615
Median		71.000
Mode		76.0
Sum		13923.0

				• •	_
		Marks obt	ained in the	examination	
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	35.0	2	1.0	1.0	1.0
	43.0	2	1.0	1.0	2.0
	44.0	4	2.0	2.0	4.0
	45.0	2	1.0	1.0	5.0
	49.0	4	2.0	2.0	7.0
	51.0	1	.5	.5	7.5
	52.0	4	2.0	2.0	9.5
	54.0	21	10.5	10.5	20.0
	55.0	8	4.0	4.0	24.0
	61.0	2	1.0	1.0	25.0
	64.0	4	2.0	2.0	27.0
	65.0	28	14.0	14.0	41.0
	66.0	14	7.0	7.0	48.0
	67.0	1	.5	.5	48.5
	71.0	4	2.0	2.0	50.5
	76.0	38	19.0	19.0	69.5
	77.0	8	4.0	4.0	73.5
	78.0	23	11.5	11.5	85.0
	80.0	4	2.0	2.0	87.0
	84.0	1	.5	.5	87.5
<i>`</i>	87.0	8	4.0	4.0	91.5
	88.0	6	3.0	3.0	94.5
	92.0	1	.5	.5	95.0
	95.0	1	.5	.5	95.5
	98.0	5	2.5	2.5	98.0
	99.0	4	2.0	2.0	100.0
	Total	200	100.0	100.0	

#### **Measures of Dispersion**

#### Calculating – Standard Deviation, Variance, Range and Standard Error of Mean

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### Statistics

#### Marks obtained in the examinatior

И	Valid	200
	Missing	0
Std. Er	ror of Mean	.9530
Std. De	eviation	13.4779
Varian	ce	181.655
Range		64.0

	ota. Enor or mean			.9550		
	Std. [	Deviation		13.4779		
	Varia	nce		181.655		
	Range			64.0		
					-	
		Marks obt	ained in the	examination		
		Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	35.0	2	1.0	1.0	1.0	
	43.0	2	1.0	1.0	2.0	
	44.0	4	2.0	2.0	4.0	
	45.0	2	1.0	1.0	5.0	
	49.0	4	2.0	2.0	7.0	
	51.0	1	.5	.5	7.5	
	52.0	4	2.0	2.0	9.5	
	54.0	21	10.5	10.5	20.0	
	55.0	8	4.0	4.0	24.0	
	61.0	2	1.0	1.0	25.0	
	64.0	4	2.0	2.0	27.0	
	65.0	28	14.0	14.0	41.0	
	66.0	14	7.0	7.0	48.0	
	67.0	1	.5	.5	48.5	
	71.0	4	2.0	2.0	50.5	
	76.0	38	19.0	19.0	69.5	
	77.0	8	4.0	4.0	73.5	
	78.0	23	11.5	11.5	85.0	
	80.0	4	2.0	2.0	87.0	
	84.0	1	.5	.5	87.5	
	87.0	8	4.0	4.0	91.5	
	88.0	6	3.0	3.0	94.5	
	92.0	1	.5	.5	95.0	
	95.0	1	.5	.5	95.5	
	98.0	5	2.5	2.5	98.0	
	Jaila Jaila	200	100.0	100.0	100.0	
	rotar	200	1 100.0	100.0	1	

# **1.7.2 Inferential Statistics: Measures of Correlations**

#### How to calculate Correlation Coefficient in SPSS.

#### **Run Correlation in SPSS Using Below Example**

We have two variables - Hours of media or hours media and college GPA.



We recorded the number of hours of media during a given week that individuals engaged in, and media could be TV, movies, internet and so on. And then we also obtained their college GPA.

We want to see if there's a relationship between these two variables, as measured by Pearson's r (our correlation).

So here will check the negative correlation which means that High on hours of media leads to low college GPA and vice versa.

So let's run the analysis and see what happens.

#### Go toAnalyze→ Correlate →Bivariate

**Bivariate** means two and it's just another name for a variable. So, we use Bivariate when we have two variables.

Then Bivariate correlation box opens. Select the variables and move to the right box. And click OK.

# **Output of Correlation**

Correlations					
		Hours_media	College_GPA		
Hours_media	Pearson Correlation	1	727**		
	Sig. (2-tailed)		.001		
	Ν	17	17		
College_GPA	Pearson Correlation	727**	1		
	Sig. (2-tailed)	.001			
	Ν	17	17		

\*\*. Correlation is significant at the 0.01 level (2-tailed).

# **Interpret of Correlation**

Now we want to see where Hours of media and college GPA intersect or meet. So as per the result shown in the output, they meet at -.727. Either box is fine to look at.

Our Pearson's Correlation is = -.727 and p-value is =.001

Will use the decision rule here with an alpha value **.01** 

If p is less than or equal to .01, the test is significant (there is a significant relationship between hours of media watched and college GPA).

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If p is greater than **.01**, the test is not significant (there is not a significant relationship between hours of media watched and college GPA).

In our example, p-value is =.001 which is less than .01 and which indicates that the test is significant (there is a significant relationship between hours of media watched and college GPA).



# **Graph Output--Correlation**

Notice the circles in the graph, they will be the total number of people, like in our example it is **17**. Each circle represents the value for a given individual in my data set.

Double-click the graph to read it. This characterises a negative relationship, high on one variable and low on other or vice versa. That is how we define a negative relationship.

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# M-105 - RESEARCH METHODOLOGY



Now right-click the plot and then a shortcut menu opens and select Add a fit line at total and then select linear and then close.

Now you can see the line is used to represent or fit the data points in general.

This is what we are doing in Pearson's correlation. We are using correlation that estimates the linear or straight-line relationship.

#### Linear Regression

SPSS Statistics procedure to perform a Linear Regression using Below Example

How to run simple regression.

Example- We have two variables- high school GPA and College GPA. and reported for 10 people.

Regression is very similar to correlation.

Simple Regression - use scores on one variable, X, and predict scores on another variable, Y.

X= predictor or independent variable (IV) (high school GPA)

Y= criterion or dependent variable (DV) (College GPA)

(Simple regression uses one X: Multiple regression uses two or more Xs)

Run the simple Regression in SPSS -

Go to Analyze  $\rightarrow$  regression  $\rightarrow$  linear (for linear relationship in the two variables)

High school GPA- IV and College GPA- DV and click OK

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#### **Output of Regression**

#### Variables Entered/Removed<sup>a</sup>

Model	Variables Entered	Variables Removed	Method
1	HS_GPA <sup>b</sup>		Enter

a. Dependent Variable: College\_GPA

b. All requested variables entered.

#### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.807 <sup>a</sup>	.652	.608	.36772

a. Predictors: (Constant), HS\_GPA

ANOVA<sup>a</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.025	1	2.025	14.972	.005 <sup>b</sup>
	Residual	1.082	8	.135		
	Total	3.106	9			

a. Dependent Variable: College\_GPA

b. Predictors: (Constant), HS\_GPA

#### / -

Coefficients <sup>a</sup>						
Unstandardized Coefficients Coefficients						
Model		В	Std. Error	Beta	t	Sig.
1 (Con:	stant)	.517	.700		.738	.481
HS_C	€PA	.880	.227	.807	3.869	.005

a. Dependent Variable: College\_GPA

# **Interpret of Regression**

First Table - Variable Entered/Removed Table: here we just have our independent variable.

Second Table - Model Summary: R and R square are two important values here.

#### In Model Summary Table

R = Multiple correlation coefficient; in simple regression it is equal to the Pearson's correlation.

R = .81; correlation of .81 between HS\_GPA and College\_GPA (we also saw this in the correlation table)

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R square = the amount of variance in the DV (criterion) that is accounted for or explained by IV(predictor).

Convert the R square value to percentage by multiplying by 100

HS\_GPA explains 65% of the variance in College\_GPA

Variance in dependent variable college gpa, if it is represented by circle and that circle could be a pie or pizza.

So 65%  $\ell_3$  of pie), that's how in terms of the v ariability in the college GPA scores, the variability in those values we can account for or explain.

Third Table- ANOVA: here will assess if high school GPA is a significant predictor of college GPA or not.

versit Does it help to predict college GPA beyond chance alone?

We can use either ANOVA or Coefficient table for this.

ANOVA p value=.005

Coefficient p value=.005

Both are identical. These are testing the exact same thing.

Use decision rule now with alpha value .05

If p is less than or equal to .05, the test is significant (high school GPA is a significant predictor of College GPA).

If p is greater than .05, the test is not significant (high school GPA is a significant predictor of College GPA).

In our example, p value is =.005 which is less than .01 and which indicates that the test is significant (high school GPA is a significant predictor of College GPA).

# **Chi-Square Test**

# SPSS Statistics procedure to perform a Chi-Square Goodness of Fit test using Below **Example**

In this hypothetical study we had 60 people who engaged in a blind taste test of the two leading brands of COLA. Referred to them as COLA A and COLA B.

We have Two variables: Cola and frequency.

Will conduct a Chi square goodness of fit test to assess the following...

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# Of two leading brands of Cola, do people prefer one over the other?

So, you can use Chi square goodness of fit test when you are seeing if there's a significant preference for one or more categories.

In our study we have only two categories called A and B.

Here 1 = Cola A and 2 = Cola B

So, of the 60 people, 28 people ended up choosing A and 32 ended up choosing B. without knowing which is which.

So will run the test to see if there is a significant preference for one of the two colas.

# Procedure

Now first thing we need to do here before running the test is to, weight the frequency variable.

If we look at the frequency value : SPSS will think that it's just an ordinary value or score in a exam.

But we actually mean this to indicate that there were 28 people who chose Cola A and 32 people who chose Cola B

For telling SPSS this we have to do something.

So go on Data click on weight cases and now we want to select the variable frequency . So select the variable frequency and click on weight cases by. And now move the frequency variable in the frequency variable box. And now click OK.

Now see at the bottom of the screen it will say "weight on" which indicates that one of the variable is currently being weighted.

So now SPSS will interpret 28 people choose Cola A and 32 people choose Cola B.

Will use Alpha value : 0.05 And for the chi-square its similar to the ANOVA F and that is really just one tailed by design.

Lets run the Chi Square Goodness of Fit test in SPSS

Go to Analyze $\rightarrow$ then scroll down to nonparametric testsselectLegacy Dialogs go to Chi Square. Now the Chi square test dialog box opens.

Move Cola to the test variable list, and click OK



# **Output: Chi-Square Test**

# Frequencies

cola					
	Observed N	Expected N	Residual		
1.00	28	30.0	-2.0		
2.00	32	30.0	2.0		
Total	60				





# Test Statistics

	cola		
Chi-Square	.267 <sup>a</sup>		
df	1		
Asymp. Sig.	.606		
a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 30.0.			

# **Interpret: Chi-Square Test**

We have two tables 1)Frequencies Table and 1) Test Statistics table

In the first table frequencies we have our variable Cola and notice the observed and that indicated what we actually got in our study.

Observed N - 28 people chose cola A and 32 people chose Cola B

Expected N - that are the frequencies that are expected if there's no preferences for either Cola.

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# M-105 - RESEARCH METHODOLOGY



So if there is no preference, in the long run will expect that half of the people will chose cola a and cola b.

Question is - this 28 and 32. Is that different enough to be significant or not?

Now will go to our Test Statistics Table to answer that question.

So will look at the p value, which is given here as Asymptotic Significance =.606

So will use our decision rule here .

Will use our decision rule here. With alpha value 0.05

If p is less than or equal to .05, the test is significant(there is a preference for one of the two types of colas).

If p is greater than .05, the test is not significant(there is not a preference for one of the two types of colas).

As our P value is .606 which is greater than .05 so the test is not significant(there is not a preference for one of the two types of colas).

Write Results in APA format

There was not a significant preference for either type of cola,  $\chi^2(1,N=60) = .27$ , p= .606.

# T-Test

# **One Sample T-Test**

The reason we use one sample t-test here is that when we have one variable. The One Samples T-Test is a parametric test. One important thing in one sample t-test is to look at the test value box and put the value that we comparing our scores to.

For example - We took Data of 30 people on variable name Perception.

Do People view the politicians as either as significantly favourable or unfavourable? Thirty people were asked: How do you view\_\_\_\_?

- 1. Highly unfavourable
- 2. Somewhat unfavourable
- 3. Slightly unfavourable
- 4. Neither favourable nor unfavourable
- 5. Slightly favourable

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- 6. Somewhat favourable
- 7. Highly favourable

Test the response of the people against test value 4.(neither favourable nor unfavourable).

So we want to test in SPSS whether the opinion of the 30 people differed significantly from a 4 as a 4 indicates neutral response.



# **Output - One Sample T-Test**

#### One-Sample Statistics

	Ν	Mean	Std. Deviation	Std. Error Mean
Perception	30	4.2333	1.43078	.26122

#### One-Sample Test

	Test Value = 4									
				Mean	95% Confidence Interval of t Difference					
	t	df	Sig. (2-tailed)	Difference	Lower	Upper				
Perception	.893	29	.379	.23333	3009	.7676				

**Fig 1.1:** Output: One Sample T-Test (*Source: SPSS - Statistical Package for the Social Sciences—Quick Overview. (n.d.). Retrieved June 13, 2021, from https://www.spss-tutorials.com/spss-what-is-it/*)

# **Interpret - One Sample T-Test**

Let's evaluate whether or not the test is statistically significant for which we will use decision rule.

Our P value =.379 and it is greater than .05.

So the test is not significant, which means that sample is not significantly different from the mean for the response of 30 people. The mean response did not significantly differ from a 4.

Now notice the 95% confidence interval of the difference here.



If the confidence interval include zero in the range that means the test is not statistically significant. In our case it does include zero. Which indicates that our test is not statistically significant.

We can always look at the confidence interval whether or not the test is statistically significant.

#### **Independent Sample T-Test**

The Independent Samples t Test compares the means of two independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different. The Independent Samples T- Test is a parametric test.

For example - We have two variables treatment(1=acupuncture, 2=massage) and pain\_level

After receiving this treatment for period of two weeks then respondent gave response on one to seven scale, the amount of pain they were currently experiencing at the end of the last treatment.

- 7 indicates highest degree of pain
- 1- indicates the lowest degree of pain

# **Output - Independent Sample T-Test**

Group Statistics								
	treatment	N	Mean	Std. Deviation	Std. Error Mean			
Pain_level	acupunture	15	4.6667	1.34519	.34733			
	massage	15	4.3333	1.29099	.33333			

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moepenoen	samples	1631

		Levene's Test for Equality of Variances			t-test for Equality of Means						
							Mean		95% Confidence Interval of the Difference		
		F	Sig.	t	ď	Sig. (2-tailed)	Difference	Difference	Lower	Upper	
Pain_level	Equal variances assumed	.026	.873	.692	28	.494	.33333	.48140	65277	1.31944	
	Equal variances not assumed			.692	27.953	.494	.33333	.48140	65285	1.31951	

**Fig 1.1:** Output: One Sample T-Test (*Source: SPSS - Statistical Package for the Social Sciences—Quick Overview. (n.d.). Retrieved June 13, 2021, from <u>https://www.spss-tutorials.com/spss-what-is-it/</u>)* 

# **Interpret - Independent Sample T-Test**

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Let's evaluate whether or not the test is statistically significant for which we will use decision rule.

Levene's test shows f=.026 and sig.=.873. Now on the basis of this we have to select which row of t will go for. As sig. (p value) .873 > .05 so variances are not significantly different. And will interpret the top row of results for t. So this leven test we do just to decide whether to interpret the top or bottom row of t.

Now the top row of t have t value=.692, df=28, sig(2-tailed) .494.

So our P value= .494 and it is greater than .05 which means that the test is not significant ( the pain level do not differ significantly for the treatment of acupuncture and massage).

Write results in APA format.

There was not a significant difference in the reported pain levels for those who receive acupuncture and massage therapy as treatment, t(28)=.69, p=.494.

Now notice the 95% confidence interval of the difference here.

If the confidence interval include zero in the range that means the test is not statistically significant. In our case it does include zero. Which indicates that our test is not statistically significant.

# **Dependent Sample T-Test**

In Dependent sample t-test, we do not have grouping variable rather we have only one group of people. So we do not have two separate groups or unrelated groups or independent groups. So these values are naturally dependent and related because same person producing them.

Dependent Sample t-test Known by different name like Dependent Sample t-test or Paired samples t-test or Related Samples t-test. It is a parametric test.

For example - we asked people to rate their openness to using E texts in the classroom and here we asked people on their freshman year, how open are you to using E texts in the classroom.

So electronic text in place of the regular physical textbooks and their response could range from 1 to 10.

1 - indicates they were not at all open to using e texts.

10 - indicates that they were very much open to using e texts in classroom.

And than in the senior year, they were asked the same question again.



Hypothetical question is - Do people's opinions change towards using E-texts from their freshman to their senior years? So we want to see whether people's opinions change over time, that is from freshman year to senior year.

# **Output - Dependent Sample T-Test**

Paired Samples Statistics							
		Mean	N	Std. Deviation	Std. Error Mean		
Pair 1	Freshman	3.4000	10	1.83787	.58119		
	Senior	5.9000	10	2.23358	.70632		

Paired Samples Correlations						
		N	Correlation	Sig.		
Pair 1	Freshman & Senior	10	.498	.143		

	Paired Samples Test											
					95% Confidence Interval of the		1					
				Std. Error	Difference							
		Mean	Std. Deviation	Mean	Lower	Upper	t	df	Sig. (2-tailed)			
Pair 1	Freshman - Senior	-2.50000	2.06828	.65405	-3.97956	-1.02044	-3.822	9	.004			

Fig 1.1: Output: Dependent Sample T-Test (*Source:* SPSS - Statistical Package for the Social Sciences—Quick Overview. (n.d.). Retrieved June 13, 2021, from <u>https://www.spss-tutorials.com/spss-what-is-it/</u>

# **Interpret - Dependent Sample T-Test**

Let's evaluate whether or not the test is statistically significant for which we will use decision rule.

If p value is less than or equal to .05 than test is significant (openness to e-texts changed from freshman to senior years).

If p value is greater than .05 than test is not significant (openness to e-texts do not changed from freshman to senior years).

Our p value is .004 < .05 so test is significant (openness to e-texts changed from freshman to senior years).

# **Z-Test**

Here's an Example to Understand a One Sample Z Test

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Let's say we need to determine if girls on average score higher than 600 in the exam. We have the information that the standard deviation for girls' scores is 100. So, we collect the data of 20 girls by using random samples and record their marks. Finally, we also set our  $\alpha$  value (significance level) to be 0.05.



#### **One-Sample Z test**

We perform the One-Sample Z test when we want to compare a sample mean with the

#### population mean.

Here's an Example to Understand a One Sample Z Test

Let's say we need to determine if girls on average score higher than 600 in the exam. We have the information that the standard deviation for girls' scores is 100. So, we collect the data of 20 girls by using random samples and record their marks. Finally, we also set our  $\alpha$  value (significance level) to be 0.05.

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Score 

In this example:

- Mean Score for Girls is 641
  The size of the sample is 20
- The size of the sample is 20The population mean is 600
- Standard Deviation for Population is 100

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Since the P-value is less than 0.05, we can reject the null hypothesis and conclude based on our result that Girls on average scored higher than 600.

#### **Two Sample Z Test**

Here's an Example to Understand a Two Sample Z Test

Here, let's say we want to know if Girls on average score 10 marks more than the boys. We have the information that the standard deviation for girls' Score is 100 and for boys' score is 90. Then we collect the data of 20 girls and 20 boys by using random samples and record their marks. Finally, we also set our  $\alpha$  value (significance level) to be 0.05.

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# M-105 - RESEARCH METHODOLOGY

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Score



In this example:

• Mean Score for Girls (Sample Mean) is 641

- Mean Score for Boys (Sample Mean) is 613.3
- Standard Deviation for the Population of Girls' is 100
- Standard deviation for the Population of Boys' is 90
- Sample Size is 20 for both Girls and Boys
- Difference between Mean of Population is 10



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Thus, we can conclude based on the P-value that we fail to reject the Null Hypothesis. We don't have enough evidence to conclude that girls on average score of 10 marks more than the boys.

### F-Test in One-Way ANOVA (Analysis of Variance)

**For Example -** we have two variables: Volume (independent variable) and Exam scores(dependent variable). Background of the study is that we have people who listened to either they have no music, low volume or they had high volume playing while they were studying and then the next day they took the exam and these once again are their exam scores.

So we use the ANOVA to see if there is a significant difference between these groups one, two and three are no volume, low volume or high volume groups.

In this example our independent variable is volume and it consists of three groups...no volume, low volume or high volume. These groups can also be called levels. New terminology used in ANOVA are Levels and factors.

Hypothetical question for one way ANOVA test is...

Does the volume of background noise while studying for an exam have an impact on exam scores?

In the study we have 30 people and they were randomly assigned to the respective groups.

# **Output : One-Way ANOVA**(Analysis of Variance)

exam_scores								
					95% Confidence Interval for			
					Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
none(no music)	10	84.9000	5.80134	1.83455	80.7500	89.0500	77.00	94.00
low volume	10	84.2000	5.86515	1.85472	80.0043	88.3957	78.00	92.00
high volume	10	77.5000	6.34648	2.00693	72.9600	82.0400	65.00	84.00
Total	30	82.2000	6.71796	1.22653	79.6915	84.7085	65.00	94.00

Descriptives

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ANOVA

exam_scores					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	333.800	2	166.900	4.622	.019
Within Groups	975.000	27	36.111		
Total	1308.800	29			

Source :*SPSS - Statistical Package for the Social Sciences—Quick Overview.* (n.d.). Retrieved June 13, 2021, from https://www.spss-tutorials.com/spss-what-is-it/

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### Interpret : One-Way ANOVA(Analysis of Variance)

Let's evaluate whether or not the test is statistically significant for which we will use decision rule.

In ANOVA we get f value instead of t. F value = 4.622 and sig.(p value)=.019

If p value is less than or equal to .05 than test is significant( the test scores differ significantly somewhere between the groups).

If p value is greater than .05 than test is not significant(the test scores differ significantly somewhere between the groups).

Our p is .019 < .05 so test is significant( test scores differ significantly somewhere between the groups ).

### Write results in APA format.

The level of volume of music played while studying had a significant impact on exam performance, F(2,27)=-4.622, p=.019.

Now notice the 95% confidence interval of the difference here.

If the confidence interval include zero in the range that means the test is not statistically significant. In our case it does not include zero. Which indicates that our test is statistically significant.

# 1.8 SUMMARY

In this lesson, the learner will get the brief understanding of Statistics and its application in research. We have discussed about two important functions of Statistics i.e., Descriptive and Inferential Statistics. In Descriptive Statistics, we discussed measure of central tendency and measures of dispersion with example in SPSS. In Inferential Statistics, we discussed measures of correlation, linear regression and various tests conducted in research like chi-square test, t-test, z-test and f-test with example in SPSS.

# 1.9 GLOSSARY

**Statistics:** It is defined as the process of collection of data, classifying data, representing the data for easy interpretation, and further analysis of data.

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**DataAnalysis:**Data analysis is a process of inspecting, cleansing, transforming, and modelling data with the goal of discovering useful information, informing conclusions, and supporting decision-making.

**Data Interpretation:**Data interpretation refers to the process of using diverse analytical methods to review data and arrive at relevant conclusions.

**Descriptive Statistics:** A descriptive statistic (in the count noun sense) is a summary statistic that quantitatively describes or summarizes features from a collection of information.

**Inferential Statistics:** A inferential statistics focus on making generalizations about a larger population based on a representative sample of that population. It focuses on making predictions (rather than stating facts) its results are usually in the form of a probability.

# 1.10 ANSWERS TO IN-TEXT QUESTIONS

1. True	6. True
2. True	7. Analysis of Variance
3. True	8. $x^2$ test
4. True	9. True
5. (e)	10. True

# 1.11 SELF-ASSESSMENT QUESTIONS

- 1. Explain Descriptive Statistics with examples.
- 2. Explain Inferential Statistics with examples.
- 3. Define Statistics
- 4. Conduct chi-square test using real life example.
- 5. Conduct z-test and t-test using real life example.

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# LESSON 12

# PRESENTATION OF DATA: TABULAR, GRAPHIC, BAR DIAGRAM AND PIE CHART, etc.

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# **1.1 LEARNING OBJECTIVES**

The objectives of the lesson are to develop a holistic approach todevelopan understanding of data presentation. After finishing the lesson, you shall be able to

- > Understand how you will presentyour discrete data in any format
- > Identify the different types of data presentation mode
- > Know the importance, arrangement, and standard of data presentation
- Design the procedure fordata presentation
- > Know about both tabular and diagrammatic presentation of data
- Improve your data presentation
- > Examine the data in differentformats, styles, and presentation

# **1.2 INTRODUCTION**

The term data is quite familiar today, sometimes its overlaps with term information often used as synonyms. It is important for LIS professionals to understand the meaningof data and to adopt appropriate methods while presenting the data. The important part of data is how and where it comes from. Data is basically of two types: i) primary data (original source i.e., collected by own) ii) secondary data (derived from primary data). There are several methods of data collection inmultiplefields. Itdepends on which type of research is going to conduct such as interdisciplinary, multi-disciplinary or cross-disciplinary, etc. Some of the data collection methods are observation method, survey method, interview method, questionnaire method, etc. After the collection of data is completed, your work should focus on transforming these raw data into a usable format that will lead to the presentation of the data in the form of a chart and table. The systematic arrangement and classification of data are very important before selecting the structure of the graph. The presentation of data is a very careful and useful step while displaying our findings for that we need to decide on the appropriate structure and shape of the graph. Data must be presented in a concise and appealing manner because they are frequently large in size. This chapter focuses on the accurate presentation of data so that the vast amounts of information gathered can be rendered usable and understandable. Data presentation typically takes one of three forms:



- I. Textual or Descriptive presentation
- II. Tabular presentation
- III. Diagrammatic presentation.

### 1.3 **OBJECTIVES OF DATA PRESENTATION**

Thedata should be presented in a simple, concise objective orientated manner. It should arose the interest of the learner. Further, facilitate statistical analysis and suggest a solution to the problem. It should convey its message as simply as possible. It must not exceed its word limit, be flexible, and learner center. The data presentation's goal is clear, and it always aids value in delivering the facts in the form of: ersityof

- Visual communication
- Charts, Graphs, and Image
- Design Principles
- ➢ Audience and Context
- > Storytelling
- Persuasiveness
- Dashboards

### PRINCIPLE OF DATA PRESENTATION 1.4

Data presentation is arts. It should be carried out in a way that satisfies the user's informational requirements. It must provide a comprehensive overview of the subject and help in future endeavors. It must be attractive, and comparative, and draw attention to the important points. The principles of data presentation itself have a variety of opinions. Mike Bell (2021) in his presentation listed ten principles of data presentation as follows:

- i. Asses variation before assurance
- ii. The control chart should dominate
- iii. Other key charts are the Run/Line, Pareto & Distribution Charts
- iv. A number of charts the whole system view
- Capture balancing measures v.
- Use raw data whenever possible vi.
- vii. Metrics Should be plotted in fixed units of time
- viii. The One minute test
  - The narrative should support the charts ix.
  - Consider all forms of intelligence х.

### 1.5 **TEXTUAL OR DESCRIPTIVE DATA PRESENTATION**

Data are described in the text when presented textually. This type of presentation is more appropriate when the amount of data is not too large.Textual resources with extra metadata

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that are utilized for language and linguistic research include lexicons, text corpora, speech and text databases, and other sources. Uses of text corpora include: dictionaries, instructional aids, word lists spelling checks, etc. Data compression is a term most likely used in the case of summarising textual or descriptive data in a shorter form while going for representation. Data compression refers to any technique that reduces the length of the text in a particular data file. Text is represented in either natural languages or written into any programming language like HTML that produces the document in HTML format and other formats also accept textual representation of data like Docx format, pdf, etc. The major problem of this type of representation is that one must read the presentation's entire text to understand it. But it's also true that this issue frequently allows one to highlight particular aspects of the presentation.

### 1.5.1 Important factors during textual presentation of data

While presenting the contextual data, textual presentation is very useful. It helps to point out the specific information during explanation and analysis. The following points are useful while considering the textual presentation:

- 1. Language should be written in an understandable format highlighting the main points targeting their base audience.
- 2. Any kind of unfairness should be avoided like slanted, biased, or emotionallanguage, and maintained accuracy with numbers and percentages.
- 3. Make a simple presentation and avoid unnecessary details.
- 4. Data should be monotonous do not contain the same information again and again.
- 5. Avoid long statements, and short as much as possible.
- 6. Do not use qualifiers words like little, never, must, exactly, all, always, etc.
- 7. Use scholarly language instead of decorative language.

### **1.5.2** Advantages f textual presentation

According to In and Lee, 2017, the text is the principal method for explaining findings, outlining trends, and providing contextual information. The textual presentation is more appropriate for a detailed explanation of data. Some of the advantages of textual data presentation are:

- 1. It helps to explain contextual information more elaborately.
- 2. It is an effective method for qualitative data that is difficult to explain in other formats like tables or graphs.
- 3. It helps to emphasize some crucial points in the data and also allows the user to draw their own conclusion about the text.
- 4. It is mainly suitable for a small set of data where a table or graph is not required. For example, The total strength of the bus is 40 out of which 25 are male and 15 are female.

### 1.5.3 Disdvantagesof textual presentation

The textual presentation always contains words and paragraphs that are not appropriate for the presentation. Some of the disadvantages of textual presentation are:

- 1. It is an ineffective method for large data because it doesn't use a table or graph.
- 2. It very draws conclusion from textual data and same it is time taking.
- 3. Sometimes it may lead to wrong analysis because of wrong interpretation.

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4. It requires reading of the whole text sometimes it is not possible.

# 1.6 TABULAR DATA PRESENTATION

Tabular data presentation most accurate mode of data presentation while considering large data. It is easy to read and well-coordinated in rows and columns. Its construction parts require some skill but the layout is simple. It is suitable to compare two or more tho subjects. It significant part that it provides additional decision-making and statistical treatment. There are four types of analysis utilized in the tabulation. As follows:

- 1. Qualitative
- 2. Quantitative
- 3. Temporal
- 4. Spatial

## **1.6.1** Tabulation of data and parts of a table

The tabulation is an orderly arrangement of data in the column and rows with respect to the characteristics that providea comparison, and statistical analysis, reduce the chance of error and must be compact and self-explanatory. The main objectives of tabulation are as follows:

- i. It provides a comparison
- ii. It provides statistical analysis
- iii. It provides additional value to data 📈
- iv. It also helps in avoiding the unnecessary gap.
- v. It makes data understandable to the common layman.

## PARTS OF TABLE

TABLE	It is a unique identification number given to each table
TITLE	It narrates the table content and is always at top of the
	table
CAPTIONS OR COLUMN	The column heading is known as "CAPTION". Always
HEADINGS	top first column explains about column contents.
STUBS OR ROW	The first row heading horizontally to the table is known as
HEADINGS	"STUBS". It explains about rows content
BODY OF THE TABLE	It is numeric facts arranged in both columns and rows that
	are read vertically from top to bottom and horizontally
	from left to right respectively.
UNIT OF MEASUREMENT	It is a kind of measurement used for both tables and rows
	and should be mentioned along with the title or alongwith
	'stubs' or 'captions'.
SOURCE	The bottom of the table indicates the original source of
	data

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NOTE	The last part of the table mentions specific features that
	are not self-explanatory in nature

Source: Retrieved from https://ncert.nic.in/textbook/pdf/kest104.pdf on 23 September 2022

### 1.6.2 Qualitativetabular data presentation

Qualitative data are descriptive, not measurable, exploratory, and always expressed in the form of quality such as color, appearance, texture, and other qualities. The classification of such data based on one of its qualities is known as qualitative classification. It provides understanding but is less reliable and objective. This kind of presentation is basically focus on theme rather than factual information and during presentation of data there will be chance



(Note : Table 4.5 presents the same data in tabular form already presented through *case 2* in textual presentation of data)

of error. In this table sex and location both are qualitatives attributes

	Loce	Location		
Sex	Rural	Urban		
Male	79	90	82	
Female	59	80	65	
Total	68	84	74	

Source: Retrieved from Census of India 2011. (Literacy rates relate to the population aged 7 years and above) on 24 September 2022

### 1.6.3 Quantativetabular data presentation



Qualitative data are measurable data. It can be of two types such as discrete and continuous data. These characteristics are expressed in numbers and expressed in factual findings. They range from lower to upper limits. In this type of data visual presentation is easy in tables and charts. There are a number of methods are used to present quantitative data such as line graphs, scattergrams, bar charts, and histograms.

## TABLE: DIFFERENT AGE GROUPS OF PEOPLE PARTICIPATED IN THE WORKSHOP

AGE GROUP (YRS)	NO. OF RESPONDENT
20-25	5
25-30	9
30-35	5
35-40	7
40-45	4
All	30

### 1.6.4 Temporaltabular data presentation

In the temporal tabulation method, variables are classified on the time factor. It may be any form like a minute, days, hours, months, weeks, year, etc.

TARI F.	VEADIV	CATEC	OF BOOK	FROM	2015 TO 2020
IADLL.	ILANLI	OALLO	OF DOOR	TROM	2013 10 2020

YEARS	NO. OF BOOKS
2015	200
2016	249
2017	351
2018	365
2019	402
2020	289
ALL	1856

### 1.6.5 Spatialtabular data presentation

In spatial classification, location factors are used for classification. It may be any place like rural /urban, block, district, state, country, etc.

### TABLE: LOCATION-WISE SALES OF BOOKS( FOUR MAIN CITIES)

PLACE	NO. OF BOOKS
DELHI	405
MUMBAI	509
KOLKATA	614
CHENNAI	756
ALL	2284

### 1.6.6 Limitation of tabular data presentation



Tabular data presentation has several advantages and disadvantages. Advantages are mentioned in the objectives of the tabular data presentation part. Some of the limitations of the tabular data presentation are listed below:

- i. Lacks description
- ii. Not represent a single item alone
- iii. Required special skills.
- iv. It is not easy to understand for laymen. etc

# **1.7 VISUAL DATA PRESENTATION**

Visual data presentation refers to the graphical or diagrammatical representation of data and information in the form of bar graphs, histograms, etc. It isanexcellent way of communicating data to a non-technical audience. It helps to understand patterns, trends, and outliers of market strategies. There are several methods of presentation of visual data in common use. Amongst them, the two major types are as follows:

- ✤ Graphical visual data presentation
- ✤ Diagrammatic visual data presenation

### **1.7.1** Graphical visual data presentation

The graphical visual data presentation is a visual representation between two variable along x and y axis for statistical data in the form of graphs, plots, and charts. It helpto correlate the influence of one variable upon the other variables. It is attractive method for analysing and representing quantative data. It suitable for large audience for effective understanding. There several graphical visual data representation such as Pie diagram , histograms, frequency graph etc.

### 1.7.2 Diagrammaticvisual data presentation

It is method of presenting quantative data through diagram such as cartograms, pictograms, bar diagrams and pie diagrams. It is most suitable for statistical data to presenting into attractive layout that are understand for large auidences. There are two major types of diagrammatical visual data presentation are :

- Non-frequency diagram
- Frequency diagram

### 1.7.2.1 NON-FREQUENCY DIAGRAM

Non-frquency diagram doesn't measure the repeation of the observation. For example, height of people in group. There are several types of non-frequency diagram such as:

**1.7.2.1.1 BAR DIAGRAM:**The visual display of data (often grouped) in the shape of vertical or horizontal rectangular bars, with the length of the bars



corresponding to the measure of the data, is called a bar diagram. Bar charts are another name for them.



**1.7.2.1.2 LINE DIAGRAM:** It use the line that connects the points or portions of the various data in the graph by taking two variables on horizontal and vertical axes. Line diagram may of single , double or multipe line diagram.



**1.7.2.1.3 PIE DIAGRAM OR PIE CHART:** Representation of data by using circles and spheres. In the pie diagrams, a circle is divided into parts, such that each part shows the proportion of various data.



## 1.7.2.2 FREQUENCY DIAGRAM

Frequency Diagramfrequency data are presented. Data having class interval are presented in this diagram. There are basically three main types of frequency diagram exists are as follows:

**1.7.2.2.1 HISTOGRAM:**Histograms are also similar to bar diagrams; they use rectangular bars to represent the data. But all the rectangular bars are kept without any gaps.



**1.7.2.2.2 FREQUENCY POLYGON:** The frequency polygon is a substitute for the histogram that is represented in the x and the y-axis where the x-axis indicates the dataset value and the y- axis indicates several occurrences in particular categories and a curve is known as the frequency polygon.

NUMBER OF STUDENTS IN AGE GROUPS IN MLIS			
CLASS LIMITS	FREQUENCY		
	•		

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15-21	4
22-28	9
29-35	6
36-42	8
43-49	3



**1.7.2.2.3 OGIVES**: It also deals with frequency cumulative distribution and explains data in a horizontal plane. Cumulative frequency is the sum of all the previous frequencies up to the current point. There are two types of ogives exits:

### TABLE: FREQUENCY DISTRIBUTION OF MARKS OF MLIS STUDENTS

Frequency d	istribution of	Less	than	cumulative	• More than the cumulative		
marks of mlis	student	frequer	icy di	istribution of	frequency distribution of		
		marks o	obtaine	ed in mlis	marks obtained in mlis		
Marks	Number of	Marks		'Less than'	Marks	'More than'	
	student			cumulative		cumulative	
				frequency		frequency	
0-20	9	Less	than	9	More than 0	80	
		20					
20-40	8	Less	than	17	More than	71	
		40			20		
40-60	35	Less	than	52	More than	63	
<b>N</b> Y		60			40		
60-80	24	Less	than	76	More than	28	
		80			60		
80-100	4	Less	than	80	More than	4	
		100			80		
Total	80						

**1.7.2.2.3.1 LESS THAN TYPES OGIVES:** The frequency of a class is increased by the frequencies of all preceding classes. The less than cumulative series is what this group is known as. The first-class frequency is added



to the second-class frequency, followed by the third class frequency, and so on, to create the final frequency. The less-than-cumulative series is the consequence of the downward cumulation.



**1.7.2.2.3.2 MORE THAN TYPES OGIVES:** The frequency of a class is increased by the frequencies of the next classes. The more than cumulative series is the name given to this set of numbers. It is created by taking the first class, the overall frequency, the second class frequency, the third class frequency, and so on. The result of the upward cumulation exceeds or exceeds the cumulative series.



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### **IN-TEXT QUESTIONS**

	1.	The data presentation help in visual
	2.	The data are basically and type.
	3.	Data presentation is useless for current scenario.True / False
	4.	Tabular data presentation are caterogrises as
		a) Qualitative b) Quantative
		c) Temporal d) All of these
	5.	The textual data also help in presentation.
	6.	The temporal data presentation time factors consider. True / False
	7.	In spatial data presentation which factors shoud be consider
	8.	Visual data presntation divided into two parts and
	9.	Examples of non-frequency diagram include
		a) Bar diagram b) Line Diagram
		c) Pie diagram d) All of these
	10	Or Ogives are basically how many types
1.8	S	UMMARY

In this module, you are going to develop an understanding of data presentation and going to understand various types of diagrams used for data presentation. As per the need and nature ofdata appropriate data presentation method should be selected to make the presentation more attractive and effective. A most important section of data presentation is the identification of the nature of data and mode presentation whether it may textual, tabular, or visual presentation. Before collection of data, we should be clear about our target population and for whom it is intended. All the data presentation methods are effective but things that always keep remembering are that it should be clear, simple, free from language bias, and understandable to laymen. After completing this module, you'll be able to draw reports and also going to enhance your chances of getting appreciation among scholar communities and business practices.

# 1.9 GLOSSARY

Data: A raw fact

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**Primary data**: It is collected by own (original data)

Secondary data: Derived from primary data

Contextual: Textual representation method that depends on a context

Tabular: Data presented in table form.

**Visual**: It is related to seeing graphs, diagrams, etc.

Frequency: Repetition of events.

**Polygon:** A flat Shape having more than three sides.

Temporal: classification of data based on time

Spatial: Classification of data based on place

# 1.10 ANSWERS TO IN-TEXT QUESTIONS

- 1. Communication
- 2. Primary and Secondary
- 3. False
- 4. All of these

7. Location

- 8. Graphical and diagrammatic
- 9. All of these

5. Contextual data

10.2

6. True

# 1.11 SELF-ASSESSMENT QUESTIONS

- 1. Explain the data presentation Discuss the various types of data presentation methods with suitable examples if needed.
- 2. Differentiate between frequency and non frequency diagrammatic presentation. Discuss its types with a suitable diagram.

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# LESSON 12 REPORT WRITING

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Importances of report writing
- 1.4 Characteristics of a good report
- 1.5 Standards of a good report
- 1.6 Types of report
  - 1.6.1 Oral Report
  - 1.6.2 Written Report
    - 1.6.2.1 Short Vs Long Report
    - 1.6.2.2 External Vs Internal Report
    - 1.6.2.3 Lateral Vs Vertical Report
    - 1.6.2.4 Formal Vs Informal Report
    - 1.6.2.5 Functional Report
    - 1.6.2.6 Descriptive Report
    - 1.6.2.7 Analytical Report
    - 1.6.2.8 Technical Report
    - 1.6.2.9 Informational Report
    - 1.6.2.10 Popular Report
    - 1.6.2.11 Proposal Report
    - 1.6.2.12 Research Report
      - 1.6.2.12.1 Brief Report
      - 1.6.2.12.2 Detailed Report
      - 1.6.2.12.3 Technical Report
      - 1.6.2.12.4 Business Report
- 1.7 Method of report writing
  - 1.7.1 Identification of Outlook
  - 1.7.2 Outline of Framework

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- 1.7.3 Sorting of data
- 1.7.4 Initiation of Report writing
- 1.7.5 Formulating the initial Draft
- 1.7.6 Revise and Redraft into Final Report
- 1.8 Report Writing Format
  - 1.8.1 First Section (Formality Part)
  - 1.8.2 Body section (Main Report)
  - 1.8.3 Appendix Section
- 1.9 Key consideration in Report Writing
- 1.10 Advantages and Disadvantages of Report Writing
- 1.11 Citation Writing
- 1.12 Summary
- 1.13 Glossary
- 1.14 Answers to In-text Questions
- 1.15 Self-Assessment Questions
- 1.16 References
- 1.17 Suggested Readings

# 1.1 LEARNING OBJECTIVES

The objectives of the lesson are to develop a holistic approach to both understanding and writing of research report. After finishing the lesson, you shall be able to

- Understand how you will write a report
- Identify the different types of report writing
- > Know the importance, characteristics, and standard of report writing
- Design the procedure for report writing
- Know about the format of report writing
- Improve your report writing
- > Examine the report in both contexts research finding and its presentation

# **1.2 INTRODUCTION**

The writing of the report is an art and it includes various stages including preparation and presentation. This is one of the self-assigned tasksthat is necessary not in research areas but in almost every technical and non-technical field. The only possible way to improve report writing is by practicing the skillof professional writing in a particular area. Every professional must needed the skills of report writing in their field. The reportis only considered relevant when it is presented concisely, transferable, meaningful, and devoted to the purpose for which it was constructed.



Everyone must know that any project/work is never completed until an appropriate research report not submitted. Report writing gives an exposure to interact with a different audience and also know about current research findings. Somehow it is a two-way communication where you tell about your own work in the form of a report and at the same time, you understand the value of the other work byacknowledging their research finding. But every report has its subsequent importance because the different report has different purpose with different audiences. But when we report our research we must be neutral because the report isone of way communication.

Report writing is the way to communicate research in the form of written documents complied by experts in that area or persons who the part of that particular project to convey their findings to target audiences. It requires all the things that are necessary to prepare a good report like time, money, expertise, experience, imagination, and a set of skills.

### **DEFINITIONS**:

- 1) According to **Oxford English Dictionary** a report is defined as "an account given on a particular matter, especially in the form of an official document, after thorough investigation or consideration by an appointed person or body". For example "The Annual Report Library"
- 2) Report is simply defined as the articulate, arranged, concise, and well-presented form of the written document.
- 3) Research Report is somehow different from an ordinary report because it contains relevant information related to particular research areas.
- 4) In other words we called a research report is a type of report writing where relevant information is articulated, arranged, concise, and well presented to particular research areas.

# **1.3 IMPORTANCE OF REPORT WRITING**

There are several purposes associated to report writing while we consider the types of reports. It gives us a clear view when we link research findings with the researchhypothesis. Report writing is very important for the accomplishment of your degree, writing for a journal, or communicating to a large audience. Some of the basic purposes of report writing are as follows:

- $\checkmark$  It is tangible evidence for the study
- $\checkmark$  It considers a more authentic result and quality work
- $\checkmark$  It provides a comprehensive overview of the selected topic
- ✓ Recorded document serves more conveniently for future endeavor
- $\checkmark$  It is a tool that is useful for professional advancement
- $\checkmark$  It helps to tackle advanced and complex situations.
- $\checkmark$  It also helps to locate the exact and quick information and decision-making.

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The timely communication of the research finding to the target audience is very important when considering the reporting of the research. Relevancy of the information decreases with the time span so while talking about a detailed report it must be in a comprehensive, objective manner to the right person at the right time.

### **CHARACTERISTCS OF A GOOD REPORT** 1.4

A good report should have a number of characteristics while considering the standard. It must not exceed its word limit, be flexible, and learner center. It should convey its message in a simple and objective orientated. The characteristics are: ofDe

- It should be **simple** •
- It must be **readable**
- It should contain **brevity**
- The report should have**clarity** in conveying the message.
- Text contains **positivity** while explaining the findings. •
- **Punctuation**should be placed properly. •
- Itapproachmust be clear •
- All the contains should be in **logical Sequence** •
- Accuracy of the report should consider while evaluating •
- The standard structure should be followed
- Presentation as per international standard. •

### 1.5 **STANDARD OF A GOOD REPORT**

Every report has unique in itself because the report may vary from person to person based on imagination, creative abilities, personality, experience, etc. However, the most experts agree that the following standards must be kept in mind while we are going for report writing. These standards are often called the essentiality of a good report.

- Selectiveness
- Cost-effectiveness
- > Objectivity
- Comprehensiveness
- > Preciseness
- > Simplicity
- $\triangleright$  Accuracy
- Proper Language
- ➢ Reliability
- Proper Format
- $\blacktriangleright$  Attractive

### **TYPES OF REPORT** 1.6

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Kerlinger (2004) states that the results of a research investigation can be presented in a number of ways via a technical report, a popular resort, a monograph, or at times even in the form of oral presentation." There are different types of reports that may differ in their length, writing style, purpose, use of key terms, and types. Initially, the report categorizes into two types oral and written reports later based on different criteria further it divided into different categoriesSome of them are:

**1.6.1 ORAL REPORT**: It is face-to-face communication that has an informal mode of the report that is presented mostly in verbal form. It doesn't contain anyrecords. Most people denied this type of report. It may contain oral and written presentations but it contains mostly factual information.

**1.6.2 WRITTEN REPORT:** It is the most commonly used formal report writing where people often recorded their information for future endeavors. Written report writing is also categorizedinto several types based on length, orientation, popularity, specificity, areas of its covers, and purpose for whom it writing. Some of the written reports are as follows:

- **1.6.2.1 Short Vs Long Report:** A short report is an informal kind of report small in length and was written for seeking routine work whereas aLong report needs costs, locations, personnel, safety, or equipment and it is a formal report having exhaustive and extensive documentation work.
- **1.6.2.2 External Vs Internal Report:**As the name explains, an Internal report is always made for within an organization and circulated among itself. This type of report is known as a private report but an external report always has a widespread distribution outside of organizations. We often called this report a public report.
- **1.6.2.3 Lateral Vs Vertical Report**: It deals with the movement of the report within or outside the organization. If the report moves upward or downward we called them a vertical report but if it moves among the same level of associate, it is known as the lateral report. It is all about the hierarchy of report migration.
- **1.6.2.4 Formal Vs Informal Report: Informal reports** do not deal with complex issues like a formal report. Their target audiences are small or even within an organization. It contains short messages and causes language. They only informed their employees about basic policies. Some of the informal reports are web postings, emails, memos, letters, etc. It includes four basics steps:
  - > Plan
  - > Write
  - Revise
  - ➤ Edit

**Formal reports** are well structured, deal with complex issues, and are essentials for decision makers like directors, educational professionals, community leaders, government officials, etc. It is most widely used in the field of science, business, education, government work, etc. Some of the common types of formal reports are research reports, problem-solving reports



analytical reports, descriptive reports, instructional reports, etc. Formal reports follow some basic guidelines during the preparation. It contains two sections.

- I. **SECTION A**: It is also called a front matter. It contains the cover, title page, letter of transmittal, table of contents (including figures), and abstract or summary of the report.
- II. **SECTION B**: It is also called the end matter provided at the last of the report. It contains a glossary, footnotes, endnote pages, and an appendix (ces). minorsity of Dolhi

Based on the complexity each formal report contains the following attributes:

- a. Title Page
- b. Letter of Transmittal
- c. Table of Contents
- d. Summary or Informative abstract
- e. Introduction
- f. Body or Development (report text)
- g. Conclusions
- h. Costing
- i. Recommendation
- j. Glossary
- k. Appendix (ces)
- 1. Bibliography

There are various types of formal and informal reports and every report has different purposes. Some of the types of reports are:

- I. Informational Reports: It deals with sharing of information such as fact, findings, and data and their background information.
- II. Analytical Report: It is quite similar to information reports but differs by analysis or recommendation and conclusion that encapsulated the findings.
- III. **Progress Reports:** It will help us to upgrade the status of the report that has been in progress, the landmark achieved, steps still pending, etc.
- **1.6.2.5 Functional Report:** It deals with an individual role within an organization involved in the functional level strategy based on its specialized nature it shares mutual responsibility between positions or organizational units at discrete management levels. Some of the functional reports are accounting reports, marketing reports, and financial reports.
- **1.6.2.6 Descriptive Report:** It is one of the most popular methods of report writing that describes the facts, experienced, trends, or findings gathered during the research activities. This type of report is very difficult to understand the value of the study at once. Basically, a descriptive research report consist of the following elements:
  - a) Title pages
  - b) Abstract
  - c) Tables of Contents
  - d) Preface

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- e) Body
- f) List of sources and literature
- g) Indexes
- h) Appendixes
- **1.6.2.7** Analytical Report: It is mostly used for complex business activities that are based on statistics and historical data for anlaying and interpretation facts and situations. It is a kind of predictive foretelling analysis using multidimensional charts and data visualization tools. Apart from this, talking about structure it should include the ty of Del following :
  - a) Title page
  - b) Tabe of contents
  - c) A clause
  - d) Body (discussion)
  - e) Conclusion
  - f) Recommendation
  - g) Bibliography or appendices (if necessary then)
- 1.6.2.8 Technical Report: It is a technically loaded scientific written document that provides information related to technical research. The technical report emphasizeson three basic key features:
  - I. PROCESS
  - II. PROGRESS
- III. PRONOUNCEMENT

The process elaborates the method employed whereas progress is assumptions made during the study and the finding, limitation, and evidence supporting the research is discussed in the pronouncement part. The basic outline of the technical research report is as:

- a) **Abstract**: Discussed finding in 2-3 pages
- b) Nature of the study: General objectives
- c) Methodology: Method used and their limitation
- d) **Data**: Method of data collection, source, and limitations
- e) Analysis and Interpretations: Deals with the presentation data in chart and table and supporting the finding.
- f) **Conclusions**: Discuss detailed findings and policy implications
- g) **Bibliography**: list of references consulted.
- h) **Technical Appendices**: It contains questionnaires, technique descriptions, mathematical derivation, etc.
- i) **Index:** Alternative guide of the alphabetically arranged list of terms.
- 1.6.2.9 Informational Report: This particular report is already mentioned in section 1.6.2.4 formal vs informal report so please refer above one.
- 1.6.2.10 Popular Report: This type of report is a trending report that emphasizes attractive layout and simplicity. The simplicity is reflected by less use of technical terms, clear writing, and detailed and liberal use of diagrams and charts. Attractiveness

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contains many heading and subheadings, clear print, and sometimes occasional use of caricature. The basic framework for the popular report is:

- a) Findings and their Implications
- b) Recommendations for improvement
- c) Objective project under study
- d) Methodology
- e) Result and conclusion
- f) Technical appendices
- **1.6.2.11 Proposal Report:** It is an extension of problem-solving/ analytical reports. This type of report is mostly needed in business setup and it is a solution-oriented report. Some examples of proposal reportsareweb designing proposal reports, digital library proposal reports, etc.
- **1.6.2.12Research Report:** It is either popular or technical in scope. It may be one-way communication while providing the recommendation and conclusion. A good research report must have the following qualities:
  - It must have a detailed presentation, precise in nature, and written lucidly.
  - Language should be simple, formal, and systematic and presented in table and charts
  - Finding should justify the objectives of the study
  - Data collected from primary source either secondary source must be arranged and presented in a lucid manner.
  - Avoid the use of pronouns like My, Me, etc it should be written in the third person.
  - It should have a proper heading, sub-heading, titles, graphs, tables, proper punctuations, etc.
  - Report generally provides recommendations for several issues.

The research report may vary based on the descriptions, length, areas cover, etc. It may further be divided into four main types such as:

- **1.6.2.12.1 Brief Report:**Itslength does not exceed 4-5 pages. It does not have any formal structure. It has scope, design of research, the methodology followed instrument designed and findings must be recorded. It is concrete proof of the study. The survey report is an example of a brief report.
- **1.6.2.12.2 Detailed Report:** It is written in both technical as well as popular reports. It contains caricature because it targets a common audience outside their domains. This type of report is mostly used in marketing research studies.
- **1.6.2.12.3 Technical Report:** It is already mentioned in section 1.3.2.8 Technical report under the heading written report. Please refer above text.
- **1.6.2.12.4 Business Report:** This type of report is technical in nature and the report must be written in business terms that will be understandable to a business tycoon which enables them for decision making.

# **1.7 METHOD OF REPORT WRITING**

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Report writing is an art but still, no set of rules is mentioned for writing a report or any guidelines. The only possible way to write an effective and attractive research report only practicing and enhancing critical thinking. However, the general guidelines listed below can help you in writing reports:

- **1.7.1 Identification of Outlook:** The researcher should identify the purpose of the study and the conjecture associated with the study. Its outlook is well designed and a formal format for academic reports should be followed and also identify some of the questions like Is there any format of reports? What is the process of report evaluation? Is there a word limit? etc.
- **1.7.2** Outline of Framework: It is necessary to establish a road map for creating the report based on the purpose, facts, and evaluation requirements. Every project work has some time span for submitting the report for this we need to draw an outline of thewrite-up. It is the very first stage of report writing during this phase reporter should cover the time frame within the report.
- **1.7.3** Sorting of data: Based on the purpose reporter should consider only relevant data for report writing that must be arranged sequentially so the right user will be obtained at right time at the purpose. All the caricatures should be named properly.
- **1.7.4 Initiation of Report writing:**This is the most important part of the report writing start with the introduction and provide the first site of your report. It should follow some order instead of writing haphazardly.
- **1.7.5** Formulating the initial Draft: Report should be prepared in multiple drafts because it needs a series of revisions. Then only it going to be an excellent report.
- **1.7.6 Revise and Redraft into Final Report:** This is the final step of report writing. The report always has some scope for improvement. So, the reporter must read again and again and rewrite the report until it has less scope for improvement. Throughout the layout, format, grammar, methodology, etc. everything should be carefully checked. After rewriting the final draft it should be confirmed one more time then it will be submitted to the concerned authority.

# **1.8 REPORT WRITING FORMAT**

Once you decided on the problem of the study then you have to draw an outline of your report which may contain formality section or first section, body, and appendix section. Its layout should follow as below:

### **1.8.1** First Section (Formality Part)

- i. Cover page
- ii. Title page
- iii. Certificate or statement
- iv. Index (brief contents)
- v. Table of contents (detailed index)
- vi. Acknowledgement
- vii. List of tables and figures used

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- viii. Preface/forwarding/introduction
  - ix. Summary report

### **1.8.2** Body section (Main Report)

- i. Statement of objectives
- ii. Methodology and research design
- **iii.** Types of data and its sources
- iv. Sampling decisions
- v. Data collection methods
- vi. Data collection tools
- vii. Fieldwork
- viii. Analysis and interpretation (including tables, charts, figures, etc.)
  - **ix.** Findings
  - **x.** Limitations
  - xi. Conclusions and recommendations
- **xii.** Any other relevant detail

### 1.8.3 Appendix Section

- i. Copies of forms used
- ii. Tables not included in findings
- iii. A copy of questionnaire
- iv. Detail of sampling and rate of response
- v. Statement of expenses
- vi. Bibliography list of books, magazines, journals, and other reports
- vii. Any other relevant information

# 1.9 KEY CONSIDERATION IN REPORT WRTING

Curtin (2015) suggested that a report prepared after research often provide recommendation for acting on the progress of work. Report writing needs lots of hard work while preparing a report we keep key considerations our mind. Some of the considerations are as follow:

- a) Problem definition
- b) Objectives
- c) Type of problem
- d) Domain of research
- e) Target audience
- f) Format including language, a form of writing, style, color, font, binding, etc.
- g) Content and its order
- h) Assessment proof
- i) Length of report
- j) Time and money
- k) Possible solution

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### l) Report checklist

The reporting checklist is the most important part of report writing where we make a series of questions related to the completion of the report and in the final stage cross-check with the report checklist, whether it is completed or not.

# 1.10 ADVANTAGES AND DISADVANTAGES OF REPORT WRITING

A written report act as a measuring document for addressing the problem in study and also informed about progress and growth for performance evaluations so, while writing a report we should need proper knowledge because there are several advantages and disadvantages of the report that are mentioned below:

### **ADVANTAGES:**

i. A successful report means successful work.



- ii. A good report will specify the proper methodology adopted during the study.
- iii. Report will also identify correct procedures to determine particular work for that instance.
- iv. It works for others as a motivational factor.
- v. It also highlights the brief description of the issue.
- vi. It sometimes works aa s monitoring measure for performance evaluations.
- vii. It provides insight and a better understanding of the topic for future endeavours.

### **DISADVANTAGES:**

- i. Time -consuming process.
- ii. Expensive to conduct and write.
- iii. Difficult to understand some technical words
- iv. Biasness in data may lead to incorrect conclusion
- v. Difficultes in implementation of recommendation
- vi. Quality of report also affects the reliability of the report.
- vii. It is one-way communication and doesn't allow you to ask a question and provide feedback.

# 1.11 CITATIONWRITING

A citation is a compulsory part of report writing where we are giving the credit to the original creator if anything is consulted from other sources. Reference is mandatory if we take any ideas, words, or information like figures, tables, diagrams, or even text. Basically, we have two methods to cite a person's work:

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I. In-Text Citation: Citation within the text

### **Example:**

Research is a combination of two words adding "RE" as a prefix to the word "SEARCH". 'Re' means again and 'Search' means to find out. **Smith (1981)** suggests that research is a "disciplined inquiry" that. . . must be conducted and reported so that its logical argument can be carefully examined.

II. **End–of–Paper Citation / Bibliography:** It is always given at the end of the report. It includes all the bibliography details like title, author, publication, n etc.

### **Example:**

Kagan, D., Moran-Gilad, J., & Fire, M. (2020). Scientometric trends for coronaviruses and other emerging viral infections. *GigaScience*, 9(8). https://doi.org/10.1093/gigascience/giaa085

### **IN-TEXT QUESTIONS**

- 1. The report should be written \_\_\_\_\_ manner.
- 2. The size of informal report should be \_\_\_\_\_.
- 3. Report often need the typical language. True / False
- 4. Basically formal and informal report are caterogrises as
  a) Informational report
  b) Analytical report
  c) Progress report
  d) All of these
- 5. The first step of informal report writing\_\_\_\_\_
- 6. The language to be used for this purpose should be hard. True / False
- 7. In technical report abstract discuss in how many \_
- 8. Report writing format divided into three parts formality part, body part and
- 9. Technical report have following basic key features:
  - a) Process

c) Pronouncement

- b) Progress
- d) All of these

10. Citation are basically how many types \_\_\_\_\_

# 1.12 SUMMARY

In this module, you are going to develop an understanding of report writing and the types of report writing. The report starts by stating the purpose of the report and drawing an outline of a written report as per the objectives of the report. As per need, a report may be of a different kind with slight modification but structure somehow common. Most important section of written report includes its finding fulfilling the objective of the study with suggestions for



improving the further study. References are compulsory section of report writing either, it is in the form of in-text citation or bibliography. After completing this module , you'll be able to draw report and also going to enhance your chances to getting appreciation among scholar communities and business practices.

# 1.13 GLOSSARY

**Report:** A detail of the study

**Front Matter**: It contains the title cover, title page, letter of transmittal, table of contents (including figures), and abstract or summary of the report

Formality: A mandatory portion of report

Abstract: A summary of whole report.

**Pronouncement**: It is brief elobration of finding, limitation and supporting data.

Literature Review: Method help to identify research gap and recent trend

Methodology: Method employed in a particular study.

**Results** Finding of the study including recommentions/ suggestions.

Recommendations: Advice to do for future improvement.

Reference List: A list of consulted document.

**Appendices**: Extra Information of the study like Graphs, tables, charts, tables, but in essential.

Citation: A credit to original creator

# 1.14 ANSWERS TO IN-TEXT QUESTIONS

1. Systematic	6. False
2. 1-3 pages	7. 2-3 pages
3. False	8. Appendix part
4. All of these	9. All of these
5. Plan	10. 2

# 1.15 SELF-ASSESSMENT QUESTIONS

1. Explain the concept of report writing. Discuss the various types of report writing with suitable examples if needed.

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2. Differentiate between oral and written report. Illustrate a research report with using all three section.

### **1.16 REFERENCES**

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## LESSON 13

## STATISTICAL PACKAGES – MS Excel, SPSS, and Web-based Statistical Analysis Tools, etc

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## STRUCTURE

- 13.1 Learning Objectives
- 13.2 Statistical Packages
- 13.3 MS Excel (Microsoft Excel)
  - 13.3.1 Data formatting
  - 13.3.2 Importing Data
  - 13.3.3 Subtotal Tool
  - 13.3.4 Pivot Table Tool
  - 13.3.5 Statistical Functions
  - 13.3.6 Data Analysis add-ins
  - 13.3.7 Running an Analysis
  - 13.3.8 Creating Chart 🔨
- 13.4 SPSS (Statistical Product and Service Solutions)
  - 13.4.1 Types of Files
  - 13.4.2 Types of Display
  - 13.4.3 Sample Files
  - 13.4.4 Entering Data
  - 13.4.5 Importing Data
  - 13.4.6 Running an Analysis
  - 13.4.7 Creating Chart
- 13.5 Web-based Statistical Analysis Tools
  - 13.5.1 R (R Foundation for Statistical Computing)
  - 13.5.2 MATLAB (The Mathworks)
  - 13.5.3 SAS (Statistical Analysis Software)
  - 13.5.4 GraphPad Prism
  - 13.5.5 Minitab
- 13.6 Summary
- 13.7 Glossary

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- 13.8 Answers to In-text Questions
- 13.9 Self-Assessment Questions
- 13.10 References
- 13.11 Suggested Readings

#### **13.1 LEARNING OBJECTIVES**

The objectives of the lesson are to introduce the various statistical packages which may be used for statistical analysis.

After reading this Unit, you would be able to:

- 1. define the word "Statistical Packages"
- 2. describe the features of statistical packages like MS-Excel and SPSS; and
- 3. Portray some Web-based Statistical Analysis Tools.

## **13.2 STATISTICAL PACKAGES**

Merriam-Webster Dictionary defines statistics as a branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data OR a collection of quantitative data. In other words, it is used as a "collection of numerical facts or data".

It is very difficult to apply statistics on large amounts of quantitative data manually. Hence, specially built computer programs are needed to apply statistical functions on large amounts of data. A statistical package is the software that is used for collecting, organising, interpreting, and presenting numerical information. The advancement in technology made it possible to run all the statistical functions using specialised packages known as statistical packages.

According to Yo, I. (2021), the Statistical package is a software product designed for statistical data processing; usually this package includes business graphics, analysis of variance, regression analysis, time series analysis, etc.

#### 13.3 MS Excel (Microsoft Excel)

Microsoft Excel is a spreadsheet program offered by Microsoft as a part of Microsoft Office. Excel is used by almost all the users of Windows Operating System. The latest version of Microsoft Office is *Office 365*. Apart from Statistical Functions, MS Excel also provides *Data Analysis* Add-Ins which can be used for statistical analysis such as ANOVAs, Correlation, Covariance, Descriptive Statistics, Exponential Smoothing, and F-Test Two-



Sample for Variances, Fourier analysis, Histogram, Moving Average, Random Number Generation, Rank and Percentile, Regression, Sampling, t-Test, z-Test etc.

#### **13.3.1 Data formatting:**

Every MS Excel file is a set of sheets. At least one sheet is required in any MS Excel File, whereas the maximum number of sheets depends upon the available memory of the computer system. Each sheet contains 1,048,576 rows and 16,384 columns in case the latest version of MS Excel is installed. These sheets can be used for data entry and for performing calculations with an easy to use Graphic User Interface of MS Excel. The intersection of a row and column is called a Cell. The data needs to be entered or imported in these cells.

Number Alignment	Font	Border	Fill	Protection			
ategory:							
General A	Sample						
Accounting Date Time	Decimal	places: 2	÷				
Percentage	<u>U</u> se 1	000 Separ	ator (,)				
Fraction	<u>N</u> egative	numbers:					
Text	-1234.1 1234.10	D					*
Special	-1234.10	D					
Custom	-1234.10	0					
-							-
Number is used for ger ormatting for monetar	eral displa y value.	y of numb	ers. Currer	ncy and Acco	unting off	er specialized	

#### Fig 13.1: Format Cells dialog box

MS Excel supports various formats of data such as General, Currency, Accounting, Date, Time, Percentage, Fraction, Scientific, Text, Special and Custom. The steps to format a cell or a range of cells is given below:

- Right Click on the cell or range of cells which need to be formatted
- Click on **Format Cells** option for the shortcut menu.

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• Users may select the required category of the data along with alignment, font, border and filling.

#### **13.3.2 Importing Data:**

ppc

MS Excel provides provisions to import the data from various sources such as MS Access, Web, Text, SQL Server, Analysis Services, Windows Azure Marketplace, OData Data Feed, XML Data Import, Data Connection Wizard, and Microsoft Query etc. The steps to import data from Access are given below:

- Click on From Access in the Get External Data section of DATA tab.
- Select Data Source dialog box will appear.
- Select the access file from which data needs to be imported and click **OPEN**.
- Select the tables for import and press **OK**.
- In the Import Data dialog box select Table and click OK.
- The data will be imported in new sheets.

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Fig 13.2: Import data from MS Access



Fig 13.3: Select Data Source dialog box

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Fig 13.4: Select Table dialog box

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#### 13.3.3 Subtotal Tool:

It is used to find the Sum, Count, Average, Minimum, Maximum, and Count Numbers etc. of one or more categories of the data. The steps to use the subtotal are given below:

- Sort the data based on alphabetic order in the category.
- Click any cell of the table and then click on Subtotal in **DATA** Tab.
- Select the category in the **At each change in** field.
- Select the desired function in the Use **function** field.
- Select the columns on which the function need to be apply and press OK
- The subtotal of the desired columns will be inserted automatically as and when the category changes.
- Click '+' or '- 'button at the left side of the row numbers to show all the details or summary respectively.

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Fig 13.5: Subtotal Tool

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	Fig 13.6: Subtotal Dialog Box

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Fig 13.7: Output after applying Subtotal Tool.

#### **13.3.4 Pivot Table Tool:**

The Pivot Table tool of MS Excel enables to create cross tabulations or two-way frequency tables across categorical variables. It is quite easy to use and provides desired results with few clicks. The steps to use the Pivot Table Tool are given below:

- Click the **INSERT** Tab and then click **Pivot Table** button.
- **Pivot Table** Dialog Box will appear in which the user has to enter the some parameters i.e. source data and cell address of the outcome and click **OK**.
- The work area of Pivot Table along with Pivot Table Field List dialog box will appear.
- The user will be provided the option to choose fields which will appear in the report. The fields dragged to the Row Labels will appear as rows whereas the fields dragged to the Column Labels will appear as columns. The values section offered Sum, Count, Average, Maximum, Minimum, Count, Standard Deviation and Variance function on the fields which are dragged to it.
- Users can easily drag the fields among Rows, Columns or Values.

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#### **13.3.5 Statistical Functions:**

MS Excel also has wide variety of commonly used functions including around 180 statistical functions which can be classified in following categories:

- Count and Frequency functions such as Count, Count Blank, Count If etc.
- Permutations functions
- Confidence Intervals functions
- Percentiles, Quartiles & Rank functions
- Deviation & Variance functions such as AveDev, StDev, StDevA, Var etc.
- Trend Line Functions such as Forecast, Intercept, Slope, Trend etc.
- Largest & Smallest Values functions
- Averages functions such as Average, Median, Mode etc.
- Distribution & Tests of Probability functions such as BetaDist, Beta.Inv, Chisq.Dist.Rt, Correl, F.Test, T.Dist, T.Test, Z.Test etc.

The steps to use Statistical Functions are given below:

- Click any blank cell in the sheet. The result of Statistical Functions will appear in this cell.
- Click on Insert Function icon i.e. fx just before the Formula bar OR click the **Formulas** Tab and then click **Insert Function** button.



- **Insert Function** Dialog Box will appear. Users may search for a function or may select the Statistical category from the list of categories.
- Click on **AVEDEV** (Average Deviation) function from the list of Statistical functions.
- **Function Arguments** dialog box will appear in which the user has to enter the parameters so that the function may be executed.
- **AVEDEV** of excel supports up to 255 arguments and the user may either enter the cell address/ cell Range or individual numbers as well.
- The outcome of the function will be reflected in the Function Arguments dialog box itself.
- Press **OK** to complete the function and view the result in the Cell.



Fig 13.11: Insert Function tool

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Fig 13.12: Formulas Tab



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AVERAGE	Date & Time			
AVERAGEA	Math & Trig	ΞΕ		
AVERAGEIF	Statistical			
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mean. Arguments car contain numbers.	be numbers or names	, arrays, or refere	ences that	
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Fig 13.13: Insert Function dialog box

Function Arguments					? ×
AVEDEV					
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Number3	A12		=	0	
Number4	5		=	5	
Number5			=	number	-
Returns the average o or names, arrays, or re	f the absolute deviations of data ferences that contain numbers. <b>Number4:</b> number1,numl average of the	point ber2, absol	= s fr . ar ute	0 om their mean. Arguments can l e 1 to 255 arguments for which deviations.	oe numbers you want the
Formula result = 0					
Help on this function				ОК	Cancel



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#### 13.3.6 Data Analysis add-ins:

To enable Data Analysis add-ins:

- Click on **File Menu (or Office Button**) at the top left corner of the Excel Window)
- Select **Excel Options** from the left pane of the menu.
- Select Add-Ins from the left pane of the Excel Options dialog box.
- In the Manage drop down menu select Excel Add-Ins and click the Go Button.
- Select the Analysis ToolPak from the scroll list and click OK
- The Data Analysis Toolpak will be visible under the DATA toolbar.

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#### Fig 13.15: File menu

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Fig 13.16: Excel Options Dialog Box

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# Add-Ins Add-Ins Add-Ins available: Analysis ToolPak - VBA Euro Currency Tools Solver Add-in Browse... Automation... Analysis ToolPak Provides data analysis tools for statistical and engineering analysis

Fig 13.17: Add-Ins Dialog Box

#### 13.3.7 Running an Analysis:

The steps to obtain the Descriptive Statistics using the **Data Analysis Toolpak** addins, are given below:

- Click any blank cell in the sheet.
- Click the **Data** Tab and then click **Data Analysis** Tools.
- **Data Analysis** Dialog Box will appear. Select **Descriptive Statistics** from the list of analysis tools and click **OK**.
- **Descriptive Statistics** dialog box will appear in which the user has to enter the parameters so that the function may be executed and click **OK**.

The outcome of the **Descriptive Statistics** will be reflected at the output range mentioned in the **Descriptive Statistics** dialog box which shows Count, Kurtosis, Maximum, Mean, Median, Minimum, Mode, Range, Sample Variance, Skewness, Standard Deviation, Standard Error, and Sum of the range mentioned in the **Data Analysis** Dialog Box.

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Data Analysis		? <mark>X</mark>	
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Fig 13.18: Add-Ins Dialog	Box		$\mathbf{O}$

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Fig 13.19: Add-Ins Dialog Box

#### 13.3.8 Creating Chart:

Excel supports a variety of charts such as Column Chart, Line Chart, Pie Chart, Bar Chart, Area Chart, X Y (Scatter) Chart, Stock Chart, Surface Chart, Doughnut Chart, Bubble Chart, Radar Chart etc. These charts are further divided based on the presentation of data in the charts. The steps to create chats are given below:

- Click a cell of the table on which the Chart needs to be drawn
- Click the **INSERT** Tab and then click on the required Chart Type from the chart panel.
- Click on the required sub-category of the chart.

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- The **Chart Area** will appear on the sheet and **Chart Tools** tab will open to enable the necessary changes in the chart.
- **Chart Tools** tab is divided in two or three subsections i.e. Design, Layout and Format. The Layout subsection has been merged with the design subsection in the latest version of MS Excel which is part of MS Office 365.
- Though all the options related to Charts may be accessed through **Chart Tools** tab, Chart elements such as axis, chart labels etc. at the **Chart Area** can be formatted by right clicking on it as well.

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Fig 13.20: Insert Chart tool

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### Fig 13.21: Subcategories of the Charts.





#### **IN-TEXT QUESTIONS**

- Microsoft Excel is a \_\_\_\_\_ program.
   \_\_\_\_\_ Add-Ins of MS Excel can be used for statistical analysis.
- 3. Every sheet in Microsoft Excel 365 has \_\_\_\_\_rows \_\_\_\_\_ columns .
- 4. The functionality of importing external data is available under:a) Insert tabb) Data tab
  - d) View tab
- 5. Pivot Table Tool is available under:

c) Formulas tab

- a) Insert tabb) Data tabc) Formulas tabd) View tab
- 6. MS Excel also has a wide variety of commonly used functions including around \_\_\_\_\_\_\_ statistical functions.
- 7. The Data Analysis Toolpak is available under the \_\_\_\_\_\_ tab.

### **13.4** SPSS (Statistical Product and Service Solutions.)

SPSS is a computer statistical software package. IBM acquired SPSS in 2009 and beginning with version 19 has officially renamed the software as IBM SPSS. The acronym SPSS stood for "Statistical Package for the Social Sciences", later changed to "Statistical Product and Service Solutions" as the usages of the software spread beyond the Social Sciences. The latest version of IBM SPSS is 28. SPSS provides various statistical analysis tools such as Compare Means, Classify, Correlate, Data Reduction, Descriptive Statistics, General Linear Model, Non-Pavansetric Tests and Multiple Response, Regression, Report, and Scale etc.

#### 13.4.1 Types of Files:

IBM SPSS uses three types of file. There are three types of files with which we ordinarily work when using IBM SPSS: *data files(.sav)*, *output file(.spv)*, and *syntax file(.sps)*.

- Data file: This is a spreadsheet which contains the data. Its icon shows a grid.
- *Output file:* This file is produced when IBM SPSS has performed the requested statistical analysis (or other operations such as saving the data file.). Its icon shows a **window with a banner**.
- *Syntax file:* This file contains the IBM SPSS computer code (syntax) that drives the analysis. Its icon shows a **window with horizontal lines**.



#### **13.4.2 Types of Display:**

The default view which shows the spreadsheet is called **Data View** as it shows the data which need to be analysed using IBM SPSS. The **Variable View** allows users to view or specify the properties of the variables which are being used in the Data View. Users can obtain the Variable View by clicking at the bottom of the Data View window. The 11 properties which can be specified in Variable View are Name, Type, Width, Decimal, Label, Values, Missing, Columns, Align, Measure and Role.

#### 13.4.3 Sample Files

IBM SPSS offers lots of sample data tables which may be loaded in the data view so that the uses can perform various statistical analyses on these data sets. Demo.sav is one such sample file which represents a fictitious survey of several thousand people along with their demographic and consumer information. The steps to open the sample files are given below:

- Click on File menu, Open submenu and Data option.
- **Open Data** dialog box will appear.
- Browse Samples or Samples\English Folder which should be available at C:\Program Files\IBM\SPSS Statistics\ folder. In earlier versions of IBM SPSS, This path needs to be suffixed by IBM SPSS version as well.
- IBM SPSS Statistics data files which have the .sav extension are displayed by default.

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2	56	0	29	153.00	4.00	76.
3	28	1	9	28.00	2.00	13.
4	24	1	4	26.00	2.00	12.
5	25	0	2	23.00	1.00	11.
6	45	1	9	76.00	4.00	37.
7	42	0	19	40.00	2.00	19.
8	35	0	15	57.00	3.00	28.
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Fig 13.23: demo.sav file in Data View (Source: https://www.ibm.com)



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Fig 13.24: Variable View (Source: https://www.ibm.com)

#### **13.4.4 Entering Data**

Viewing Sample files in the Variable will help to understand various properties of variables, which is necessary while entering data in the SPSS directly. The steps to enter data in IBM SPSS are given below:

- Click on File menu, New submenu and Data option.
- Blank spreadsheet opens in Dataview. Users may directly enter the data in this view.
- Click on Variable View at the Bottom of the page.
- Type the Name of the Variable in the **Name** Field.
- Define the format of the variable in the second column i.e. **Type**
- Define the length of the data which the variable need to hold in the third column i.e. **Width**
- If value at Forth Column i.e. **Label** will display as column name in the Data view. If it is left blank, the value of Name Field will appear as column name in the **Data View**.



IBM SPSS supports various formats of Variables through the second column (Type Field) of the Variable View such as Comma, Custom Currency, Date, Dollar, Dot, Numeric, Restricted Numeric, Scientific Notation, and String. The brief description of these formats is given below:

- **Comma:** This format is used for numeric values. The data of this format will appear with a comma that delimit every three places and use a period to delimit decimals e.g. 12,050,000.00
- **Custom Currency:** This format allows data to be represented along with the Custom Currency Format. The Custom Currency characters are displayed in the Data Editor but cannot be used during data entry
- **Date:** This format allows data to represent in calendar date or clock-time formats e.g. Date of Birth 01/31/2013, 31.01.2013 or Time of the Shift etc. 09:00:00.0.
- **Dollar:** The data of this format will appear with Dollar Sign (i.e. \$). Further, Comma delimit every three places and a period to delimit decimals e.g. \$ 50,000.00
- **Dot:** In this format, the period (dot) delimit every three places and comma is used to delimit decimals e.g. 12.050.000,00
- Numeric: As the name suggests, this format is used to store the numerical values. However, it is also used to store the to denote nominal (unordered) or ordinal categorical variables e.g. "1" and "2" are used instead of the words "male" and "female". Any blank cell (Missing values) within this field will automatically appear as a dot (i.e. "."). Hence, user should not enter the dot (i.e., ".") for missing values (i.e. NULL value).
- **Restricted Numeric:** In this format the numbers are prefixed with the leading zeros to the maximum width of the variable. This format does not support the decimal point and negative integers.
- Scientific Notation: In this format the numeric value is represented with an E and power-of-ten exponent e.g. 3.56E2, 3.56D2, 3.56E+2, 3.56+2. All these values are treated as numerical values by IBM SPSS.

**String:** In this format the values are represented as Text. This format is also known as alphanumeric or character variables.

Sometimes users need to add or remove Variables in SPSS data. The steps to insert Variables are given below:

- Select the column before which the variable needs to be inserted after which new cases (rows) need to be inserted.
- Click on Edit Menu and Insert Variable option , or
- Right Click on the column and select **Insert Variable option** from the menu.
- Users may also click directly on the Insert variable icon of the toolbar.

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The steps to delete any Variable are given below:

- Click the Variable which needs to be deleted.
- Right Click on the Variable and select **Clear option** from the menu.
- Users may also press the Del button of the keyboard after selecting the Case number (row) which needs to be deleted.

In IBM SPSS rows of data are called as **Cases**. Sometimes users need to add or remove rows (Cases) in SPSS data. The steps to insert case are given below:

- Select the cell after which new cases (rows) need to be inserted.
- Click on Edit Menu and Insert Cases option , or
- Right Click on the row and select **Insert Cases option** from the menu.
- Users may also click directly on the Insert Cases icon of the toolbar.

The steps to delete any Case are given below:

- Click the Case number (row) which needs to be deleted.
- Right Click on the Case number and select **Clear option** from the menu.
- Users may also press the Del button of the keyboard after selecting the Case number (row) which needs to be deleted,

#### **13.4.5 Importing Data:**

IBM SPSS provides provisions to import the data from other sources such as Excel File, CSV File, Text file, SAS etc. The steps to import the data from MS Excel are given below:

- Click on File menu, Import Data submenu and Excel option.
- **Open Data** dialog box will appear.
- Browse the Excel file which needs to be imported and click **Open**.
- **Read Excel** File dialog box will appear which provides many options along with the preview of the first sheet in the MS Excel file. If the user changes the **Worksheet** in this dialog box, the preview also reflects accordingly.
- Click **OK** to load the Excel file.



Fig 13.25: Import Excel Sheet in IBM SPSS (Source: https://www.ibm.com)

The steps to import the data using ODBC from dBase, MS Access or MS Excel are given below:

- Click on File menu, Import Data submenu, Database submenu and New Query option.
- Select the desired database.
- The list of tables and their fields will be displayed. User has to select the table and respective fields that need to be imported.
- Click Finish to load the data.

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Fig 13.26: Select Data dialog box (Source: https://www.ibm.com)

#### 13.4.6 Running an Analysis:

The Analyze menu contains a list of reporting and statistical analysis categories. The steps to create a simple frequency table are given below:

- Click on Analyze menu, Descriptive Statistics submenu and Frequencies option.
- The Frequencies dialog box will be displayed
- Select the variables for analysis and drag them into the target **Variable**(s)
- Click OK to generate the Descriptive Statistics
- Results are displayed in the Output window.



Age in years [age] Marital status [marital] Years at current addr Household income in t Price of primary vehicl Primary vehicle price Level of education [ed] Years with current e Retired [retire] Years with current e	•	ariable(s):	in thous	Statistics Charts Format Bootstrap	27

Fig 13.27: Frequencies dialog box (Source: https://www.ibm.com)

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		\$25 - \$49	2388	37.3	37.3	}
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**Fig 13.28:** Frequencies dialog box (Source: https://www.ibm.com)

## 13.4.7 Creating Chart:

Although some statistical procedures can create charts, users can also use the Graphs menu to create charts. IBM SPSS supports a variety of charts such as Bar Chart, Line Chart, Area Chart, Pie Chart, Scatter Chart, Histogram Chart, High Low Chart, Box Plot Chart, Dual Axis Chart etc. These charts are further divided based on the presentation of data in the charts. The steps to create charts are given below:



- Click on **Graphs** menu and **Chart Builder** option.
- The **Chart Builder** dialog box will be displayed
- Select the desired Chart category and Chart from the Gallery tab.
- Some other options have been provided in other tabs e.g. **axes** and **graphic** elements are provided in the **Basic Elements** tab.
- Drag the desired chart icon onto the canvas, which is the large area next to the variables in the **Chart Builder** dialog box itself.
- Select the Variables and drag them at the required position on the Canvas such as x axis, y axis etc.
- Click **OK** to create the chart.
- The Chart will appear in the Output Window.

Users can edit charts and tables by double-clicking them in the Output window. These charts may be copied into other applications as well.



Fig 13.29: Chart Builder dialog box (Source: https://www.ibm.com)

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Fig 13.30: Bar chart displayed in Viewer window (Source: https://www.ibm.com)

ODDCE



#### **IN-TEXT QUESTIONS**

8. IBM has acquired SPSS in \_\_\_\_

c) Four

- 9. How may tpes of file are used by IBM SPSS?a) Twob) Three
  - d) Five
- 10. The default view of IBM SPSS is \_\_\_\_\_.
- 11. Demo.sav is one of the \_\_\_\_\_\_ file in which represents a fictitious survey of several thousand people along with their demographic and consumer information.
- 12. IBM SPSS shows the preview of the \_\_\_\_\_\_ sheet while importing data from the MS Excel.
- 13. The \_\_\_\_\_ menu contains a list of reporting and statistical analysis categories.
- 14. Chart Builder option is provided under \_\_\_\_\_ menu.

#### **13.5** Web-based Statistical Analysis Tools

There are many Web-based Statistical Analysis Tools apart from MS Excel and IBM SPSS, Some of them are ADaMSoft, ADMB, Arc, BV4.1, Cum Freq, Dap, DataMelt, Dataplot, Develve, EasyReg, Epi Info, First Bayes, GNU Data Language, GNU Octave, GNU PSPP, GraphPad Prism, Gretl, IDAMS, IVEware, JAGS, MacAnova, MATLAB (The Mathworks), MaxStat Lite version, MicrOsiris, Minitab, NCAR Command Language, NIMBLE, OpenEpi, OpenMx, OpenStat, Past, pbdR, Perl Data Language, Ploticus, R (R Foundation for Statistical Computing), SageMath, Salstat, SAS (Statistical Analysis Software), Scilab, SciPy, Shogun, Simfit, SOFA Statistics, Stan, Statcato, StatCVS, Statistical Lab, Vista, WinBUGS, WINPEPI, Yorick, and Zelig. Some of these tools are discussed below:

#### **13.5.1 R (R Foundation for Statistical Computing)**

R is a language and environment for statistical computing and graphics. It is a GNU project which means that users may use it free of cost. The source code of R is also available for modification as well. R provides a wide variety of statistical and graphical techniques such as classical statistical tests, classification, clustering, linear and nonlinear modelling, time-series analysis etc. It is highly extensible as well. It is an integrated suite of software facilities for data manipulation, calculation and graphical display. The latest version of R is 4.2.1 (Funny-Looking Kid) which was released on 23-06-2022. Some of the major features of R are given below:



- an effective data handling and storage facility,
- a suite of operators for calculations on arrays, in particular matrices,
- a large, coherent, integrated collection of intermediate tools for data analysis,
- graphical facilities for data analysis and display either on-screen or on hardcopy, and
- a well-developed, simple and effective programming language which includes conditionals, loops, user-defined recursive functions and input and output facilities.

(Source: https://www.r-project.org/about.html accessed on 17-08-2022)

#### 13.5.2 MATLAB (The Mathworks)

MATLAB (MATrix LABoratory) is commercial software used to organize, clean, and analyze complex data sets from diverse fields such as climatology, predictive maintenance, medical research, and finance. Some of the major features of MATLAB are given below:

- Datatypes and preprocessing capabilities designed for engineering and scientific data
- Interactive and highly customizable data visualizations
- Apps and Live Editor tasks that helps with interactive data cleaning, preparation, and code generation
- Thousands of prebuilt functions for statistical analysis, machine learning, and signal processing
- Extensive and professionally written documentation
- Accelerated performance with simple code changes and additional hardware
- Expanded analysis to big data without big code changes
- Automatic packaging of analysis into freely distributable software components or embeddable source code without manually recoding algorithms
- Sharable reports automatically generated from your analysis

(Source: https://in.mathworks.com/products/matlab/data-analysis.html accessed on 17-08-2022)

#### 13.5.3 SAS (Statistical Analysis Software)

Statistical Analysis System (SAS) is commercial software provided by SAS Institute Inc. The following tools are inregrated with SAS:

- SAS/STAT® State-of-the-art statistical software.
- Base SAS® Flexible, extensible fourth-generation programming language for data access, transformation and reporting.

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- SAS/IML® Interactive matrix programming and exploratory data analysis.
- SAS/OR® Enhanced operations research methods for optimizing processes and addressing management science challenges.
- SAS/QC® Tools for statistical quality improvement.
- SAS/ETS® Model, forecast and simulate processes with econometric and time series analysis.

These tools made it possible that SAS software is not only used for statistical analysis, data mining and forecasting, but can also be used for following purposes as well.

- Report writing and graphics
- econometrics
- Business planning, forecasting, and decision support
- Operations research and project management
- Quality improvement
- Applications development
- Data warehousing (extract, transform, load)
- Platform independent and remote computing

SAS through its product named "SAS® OnDemand for Academics" provides free access for the Educators, Students & Independent Learners. This SAS Software may be used for Educators, Students & Independent Learners.

(Source: https://www.sas.com/en\_in/software/on-demand-for-academics/featureslist.html accessed on 17-08-2022)

#### 13.5.4 GraphPad Prism

The authorised distributor of Graphpad Prism is Graphstats. According to its developer. It is a versatile Statistical Graphing Software that is used by Scientists - Not Statisticians. Hence, the software is designed to help the researcher to Analyze, Graph and Present their scientific Work by providing following features:



• **Perform The Right Analysis:** GraphPad Prism offers a broad variety of analyses from standard to very specialized – t tests, one-, two- and three-way ANOVA, linear and nonlinear regression, dose-response curves, binary logistic regression, survival analysis, principal component analysis, and many



more. Every study has a checklist to help users understand the necessary statistical assumptions and ensure that usesr have chosen an acceptable test.

Actionable Help: GraphPad Prism offers a very good online help. Users can browse thousands of pages from Prism Guides online or browse the Graph Portfolio to learn how to create a wide variety of graph types. It also offered sample data sets to understand certain analyses and how the conclusions can be viewed.

(Source: https://www.graphpad.com/scientific-software/prism/ accessed on 17-08-2022)

#### 13.5.5 Minitab

Minitab is statistical Software which has four modules i.e. Health Care, Predictive Analysis, Supply Chain and Customer Contact Center. It has grouped its functionality into following categories: mivers

- Assistant
- Graphics
- Basic Statistics
- Regression
- Analysis of Variance •
- Measurement Systems Analysis
- **Quality Tools** •
- Design of Experiments
- Reliability/Survival •
- Power and Sample Size
- **Predictive Analytics**
- Multivariate

The list of functions which are available under these groups is available at https://www.minitab.com/en-us/products/minitab/features/.

#### **IN-TEXT QUESTIONS**

- 15. The latest version of R is \_\_\_\_\_
- 16. The name MATLAB stands for
- 17. SAS provides free access to the for Educators, Students & Independent Learners through its product named
- 18. The authorised distributor of Graphpad Prism is\_

### **13.6 SUMMARY**

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Statistical packages are required to apply statistics on a large amount of quantitative data. In this chapter, brief description of two Statistical packages i.e. MS Excel and IBM SPSS have been provided. Some basic functionality of these packages was described in this lesson. Some other statistical packages are also described very briefly. The chapter is intended to make the student familiar with these packages so that they may use it for the data analysis.

## 13.7 GLOSSARY

**Statistics:** A branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data OR a collection of quantitative data.

Statistical Package: Software designed for statistical data processing and capability to produce Graphics of Data.

**Microsoft Office:** A product of Microsoft Corporation which includes Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Microsoft OneNote, Microsoft Outlook, Microsoft Outlook and Microsoft Teams as its core app and services.

## **13.8 ANSWERS TO IN-TEXT QUESTIONS**

10. Data View				
11. Sample				
12. First				
13. Analyze				
14. Graphs				
15. 4.2.1				
16. MATrix LABoratory				
17. SAS OnDemand for Academics				
18. Graphstats				

## **13.9 SELF-ASSESSMENT QUESTIONS**

1. Downlaod https://www.contextures.com/SampleData.zip and unzip it using any file extracting software OR copy the sample "Office Supply Sales Table" from https://www.contextures.com/xlsampledata01.html#data in a Excel Sheet. Apply Subtotal tool on this data to obtain the Region wise and Representative wise Subtotals and Grand Total.



- 2. Downlaod https://www.contextures.com/pivotsamples/hockeyplayerdata2018.zip and unzip it using any file extracting software. This file contains the sample data of Hockey Player along with many Pivot Tables and Pivot Charts. Try to recreate these tables and charts for better understanding of Pivot Table and Pivot Chart Tool.
- 3. Downlaod https://www.contextures.com/tablesamples/sampledataworkorders.zip and unzip it using any file extracting software. This file contains the sample data of Work Orders. Try to apply various Statistical Functions and Data Analysis tool on it.
- 4. Downlaod https://www.contextures.com/tablesamples/sampledatasafety.zip and unzip it using any file extracting software. This file contains the sample data of Workplace Safety. Try to create various Charts using this data.
- 5. Import demo.xlsx file from the Samples\English folder to understand the import function of the IBM SPSS.
- Open https://www.ibm.com/docs/en/spss-statistics/28.0.0?topic=studies-sample-files in which the description of all the sample file available with the installation of IBM SPSS 28 is given. Apply various functions of SPSS on these files for better understanding.
- 7. Open demo.sav file from the Samples\English folder of the SPSS installation. Change the view to Variable view in order to understand the Fields and Data. Apply Frequencies from Descriptive Statistics in the Analyze menu. Drag gender and inccat fields to the target list and click OK. Analyse the output of this operation. Similarly apply other data analysis on Sample files available the Samples\English folder.

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SAS OnDemand for Academics / SAS India. (n.d.). https://www.sas.com/en\_in/software/on-demand-for-academics/features-list.html

\*\*\*\*\*\*\*\*\*\*\*\*\*\*LMS Feedback: lmsfeedback@sol-du.ac.in\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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iversity



## **LESSON 1**

## Scientometrics, Infometrics and Webometrics

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## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Scientometrics
  - 1.3.1 Definitions and scope
  - 1.3.2 Application of Infometrics
- 1.4 Infometrics
  - 1.4.1 Scope of Scientometrics Sub-Section 1
  - 1.4.2 Characteristics of Scientometrics
- 1.5 Webometrics
- 1.5.1 Definition of Webometrics
- 1.5.2 Objectives of Webometrics
- 1.5.3 Scope of Webometrics
- 1.5.4 Areas of Webometrics
- 1.6 Summary
- 1.7 Glossary
- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

### 1.1 LEARNING OBJECTIVES

In this Unit the students will be made familiar with the topics of Scientometrics, Infometrics and Webometrics. All these are somehow interrelated but still represent different concepts. In nutshell it can be called that these topics are used to represent the methods, techniques of measurement of information services and contents of documents and texts. Scientometrics is the field of study which concerns itself with measuring and analysing scholarly literature.


Infometrics is a subject, which gets a quantitative insight of any informational process. Scientometrics is a sub-field of infometrics. It includes measurement of the impact of research output of an institution or person, pattern of citations. Webometrics is used for the techniques used to analysis the World Wide Web to get knowledge about the number, types of hyperlinks, structure of the World Wide Web.

#### **1.2 INTRODUCTION**

"Librametry," "Infometrics," "Bibliometrics," Different metric studies like Scientometrics," "Techometrics," "Webometrics," and "Altmetrics" arose in the information field sciences during the 20th century and attracted a lot of interest from its experts. One of Informetric's most intriguing features is the quantitative norms of the content manufacturing processes. Informetric is the science of information is available numerical components. This covers the creation, diffusion, and utilization of all information, irrespective of its structure or where it originated. It focuses mostly on the creation of models to describe and pinpoint the many literary traits. It also covers topics like research collaborations and scientific performance. The quantitative aspects and traits of research and scientific inquiry are the focus of scientometrics. Today, scientometrics is used in the development of scientific organizations and is regarded as a component of the sociology of science. Scientometrics and Informetric are terms for statistical methods used to assess system can be integrated between people. Many scholars have been drawn to using classic bibliometric and Scientometrics techniques on the World Wide Web as a new mix of communication since it has become a significant source of knowledge. Webometrics, which encompasses hyperlink evaluation, website citation analysis, internet sites, etc. is a quantitative investigation of web occurrences.



Fig.1. The association of the metrics phrases



### **1.3 INFORMETRIC**

Informetric facilitates the identification of recent developments in the field, advances in information, forecasting of researcher efficiency, and past, present, and future patterns in publication. Additionally, informetric is important for evaluating research, measuring performance, establishing connections between authors and scholarly organization, determining an impact, and other similar tasks (Zungu, 2020). informetric originally referred to the use and creation of a wide range of metrics to investigate and evaluate various characteristics of knowledge in generally and records in specifically. informetric is defined as "the use of computational models to the analysis of data science entities with the goal of identifying and evaluating their laws and attributes in order to maximize such items in making decisions." This covers the creation. distribution, and utilization of all knowledge, irrespective of its format or place of origin. Informetric therefore covers the domains that investigate the Jmerical aspects of scientific research (Arora et al., 2019). Most services, encompassing broad science databases like Web of Science (WoS) or Scopus as well as domain-specific assistance like fulltext for emergency care, are recognized to be inadequate in Infometrics and scientometrics (Dorsch, 2017). Informational, materials, and activity have evolved into the three main pillars of modern society because of the quick advancement of information technology and the widespread use of the Internet (Siluo & Qingli, 2017).

#### **1.3.1 Definitions and scope:**

According to Wikipedia, "Informetric is the research of the quantitative features of data in any shape, not only archives or bibliography, and in any social circle, not just academics". The goal of informetric is to d quantitative explanations for the characteristics of information (Martin- Martin et at., 2018). Informetric is the analysis of statistical elements of information, such as the production, diffusion, storage, and evaluation of information, independent of its form or source (Naseer et al. 2019). Informetric includes epidemiological findings of literary and documentation, conceptual investigations of various mathematical principles and attributes, as well as identified groupings (Dutta. 2014).

#### **1.3.2 Application of Infometrics:**

In general, Informetric research are employed to influence decision and policies in the economical, legal, technical, and social areas that affect sharing of information and usage patterns.



- Establishing connections between academic publications and writers (including authorship patterns),
- Assessing findings for finance of researching or development courses,
- Examining the publishing habits of researchers
- Creating, organizing, and removing policies
- Analyzing the effect of academic contributions
- Analyzing past and present publication trends and predicting those for the future
- Researching obsolescence and disseminating academic literature
- Finding literature in particular fields, among other things

#### **IN-TEXT QUESTIONS**

- 1. Librametry was coined by:
- (a) Melvil Dewey (b) Derek Austin (c) S R Ranganathan (d) None of these
- 2. Alan Pitchard Coined the term:(a) Bibliometrics (b) Scientometrics (c) Altmetrics (d) Infometrics

### **1.4 SCIENTOMETRICS**

"Scientometrics study is focused to quantified investigations of science and technology". Bibliometrics and Infometrics share connections and areas of interest with scientometrics. The statistical examination of technological and scientific literature is the focus of scientometrics. Several academics suggest that Scientometrics can encompass a portion of the work performed in Sciences Finance by simply defining it as the quantitative analysis of science (Abramo, 2018). With the development of the internet and social websites, scientometrics' research focus switched from measuring academic influence in the scientific field to measuring the impact on all areas of society (Hou & Yang, 20 18). Scientometrics is based on the quantitative evaluation of scientific discoveries, particularly in the field of "research findings," for which it attempts to gauge influence in the context of evaluation. Scientometric s, which used to refer to the scientific effective communication that included sociological considerations, now seems to be nearly interchangeable with understanding of science with a stronger emphasis on its quantitative components. Both quantity of Scientometrics sets they reflect, and the use of standard values can be used to categorize Scientometrics indications. Generalized indicators are scientometric measures that refer to the measurement of a particular scientometric component of a scientometric system are expressed by a. single scientometric set with a specific hierarchy level (Sab et al., 2019). While the more specific word scientometrics refers to the quantitative analysis of scientific and technological developments (Mondal & Raychoudhury, 2019).

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#### **1.4.1 Scope of Scientometrics:**

Scientometrics' main emphasis is too constrained to cover the entire valuation process, from research financing through social impact. Scientometrics is a field of study that examines scientific journals to discover how science is structured and developing (Faizi et al., 2017). The findings demonstrate that Scientometrics and a number of other subjects and fields, including the social anthropology of science, scientific process, science and technological management and policy the economic growth of scientific knowledge, and fields related to data and information science, have a strong relationship. Information science is surpassed by scientometrics (Conference & Innovation, 2021). Along with advancements in data science and technological capabilities, Scientometrics' usage and growth have expanded (Cogkun et al., 20 19). The most important measurements for gauging scientific production are scientometrics indicators (Zimik. 2021). To examine the development of diverse branches of research, from biological, chemicals, and nanomaterials informatics and scientometrics to behavioral sciences, scientometricians have merged numerous methodologies from scientometrics, data visualization, and text mining (Chandra, 20 18).

#### **1.4.2 Characteristics of Scientometrics:**

- Scientometrics enables scholars in other fields to make greater contributions.
- Scientometrics identifies research areas' strengths and weaknesses.
- Facilitates not only the focus on organization level of research but also measures national participation.
- The means of transmission assist researchers in disseminating their findings, which are primarily favored by consumers.
- Information's geographic dispersion without consulting a wider variety of sources of information.
- The subject dispersal analysis assists in locating information sources for scholars as well as the library's obsolescence research endeavors.
- The publication pattern enables both researchers and scientists to cooperate on their research regardless of differences in geography and languages (Evidences, 2019).

#### **IN-TEXT QUESTIONS**

- 3. Vassily V. Nalimov coined the term in 1960:(a) Bibliometrics (b) Scientometrics (c) Altmetrics (d) Infometrics
- 4. The quantified investigations of science and technology is known as:(a) Webometrics (b) Altmnetrics (c) Scientific Analysis (d) Scientometrics

### **1.5 WEBOMETRICS**

Webometrics has been one of the most significant aspects of information technology for some times, according to bibliometric research. The field of webometrics is engaged with quantifying web-based occurrences, including websites, onl ine pages, and components of

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web pages, educational and political internet sites, blogging, social media sites, and terms in website pages, hyperl ink, and foreign web domain names. The discovery that the web is a vast document archive with many articles being academic in nature led to the development of bibliometrics (Box & Delhi-, 1987). Webometrics. also known as cybermetrics, seeks to quantify the World Wide Web to learn more about its design. user behavior. and the amount and types of hyperlinks (Chellappandi & V ijayakumar. 2018).

#### **1.5.1 Definition of Webometrics:**

The original and dominant definition of webometrics is, "The study of the quantitative aspects of the construction and use of information resources, structures and technologies on the Web drawing on bibliometric and informetric approaches." Webometrics/cybernetics, a recent innovation in Infometrics, has become an accepted part of library and information sciences studies. Webometrics' integration broadens the scope of Bibliometrics considering that it will certainly result in new methodological advancements (Jacobs, 2010).

#### **1.5.2 Objectives of Webometrics:**

Webometrics, the statistical analysis of web-related concepts, was born out of the realization that techniques developed for bibliometric analysis of citation structures in scientific journal articles could also be used to analyze web data, with advertising search engines serving as the source of the original data. The goal of webometrics is to measure users' online information-seeking (or "web search") behavior. Supporting research into web phenomena is where webometrics is most clearly needed.

#### **1.5.3 Scope of Webometrics:**

The field of webometrics is involved in quantifying web-based events, including website, online pages, and components of web pages, educational and elections webpages, blogs, social networking sites, and terms in web pages, hyperlinks, and national domains. A variety of contemporary advancements are included in webometrics, including patent analysis, national research evaluation activities, visual analytics, online citation indices, the establishment of library resources. Today, webometrics research includes studies of social websites like blogs, RSS feeds, and social network like Facebook, YouTube, and Twitter in addition to general or academic web assessments. Weblin£s, how they create networks, and, among many other things, whether websites can be evaluated and based entirely on their connections are all topics of extensive research in the discipline of webometrics (Dudek et at., 2021).

#### 1.5.4 Areas of Webometrics:

The previous concept of webometrics incorporates quantifiable elements of the web activity and development, resulting in five key fields of webometrics research today, which are summarized as follows: (Harinarayana, 2015)

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#### 1. Web page content analysis:

"Web site (Physical Definition): the set of web pages located at one Internet Provider address." "Web site (Information Definition): a set of related web pages that, in the aggregate, form a composite object of international relevance".

The website could have surface-level material or deep web content, like repositories for public or private information. The "connected" aspect of the web can, in theory, lead to the claim that it is one massive website all by itself. The web comes in two varieties. Surface web:

Most of it is unsuitable for educational or intellectual purposes, and some of it might even be biased or inaccurate. Therefore, Qing too much on the "surface web" could lead to lazy research practices, jeopardize the value of academic material, and degrade the standard of academic research and publications.

#### 2. Invisible web:

The amount of information on the internet is still extremely limited. Only small portion of the content on the online gets indexed by search engines, and the majority of users do not access the information on the "invisible web." This website has reliable information.

#### 3. Web link structure analysis:

Web documents are now referred to as hypertext, which contains I inks to further related publications, like the citations in a science report or the cross-references in cataloging. These cross-references or networks in digital information can be explored with a click of mouse. The homepage, which approximately corresponds to the title page in a printed format. is where users often enter a website. The homepage frequently serves as a table of contents and gives information about the website. The web page is the secondmost important bibliographic component on the internet afier the homepage (static or interactive HTML file).

#### 4. Web usage analysis:

The web is typically understood to be a network of HTTP servers running over TCP/IP connections. Therefore, its more limited interpretation includes all running HTTP servers that take in, comprehend, and handle client requests. The response code issued to the client making the connection attempt will reveal its availability.

#### 5. Web technology analysis:



Searching for information online can often feel like looking for a needle in a haystack. The fact that the Online world is a continuous network col lecti gives the "haystack" image a new dimension. Early search engines on the Internet included Archie, Veronica, Gopher, Wide Area Information System (WAIS), Mosaic, Aita V ista, HotBot, NorthemLight, Excite, Lycosse, Inforseek, and others in an effort to increase ordered and retrieval of information. Those earlier services were created before web browsers and are still available today, but they have typically been overtaken by more widely used web search engines like Yahoo and Google.

#### 6. Web Ranking:

Webometrics indicator has been introduced to rate global universities and scientific archives. Repository evaluation indication offers a list of the top research-focused archives, organised by a composite index based on the web impact (link visibility) of their articles as well as their web presence, using information from the top commercial search engines. Webometrics is a field of study that looks at the quantitative elements of the Internet (Arora et al., 2019).

#### **IN-TEXT QUESTIONS**

5. Which one of the following emerged in the last?

(a) Bibliometrics (b) Informatics (c) Librametry (d) Webometrics

6. The term Webometrics was first coined by:

(a) Almind & Ingwersen (b) S R Ranganathan (c) Vassily V. Nalimov (d) Alan Pitchard

### 1.6 SUMMARY

Statistical techniques are now days used in scientific output evaluation and forecasting studies. In recent past, statistics has been applied to a number of areas such as planning, industrial and agricultural development, etc. Similarly, librarians in recently have also started using various quantitative techniques for evaluation of scientific output.

### 1.7 GLOSSARY

**Bibliometrics** It is the quantitative analysis of intellectual activities in some manner.

Informetrics Quantitative study of all informational process.

**Ranking** Arrangement of data either in ascending or descending order on the basis of a chosen criterion.

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### **1.8 ANSWERS TO IN-TEXT QUESTIONS**

- 1. S R Ranganathan
- 2. Bibliometrics
- 3. Scientometrics
- 4. Scientometrics
- 5. Webometrics
- 6. Almind & Ingwersen

### **1.9 SELF-ASSESSMENT QUESTIONS**

- 1. Explain in brief the metric studies in Library & Information Science.
- 2. Differentiate the terms "Scientometrics, Infometrics and Webometrics."
- 3. Enumerate various techniques used in mapping of Knowledge. Define each in brief.

### **1.10 REFERENCES**

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University



### **LESSON 1**

## Manual Structure, Style, Contents

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### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Manual
  - 1.3.1Definition
  - 1.3.2 Structure
  - 1.3.3 Key Factorsto be considered
- 1.4 Referencing Styles
  - 1.4.1 APA Style of Referencing
  - 1.4.2 MLA Style of Referencing
  - 1.4.3 Chicago Style of Referencing
  - 1.4.4 Harvard Style of Referencing
  - 1.4.5 IEEE Style of Referencing
  - 1.4.6 ACS Style of Referencing
  - 1.4.7 Vancouer Style of Referencing
- 1.5 Summary
- 1.6 Glossary
- 1.7 Answers to In-text Questions
- 1.8 Self-Assessment Questions
- 1.9 References
- 1.10 Suggested Readings

### **1.1 LEARNING OBJECTIVES**

After reading this unit, students will be

- able to know the importance of a research report;
- can define various types of research reports; and
- will get acquainted with the style and format of writing a research report.

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### **1.2 INTRODUCTION**

A research report is a valuable document for a researcher. It is an essential part of the whole research process. These reports are the mode of communication of research output. The publication of the research findings and results is of great importance in all areas of research. The purpose of writing a research report is to communicate the ideas and information with other people.

The unit will give an overview of research methodology, its structure, and different styles. It will also cover different reference styles used inresearch.

### 1.3 MANUAL

Mostly, research work is presented in written form. The practical utility of research studies depends heavily on the way it is presented to those who are expected to act on the basis of research findings. A research report or manual is a written document containing key aspects of a research project. A research report is a medium to communicate research work with relevant people. It is also a good source of preservation of research work for future reference. Many times, research findings are not followed because of improper presentation. Preparation of a research report is not an easy task. It is an art. It requires a good deal of knowledge, imagination, experience, and expertise. It demands considerable time and money.

#### **1.3.1Definitions:**

1. A research report is the systematic, articulate, and orderly presentation of research work in a written form.

2. A research report is a research document that contains basic aspects of the research project.

3. A research report involves relevant information on the research work carried out. It can be written by hand, typed, or computerized.

#### 1.3.2 Structure:

There is no standard format for all types of reports. The format depends on several relevant factors. One must employ a suitable format to create a desirable impression with clarity.

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Reports must be attractive. It should be written systematically and bound carefully. A report must use the format (often called structure) that best fits the needs and wants of its readers. Typically, the following format is suggested as a basic outline that is flexible enough to meet the majority of situations.

A research report is divided into three parts as:

I. :(i) Title page (ii) Certificate or statement (iv) Index (brief contents)(v) Contents page (detailed index)(vi) Acknowledgement (vii) Table and figure list(viii) Foreword/forward/introduction (ix)Summary report

II. Main Report: (i) Objectives statement (ii) Methodology and research design (iii) Data types and sources(iv) Sampling choices(v) Methods of data collection (vi) Data collection tools (vii) Fieldwork (viii) Analysis and interpretation (including tables, charts, figures, and so on)(ix) Results (x) Limitations (xi) Conclusions and suggestions(xii) Any other pertinent information

III. Appendix: (i) Form copies (ii) Tables not included in findings (iii) A questionnaire copy(iv) Detail of sampling and response rate (v) Expense statement (vi) Bibliography - list of books, magazines, journals, and other reports(vii) Any additional relevant information

#### **1.3.3 Key factors to be considered:**

While preparing a research report, the following issues must be considered: Objectives (ii) Problem or subject type (iii) Nature and type of research (iv) Audience or users of research work (v) Report size (vi)form of writing—handwritten, typed, or computerized. (vii) Time and cost (viii) Language (ix) Report Contents (x)Number of copies (xii) Order of contents (xi)format - paper type and size; length, width, and depth of report; and writing pattern, including paragraph, indent, numbering, font size and type, coloring, and so on.(xiii) binding (for soft and, particularly, for hard copy) – type, quality of material, colour, etc., related issues.

#### **IN-TEXT QUESTIONS**

- 1. Final stage in the Research Process is
- (a) Problem formulation (b) Data collection (c) Data Analysis (d) Report Writing

2. A comprehensive full Report of the research process is called(a) Thesis (b) Summary Report (c) Abstract (d) Article

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### **1.4 REFERENCE STYLES**

A reference or citation is a method of acknowledging someone whose work you have used in your own work or publication. It can also be used to find a particular source. A citation style is the format in which the required information from the source is noted down. There are various methods of citing sources in your work.

Mostly, the styles depend on the subject area involved. For example, APA (American Psychological Association) is mostly used by education, psychology, etc. The Humanities use the MLA (Modern Language Association) style. The Chicago/Turabian style is generally used by history.

Some of the important referencing styles are discussed in detail in the following paragraphs.

#### 1.4.1 APA Style of Referencing

APA is an acronym for the American Psychological Association. It is mostly used in the social sciences.

(author surname>, year of publication>, page number/s>)

In in-text citation, only the surname of the author is used; the author's surname and year of publication are separated by a comma. For instance, (Ranganathan, 1965). If a page number is also to be included, then it is also separated by a comma. (Ranganathan, 1965, 35, for example.)

Multiple Authors of a Source:

If there are multiple authors of a source, write their names exactly in the same sequence as they are in the publication.

In the in-text citation, the surnames of the two authors will be used, separated by '&'. (Neelameghan and Ranganathan 29)

#### 1.4.2 MLA Style of Referencing

MLA is an abbreviation for Modern Language Association. The MLA style is mostly used in the humanities fields.

(author's surname> page number/s>

In in-text citation, only the surname of the author is used; the author's surname and page number are not separated by a comma. For example, (Ranganathan 23, for



Multiple Authors of a Source:

If there is more than one author of a publication, mention their names exactly in the same sequence as they are presented in the publication.

In the in-text citation, the surnames of the two authors will be used, separated by 'and'. (Neelameghan and Ranganathan 29)

#### 1.4.3 Chicago Style of Referencing

This style was originated by the University of Chicago more than a hundred years ago. It uses the note system for referencing. A reference is first given in the form of footnotes preceded by a numeric digit, and then it is provided again at the end of the document in the form of a reference list or bibliography.

In the footnote, various pieces of information such as author name, title, publication date, etc. are separated from each other by a comma; in the reference list, the pieces of information are separated by a full stop.

In-text citation

The number for each reference is given in the superscript without any parenthesis.

#### 1.4.4 Harvard Style of Referencing

Harvard Style uses an "author-date" system. This style is most commonly used in the humanities.

(author name>, year of publication>, page number/s>)

In in-text citation, only the surname of the author is used. The author's name and year of publication are not separated by a comma. For example (Ranganathan 23, p. 52). Multiple Authors of a Source:

If there are multiple authors of a source, write their names exactly in the same sequence as they are in the publication.

In the in-text citation, the surnames of the two authors will be used, separated by '&'. (Neelameghan and Ranganathan 29)

### **1.4.5 IEEE Style of Referencing**

The Institute of Electrical and Electronics Engineers (IEEE) Referencing Style is mostly used by writers in electrical, electronic and computing fields.

In-Text Citations, the cited documents are numbered in the order in which they are first cited in the text. If the same source is cited again later in the text, the same number is used:

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'The theory was propounded by .... [1].'

#### 1.4.6 ACS Style of Referencing

The ACS style was developed by the American Chemical Society and is used for academic writing in chemistry.

ACS uses both numbered and author-date systems:

In-text citation:

References in the text should be cited in one of the two ways:

# By number: either italic numbers in brackets, or superscript numbers numbered sequentially

If a reference is cited more than once, it does not receive a new number.

When citing more than one reference at a time, include reference numbers in increasing order separated by commas.

....(1) or Neville (1) stated that .....

.....1 or Neville1stated that ....

#### By author-date: surname and year of publication in brackets.

.....(Neville, 2010) or Neville stated that ..... (2010)

The list of references appears at the end of the paper in numerical order if cited by number or in alphabetical order if cited by author-date.

Use only the initials of the authors' given names. Use full stops and spaces between the initials. Last name comes first.

1 Neville, C. The Complete Guide to Referencing and Avoiding Pagiarism, 2nd ed.; Open University Press: New York, 2010.

Neville, C. The Complete Guide to Referencing and Avoiding Pagiarism, 2nd ed.; Open University Press: New York, 2010.

#### 1.4.7 Vancouver Style of Referencing

#### **In-text citations**

- A number is allocated to a source in the order in which it is cited in the text. If the source is referred to again, the same number is used.
- Use Arabic numerals (1,2,3,4,5,6,7,8,9)
- Either square [] or curved brackets () can be used as long as it is consistent.
- Superscripts can also be used rather than brackets eg. ...was discovered. 1,3
- Reference numbers should be inserted to the left or inside of colons and semi-colons.

**Multiple works by the same author:** Each individual work by the same author, even if it is published in the same year, has its own reference number

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#### 1.4.5Vancouver Referencing Style

#### In-text citation:

- A number for each citation in super script.
- Number to each source is given in the sequence as it appears in your document.
- In case the same source is cited again in the document, use the same number that have been used earlier for the source in the work.
- Name of author may also be used in your text but it must follow a number.

#### In-text Citation and reference list entry for 2 to 6 authors: Surname of the first author is be used followed by et al Surname # et al <sup>6</sup> Sharma <sup>(6)</sup>

In-text Citation and reference list entry for more than 6 authors: In the in-text citation only the surname of the first author is written followed by 'et al' thus it appears like this: et al (7)

Example: Alvi (7)

#### **IN-TEXT QUESTIONS**

3. APA stands for:

(a) American Psychological Association (b) American Psychological Associates(c) Association of Psychological of Americans (d) American PsychologistAssociation

4. Parenthetical Referencing is also known as:

(a) Foot Note Referencing (b) Endnote Referencing (c) In Text Referencing (d) Title Referencing

### 1.5 SUMMARY

After going through this unit, the students must have learnt that a research report is a channel of communicating the research findings to the readers of the report. A good research report is one that does this task efficiently and effectively.

Referencing styles are a set of rules that tell you how you should acknowledge the intellectual works of others that you use in your research. Referencing is an important part of successful academic writing. It helps you avoid plagiarism while doing



yourassignments.

### 1.6 GLOSSARY

In-Text Citation	An acknowledgement of the sources	used in the work given in the text.
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**Reference** List of sources which were used while preparing the work.

**Bibliography** List of sources consulted while preparing the work.

### 1.7 ANSWERS TO IN-TEXT QUESTIONS

- 1. Report Writing
- 2. Thesis
- 3. American Psychological Association
- 4. In-Text Referencing

### 1.8 SELF-ASSESSMENT QUESTIONS

- 1. Differentiate a bibliography and a reference by giving suitable examples.
- 2. Discuss the structure of a research report in details.

### **1.9 REFERENCES**

- 1. American Psychological Association (2001): Publication Manual of the American Psychological Association (Yh ed.). Washington, DC:American Psychological Association.
- 2. Baumgartner, A. Ted., Strong, H. Clinton, and Hensley, D. Lany (2002): Conducting and Reading Research in Health and Human Performance. Third Edition, San Francisco: McGraw Hill.
- 3. Bell, J. (1999): Doing Your Research Project, A guide for first-time researchers in Education bd Social Science. Third Edition, New Delhi: Viva Books Private Ltd.

### **1.10 SUGGESTED READINGS**

- 1. Best, J.W., and Kahn, J.V. (1995): Research in Education, Seventh Edition, New Delhi: Prentice Hall of India Private Limited
- 2. Blaxter, L., Hughes, C., and Tight, M. (2002): How to Research. First South Asian Edition, New Delhi: Viva Books Private Limited.
- 3. Campbell, W.G (2000): Form and Style: Thesis, Reports, Term Papers. I lth ed., Boston: Houghton Mifin.

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Master of Library & Information Science

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### **LESSON 1.1**

## NEEDS, OBJECTIVES AND PHILOSOPHY

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### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Marketing: Concept
- 1.4 Marketing Approach
- 1.5 Marketing Philosophies
- 1.5.1 Production concept
- 1.5.2 Product concept
- 1.5.3 Selling concept
- 1.5.4 Marketing concept
- 1.5.5Societal concept
- 1.6 Need of Marketing of Library & Information services
- 1.7 Functions of Marketing
- 1.8Implication of marketing with Library & Information services
- 1.9Importance of marketing
- 1.10 Summary
- 1.11 Glossary
- 1.12 Answers to In-text Questions
- 1.13 Self-Assessment Questions
- 1.14 References
- 1.15 Suggested Readings

### **1.1 LEARNING OBJECTIVES**

After reading this lesson, you will be able to:

• Explain the meaning of the term marketing and various concepts of marketing.

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- Learn different philosophies related to marketing
- Understand the need and importance of marketing
- Familiarize with the implication of marketing in library and information services.

### **1.2 INTRODUCTION**

A marketing information system is a collection of procedures and methods for the regular and planned collection, analysis, and presentation of data for use in marketing decisions.Marketing is becoming increasingly important to all organisations, including nonprofits such as libraries, archives, and information/documentation centres. Marketing is entirely a managerial function.Marketing also includes selling, advertising, physical distribution, sales promotion etc. Selling, one major aspect of marketing is an exchange of goods or services.Thus, the essence of marketing is determining what users want and then setting out to meet those needs. Librarians are involved in this process of assessing and attempting to meet the needs of their users. As a result, we are already marketing our library information abilities. However, in order to do so effectively, librarians must embrace the entire marketing function, which includes market research and analysis, service planning, and promotion.

Libraries and information centres have begun to recognise that marketing information products and services is an essential part of administration, particularly as a means of improving user satisfaction and encouraging current and potential users to use services. Three major factors are responsible for encouraging the library profession to develop a marketing approach in its operations and services: the information explosion, the technological revolution, and rising library costs.

### **1.3 MARKETING: CONCEPT**

Marketing is a system-wide planning and adjustment process that ensures the establishment and maintenance of mutually beneficial exchange relationships. Marketing, in general, is concerned with selling, market research, and advertising. Every organisation has two fundamental operational functions.

- Production of goods, services, or idea
- Marketing of the goods, services, or idea

Utility is created for the consumer through production and marketing. The ability of a good or service to satisfy a desire is referred to as utility. Production generates utility by converting raw materials into goods and services. In addition to form utility, marketing creates time, place, and ownership utility. The availability of goods and services to consumers at the right time and right place is referred to as time and place utility. The



transfer of a product or service from the possession of the producer or marketer to the possession of the consumers is referred to as ownership utility.

There are various perspectives on the concept of marketing. However, the three basic elements of marketing that can be seen in the definition are selling, market research, and advertising. In a broader sense, it is a management process that efficiently and profitably identifies, anticipates, and satisfies customer requirements. It is the process of planning and carrying out the conception, pricing, promotion, and distribution of ideas, goods, and services in order to create exchanges that meet the individual and organisational objectives. During the exchange process, two or more parties exchange something of value in order to meet their perceived needs.

The American Marketing Association defined marketing as "tlle performance of business activities that direct the flow of goods and services from producer to consumer or user ".

According to Philip Kotler, "marketing is a societal process by which individuals and groups obtain what they need and want through creating, offering and freelyexchanging products and services of value with others. Marketing is an ongoing process of discovering and translating consumer needs and desires in to products and services, creating demands for these products and services, serving the consumer and its demand through a network of marketing channels and expanding the market base in the face of competition".

Paul Mazur defined marketing as "the creation and delivery of a standard of living to society."

According to Buhsing, "Marketing offers both a theory and a process by which libraries can link products, results, and roles. Marketing can assist libraries in determining their future and in identifying quality products- services, programs, and materials. A marketing audit and the resulting plan can contribute to a library's ability to find a niche in the present as well as in the future and to fill that niche by an optimal allocation of resources. A marketing orientation can assist libraries in defining their role and in guaranteeing their future. Marketing provides a theoretical framework within which to address the specific library and information science questions facing public, school, special, and academic libraries in both the public and private sectors. What the library will look like and what it will offer as products can be determined through the use of modern marketing theory and practice".

The true essence of marketing is that:

- There is demand for information products and services on offer;
- These products and services have ability to satisfy customer needs;
- The exchange of product or service is the primary consideration for payment;
- There is always a need to create an edge over competitors;
- The identification of favourable marketing opportunities;
- The resources are utilised to maximise a business's market position; and

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• The aim to increase market share in priority target markets.

The marketing concept is based on three pillars, namely :

- (i) customer orientation
- (ii) integrated marketing, and
- (iii) profitable sales volume through customer's satisfaction.

The customer is considered to be the most important object of the organisation. A

analysis of his needs and wants, likes and dislikes and preferences and tastes is the starting point for all marketing. activities. The company should plan and develop the product after ascertaining the needs of the customer which the product is going to Satisfy. This is an implementation of the classic concept of the economic theory known as 'consumer sovereignty'. What is to be manufactured should be decided by the consumer and not by the company or the Government.

The second pillar of the marketing concept is integrated marketing. All the activities of the marketing department which have any thing to do with the customer and the productshould be effectively integrated, so as to coordinate and consolidate the efforts in order tosatisfy the customer's needs. Various departments of the company should recognise that the action of them all, and not only the action of the sales and marketing people, would have an important effect on the company's ability to create and retain customers.

The third pillar of the marketing concept is profitable sales volume through customer satisfiaction. A company seeks to satisfy a customer not merely by reducing the price but providing other services to him and at the same time the company seeks to achieve its owngoal. What is more important is the long,run welfare of the customer and not his immediateneeds satisfaction. The product should be so designed, priced, distributed and promoted as tosatisfy the customer's need and to take care of his long-term welfare.

### **1.4 MARKETING APPROACH**

A marketing approach assists an organisation in better managing its limited resources by determining what the user wants and needs and then producing a product or service to meet those needs. A variety of analyses and tools are available to assist an organisation in implementing a marketing strategy. Market analysis, user analysis, organisational analysis, competitive analysis, and marketing mix are examples of these.

#### Market Analysis

Market analysis begins with the identification of all potential markets in which exchanges could take place. The most obvious market is library patrons, parent institutions of libraries/information centres, government agencies that provide funds, and other institutions



with information needs but no libraries. In the market analysis, both funding and user markets should be identified.

After identifying the markets, it is critical to determine the size of each market as well as the trends influencing service demand. Market research also entails breaking down the overall market into smaller units with distinct wants and needs. A market segment's users are similar to one another but distinct from users in other segments. The library market is segmented using several criteria.

#### **User Analysis**

After identifying the market, the marketer must identify the users within that market. Who is eligible to be a user? Is it a librarian, a department head, a reference librarian, a professor, the board of directors, or a student? It could be any of the options listed above. A useful way to organise these users is to classify them as influencers, decision makers, purchasers, or users of a service or product.

#### **Customer Satisfaction**

Customer satisfaction is reflected in the difference between the actual performances of the product perceived by a customer vs. the expectation of the customer. Hence it's the match between customer expectations of the product and the product's actual performance. Customer satisfaction differs from person to person it's an experience which is different for different individuals. A proper evaluation of a product or service can only be done by experiencing it. Therefore customer satisfaction is a post- purchase phenomenon. Satisfaction can only be measured by comparing pre-purchase expectation and post-purchase experience. Customer satisfaction is also the measure of success of an organization

### **Organisational Analysis**

When determining which markets to serve and which products and services to provide, an organization's objectives, strengths, and weaknesses must be carefully considered. Considerations in the analysis would include the organization's resources, any restrictions, authority attitudes, special expertise of staff, the organization's structure, and any successes and failures. Assessing the organization's strengths can assist in turning opportunities into successes.

### **Competitive Analysis**

To begin a competitive analysis, identify as many potential competitors as possible. In fact, identifying markets will aid in the identification of competitors, and vice versa. Who is a library/information organization's competitor? Other library/information organisations, library associations, for-profit vendors (such as information brokers), and library schools are competitors. Other organisations vying for funding are also competitors; for example, college libraries compete with one another for government funding. An organisation competes with



others seeking foundation funding. As library budgets have shrunk, competition for limited funds has increased, putting information organisations in a highly competitive environment. Competitors can be assessed by comparing the attributes and prices of their services and products to those of others.

### Marketing Mix

While marketing is a long-term planning approach, it can also help make short-term plans for the delivery of specific services to specific markets. The marketing mix, also known as the four P's of marketing after its four components, namely product, price, place, and promotion, is a short-term planning tool. This will be covered in greater detail later in this unit.

#### **IN-TEXT QUESTIONS**

- 1. Marketing is a process which aims at \_\_\_\_\_.
- 2. Marketing is an art of \_\_\_\_\_.
- 3. Marketing involves selling \_\_\_\_
- 4. What is the basis of marketing?
  - a) Exchange
  - b) Net Sales and Net Profit
  - c) Profit
  - d) Packaging

### **1.5 MARKETING PHILOSOPHIES**

Marketing can be traced back to the prehistoric period, when people first began to settle and a division of labour was established for communal living. Mutual cohabitation resulted in this division of labour in society because it was difficult for everyone to engage in activities that met all of the needs. The origins of modern-day marketing can be traced back to the birth of a barter system, in which two parties engage in the physical exchange of goods and services for mutual benefit, as well as the voluntary agreement of both parties to transfer ownership of the physical goods exchanged.

The advancement of civilization, rising living standards, changing lifestyles, and technological advancement have all resulted in new desires. These can only be met by a wide range of new goods and services, in addition to changes and improvements to existing goods and services. However, this is the general trend, and there are a few exceptions. To



experience this evolutionary trend, markets for all products and services must reach a certain level of maturity. It might not be the case for every product or market.

With changing times businesses have evolved significantly and markets have transformed in line with businesses all over the world. The firms have also changed the way they deal with the market, evolving through different phases of progress. The change in the attitude and perception of people, the rapidly changing tastes and preferences and the way they live and work. In line with this change, the marketing function has come into being. Therefore the purpose of a marketing philosophy is to identify needs and fulfill them. Therefore a marketing philosophy is a fundamental idea that guides a company's efforts to satisfy customers and achieve organizational goals. Each of these philosophies considers the interests of organizations, customers, and society at large.

Businesses conduct their marketing activity on the following five marketing philosophies: Jaiversity

- Production concept
- Product concept
- Selling concept
- Marketing concept
- Societal concept

#### **1.5.1Production Concept**

The production orientation gives rise to the Production Concept. Customers will choose products and services that are widely available and inexpensive, according to the basic proposition. As a result, managers attempt to increase volume through a low-cost, intensive distribution strategy. The managers believe that consumers prefer low-cost, widely available products. This appears to be a viable strategy in a developing market where market expansion is the business's survival strategy. Companies that want to take advantage of scale economies pursue this type of orientation. It is natural for businesses to struggle with delivering quality products and dealing with problems caused by impersonal customer service.

### **1.5.2 Product Concept**

According to the Product Concept, consumers will prefer products with the most attributes such as quality, performance, and other innovative features. Over time, the managers concentrate on developing superior products and improving existing product lines. The "Technology Push Model" refers to the commercialization of scientific laboratory innovations and the opportunity for consumers to learn about and use these products. The problem with this approach is that managers forget to read their customers' minds before launching products. Many times, innovations are introduced into the market before the market is ready for them. Innovative products are launched without educating customers about the innovation and the potential benefits to the customer. The television major Videocon



introduced the Golden Eye Technology to the Indian market, but the market did not recognise the benefit of this advantage. Following that, at a later stage in the market, LG introduced technology and developed its Unique Selling Proposition for marketing success.

#### 1.5.3 Selling Concept

According to the Selling Concept, customers, whether individuals or organisations, will not purchase enough of the organization's products unless they are persuaded to do so through selling effort. As a result, organisations must sell and promote their products in order to achieve marketing success. Consumers are typically inert, and they must be persuaded to buy by converting their inert need into a buying action through persuasion and selling action. This method is useful in the case of unsought goods such as life insurance, vacuum cleaners, and firefighting equipment such as fire extinguishers. These industries are known to have a strong sales force network.

#### 1.5.4 Marketing Concept

According to the Marketing Concept, the reason for success is the company's ability to create, deliver, and communicate a better value proposition through its marketing offer than competitors in its chosen target market. Theodore Levitt claims that "Selling is concerned with the needs of the seller, whereas marketing is concerned with the needs of the buyer. Selling is concerned with the seller's need to convert his product into cash, while marketing is concerned with satisfying the needs of the customer through the product and the entire set of activities associated with creating, delivering, and finally consuming it ". The marketing concept is an elaborate attempt to explain a phenomenon that is founded on four key issues: target market, customer need, integrated marketing, and profitability.Companies want to improve their return on investment. Instead of investing in a mass market, they have begun to look for specific markets where their product will best fit and have designed a marketing programme to suit the tastes of this target market. The next critical step is to understand the customer's needs in that target market so that a suitable marketing offer can be designed.

### 1.5.5 Societal Concept

According to the Societal Concept, the enterprise's task is to determine the target market's needs, wants, and intentions and to deliver the expected satisfaction more effectively and efficiently than competitors in order to preserve or enhance the consumer's and society's well-being. It combines the best marketing alternatives to effect social change in an integrated planning and action framework through the use of communication technology and marketing techniques. It also expects marketers to incorporate social and ethical considerations into their marketing practises. With a growing awareness of business's social relevance, there is an effort to make marketing socially relevant as well. In some ways, marketing is more than just a business activity; it must also consider social needs. Excessive resource exploitation, environmental degradation, and customer movements have necessitated the recognition of marketing's societal relevance. Marketing must then be



regarded as a socially responsible or accountable activity. According to the societal concept, a business organisation must consider the needs and desires of its customers and deliver goods and services efficiently in order to increase consumer satisfaction and the well-being of society.

### **1.6 NEED FOR MARKETING**

Currently, all types of libraries recognise the importance of marketing information services. Other information service providers are competing with libraries. They must make daily decisions about the form and format of information acquisition and archiving. Librarians work hard to ensure that information is freely available. They are dealing with space constraints, shrinking budgets, and rising material costs. At the same time, with the advent of online information access, users' expectations are skyrocketing. In response to these factors, library management philosophies and administrative operations have evolved. Librarians are embracing marketing techniques in order to become more effective managers and information service providers.

- Libraries face the greatest challenge, as financial resources for libraries are continually reduced and they are under pressure to be self-sufficient. Librarians face significant financial challenges. This necessitates a greater emphasis on marketing. Good marketing efforts can take care of all resources and how they can be channelled as efficiently as possible.
- Library services are valuable, but they are undervalued due to a lack of visibility among users. Marketing efforts can help improve the image of library and information (LIS) professionals by establishing friendly relationships with users and other patrons, providing good facilities, providing a high standard of service, maintaining good discipline, and having well-behaved staff.
- For a long time, LIS professionals focused on suppliers and thus lost interest in working with users/customers. However, it should be noted that only satisfied users return, and dissatisfied users are more likely to seek out other sources of information to meet their information needs.
- The reasons for using marketing techniques in any organisation, particularly a library or information centre, are not to make money, but to increase user satisfaction and the perceived value of their services and products. Increased user satisfaction leads to increased willingness to use and pay for the services provided. Increased perception of the organization's value will translate into increased levels of support for the organisation. As a result, user satisfaction has a direct impact on the library's support. However, some efforts could be made to obtain such funding by dealing directly with funding bodies.

To meet users' needs satisfactorily, LIS professionals must first understand who they are attempting to serve. What are the user's preferences? What services can librarians provide to

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meet these needs? Under what circumstances can librarians provide services and products? How do librarians interact with their customers? How do users communicate their requirements to LIS professionals? The librarian is well-versed in the library's resources, facilities, services, and products, among other things. There is nothing wrong with librarians informing their clients about how well they can assist them in achieving their goals. Librarians, on the other hand, must leverage their expertise in meeting users' needs through the resources available. Marketing puts such a concept to use.

Libraries want visitors to return and use their resources and services.Libraries have traditionally had very positive and favourable relationships with their users. Members of the library are formally associated with the library.Librarians have a great opportunity to transfer this positive, beneficial relationship to attract users on a regular basis. However, users will return only if their current needs are met, and marketing attitude plays a critical role in meeting users' information needs.

The world in which libraries exist has dramatically changed. It moves faster, is more reliant on technology, and competes more fiercely. We must look to marketing to help us manage better because we are afraid that change will threaten the existence of libraries.Despite interest in marketing, there has been resistance due to a misunderstanding of the concept and its application in the library environment; failure to recognise and understand a marketing orientation and its process even when it is present; and disagreement with the basic tenets of marketing that place the emphasis on the customer rather than the product, profit, or the organisation itself. Many myths exist in the minds of library professionals, such as marketing equates selling; promotion or advertising; marketing focuses on customers; marketing is about products and information is not a product; marketing necessitates good marketing people; marketing necessitates extra work; marketing necessitatesmassive budgets; marketing is all about profit; library services are still free.

### 1.7 FUNCTIONS OF MARKETING

The various definitions of marketing given earlier refer to the broad scope and variedfunctions of marketing. Most of the authoriries on marketing agree that the four majorinstruments or responsibilities of marketing are product planning and development, pricing, physical distribution, and promotion. These are also termed as the four pillars of marketing or the elements of marketing-mix. Functions of marketing be classified under three categories :

- i. those concerned with the stimulating of demand,
- ii. those concerned with the servicing of demand after it is created, and
- iii. supporting or facilitating functions

*Stimulating the demand* : This category includes the major tools of promoting theproduct, namely, advertising, personal selling, publicity, and sales promotion. Product packaging,

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branding, Iabelling and pricing can also be included under this category of marketing functions since one of the objectives in those activities is to stimulate the demand of theproduct.

*Servicing the demand* : The major functions under this category are:

- Product planning and development: The product required by the prospective buyershas to be planned and developed so as to satisfy the needs and wants of the buyer and toprovide him the desired utility. This activity includes the whole gamut of activities relatingto new product development, packaging, branding, planning and providing after-sales service, supply of spare parts and comp::inents wherever applicable.
- Transportation : The products are to be transported from the place of manufacturingto the place where it is needed by the buyer. This involves physical handling of the product.
- Warehousing : The goods have to be stored from the time they are manufactured till they are needed by the buyer.
- Inventory management ; An adequate stock has to be maintained in the warehouseto meet the unexpected demand of the buyers and to provide a buffer to meet excess damandor short supply of the goods.
- Order processing and handling. The orders for supply of the goods have to bepromptly and efficiently processed and dispatch of goods made so as to ensure timely deliveryof goods to the buyer.

### Facilitating fucntions: This category includes :

- Marketing research : It is needed for collecting, analysing and interpreting datafor purposes of solving various marketing problems and in order to improve decisions in themarketing area.
- Sales forecasting: Future sales have to be estimated before the production andmarketing of goods take place.

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Name of the Course



### Fig: Marketing functions

# 1.8 IMPLICATIONOF MARKETING WITH LIBRARY & INFORMATION SERVICES

Libraries are fundamentally service institutions, but there is no doubt among library and information professionals that 'information' is at the heart of the business of libraries and information centres.Peter F. Drucker rightly said 'Sooner or later all thinking and planning has todegenerate into work' and all marketing thinking and planning accordingly hasto be put into work. Effective implementation of marketing largely relies upon the following aspects:

- Developing a marketing culture throughout the library; everyone must realise this and work for the marketing success.
- Promoting service culture.
- Developing growth oriented, services oriented staff, as the staff makesmarketing success in any service unit.
- Developing a clear statement of the expenditure to achieve the desired levelof marketing success.
- Developing and implementing the marketing plan and actions associated with it.
- Asking for feedback, reviews and insights to help achieve the targets moreefficiently.
- Putting marketing efforts consistently over a period of time.
- Monitoring marketing efforts as to know how the outcome of marketingactivities has been effective.

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The philosophy of libraries revolves around the Five Laws of Library Science. Many authors find these laws closer to modern marketing principles. The five laws with their marketing implication is shown in the table below:

Five Laws	Marketing Implications
Books are for use	Acquiring appropriate information material and
	ensuring sufficient resources and services are
	available for the use of users. Convenient location,
	effective signage and longer opening hours,
	human resource for using resources and services.
Every reader his/her book	Collecting and interpreting information,
	understanding the needs of users and matching
	them with the organisational resources.
Every book its reader	Publicising value and benefits, promotional
	campaign, advocacy, public relations, personal
	communication, etc
Save the time of the user	Repackaging information into appropriate form,
	availability of information when they need.
	Ensuring quality of services and products.
Library is a growing organism	Mobilising resources, dealing with uncertainty
	about future user needs, new services, new
	customer groups, etc.

Table 1.1: Marketing implication on five laws on library science

### **1.8 IMPORTANCE OF MARKETING**

Marketing is not only important for the producer, but also for the distributors and consumers. The importance of marketing are as follows:

- i. Marketing helps in distribution of products to the consumers in urban andrural areas. Proper distribution ensures the food availability to the people. Byensuring smooth distribution of products, marketing sector serves the dualpurpose of satisfying both the producers' and the consumers' interests.
- ii. An efficient marketing system helps in preventing or minimizing the harvestand postharvest losses especially in case of perishable products like milk, fish etc. As the time gap between production and consumption increases, the chances of spoilage also increase which may result in physical and economiclosses.
- iii. The production of commodities tends to increase along with the increase with demand in the market. Thus, it supports a large production industry bytapping the opportunities in the market.

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- iv. Effective marketing ensures revenue generation and provides reasonable profitto producers, distributors, merchants etc. to make their livelihood.
- v. Huge infrastructure has been created to meet the rising demand of consumersboth atdomestic as well as international markets. Competitiveness has ledto modernization of industries leading to large-scale development ininfrastructure. New facilities including buildings, machineries, equipments, laboratories etc. were created with huge capital investment leading to industrial development.
- vi. Growth of production and distribution of goods has resulted in creation of large-scale employment opportunities, which stimulate economic activity.
- vii. Marketing helps in creation of high quality products as a result of competitiveness in both domestic and international markets. In modernmarketing, consumers play a very dominant role. Many experts haveconcluded that the ultimate objective of marketing is to attain consumersatisfaction. The producer has to take into account consumer preference and incorporate suitable modifications in his/her products. The increasing demandof goods also will be a temptation for producers to enhance production.Consumer awareness of quality has completely changed the marketing scenarioand has made products more competitive. The emphasis on quality andvariety of products by consumers has led to product diversification.Technological advancements and its application have resulted in introduction for mew products, especially value-added products in agriculture and fisheriessectors.
- viii. Marketing has led to substantial growth in exports and foreign exchangerevenue. Due to development of international marketing, our country wasable to achieve a high rate of export growth in terms of quantity and value.Due to technology development and adoption of modern marketing strategies,we are now in a position to compete with any other country in the internationalmarket. India is now exporting annually around 4 lakh tonnes of marineproducts fetching more than 8000 crores of rupees.
  - ix. Promotes substantial growth of National income. The creation of hugeemployment opportunities, higher rate of production, increased revenuegeneration and foreign exchange earnings etc. have substantially contributed to growth of national income. The total GDP contribution from the fisheriessector amounts to about 1.5 per cent.
  - x. Vibrant marketing system enhances demand of goods and services and inturn results in high rate of production.

### 1.9 SUMMARY

In this lesson, you have discovered that marketing is a vital activity in libraries.Marketing assists librarians in proving their worth, mobilising resources, developing a positive image, and becoming effective managers. Marketing is no longer limited to promotional efforts, but is based on interaction with users, whether they are current or potential users, and whether they are in the library or outside. The goal of marketing information services is to make them more responsive to user needs and to boost user satisfaction. To fully utilise information



products and services, information managers must employ a well-integrated marketing approach.

### 1.10 GLOSSARY

**Markets**: The processes by which individuals and groups obtain what they need and want by creating and exchanging products and value with others.

**Marketing Mix:** The set of four co~ltrollable marketing tools viz, product, price, promotion and place (Physical Distribution) that the marketer blends to achieve the outcome of desired level of custo~ner satisfaction. Marketing mix is also known as 'Four Ps'.

**Demands** : Human wants that are backed by buying power or resources.

**Needs** : Represent a state of felt deprivation; there are two ways of responding to it. One is by satisfying the need, the other is by reducing the need.

**Wants** : Human needs that are shaped by experience, culture, peer group, etc.Wants are satisfied through appropriate products or services

**Products** : Anything that can be offered to satisfy a need or want. It can be a service.

### 1.11 ANSWERS TO IN-TEXT QUESTIONS

- 1. Satisfaction of customer needs
- 2. Selling more
- 3. Products
- 4. Exchange

### 1.12 SELF-ASSESSMENT QUESTIONS

- 1. Explain marketing. Discuss various philosophies of marketing.
- 2. What is the need of marketing?

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### LESSON 1.2

# MARKETING ENVIRONMENT: PRODUCER, CONSUMER – BUYER BEHAVIOUR

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### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Marketing environment: Definition & Types
  - 1.3.1 Importance of marketing environment
  - 1.3.2 Types of marketing environment
- 1.4 Government acts affecting marketing
- 1.5 Marketing implications of government acts
- 1.6 Consumer behaviour
  - 1.6.1 Characteristics affecting consumer behaviour
- 1.7 Summary
- 1.8 Glossary
- 1.9 Answers to In-text Questions
- 1.10 Self-Assessment Questions
- 1.11 References
- 1.12 Suggested Readings

### **1.1 LEARNING OBJECTIVES**

After reading this lesson, you will be able to:

- Understand the various types of marketing environment.
- Know various government regulations affecting the marketing environment.
- Understand the marketing implications of different government acts.
- Familiarize with the consumer behaviour.

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### **1.2 INTRODUCTION**

Marketing environment is the combination of external and internal factors and forces that affect the company's ability to establish a relationship and serve its customers.

The marketing environment of a business consists of an internal and an external environment.

- The internal environment is company-specific and includes owners, workers, machines, materials etc.
- The external environment is further divided into two components: micro & macro.
  - ✓ The micro or the task environment is also specific to the business but is external. It consists of factors engaged in producing, distributing, and promoting the offering.
  - ✓ The macro or the broad environment includes larger societal forces which affect society as a whole. It is made up of six components: demographic, economic, physical, technological, political-legal, and social-cultural environment.

"A company's marketing environment consists of the actors and forces outside of marketing that affect marketing management ability to build and maintain successful relationships with target customers". – Philip Kotler

### **1.3 MARKETINGENVIRONMENT: DEFINITION, TYPES**

Marketing environment is one of the important terms of marketing management. It is external to marketing management and is uncontrollable and ever changing. Marketing activities are influenced by several factors inside and outside a business firm. These factors or forces influencing marketing decision-making are collectively called marketing environment. It comprises all those forces which have an impact on market and marketing efforts of the enterprise. According to Philip Kotler, marketing environment refers to "external factors and forces that affect the company's ability to develop and maintain successful transactions and relationships with its target customers".

As we all know, marketing research and marketing intelligence systems are methods used by businesses to scan the environment and gather vital information about changes. Customers' behaviour and competitors' activities are also important environmental factors to monitor. Environmental analysis attempts to provide a comprehensive understanding of current market conditions as well as the impact of external factors that marketers cannot control. These variables are crucial in persuading potential customers about changes in market trends, market conditions, and so on. Environment analysis is important because:

• It aids in marketing research.

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- It can assess the business impact of opportunities and threats.
- It helps the company raise general awareness of environmental changes.
- On the basis of analysis, effective marketing strategies can be developed.
- It aids in capitalising on opportunities rather than losing them to competitors.
- It makes it easier to comprehend environmental elements.
- It aids in the development of best strategies by analysing "what is going on around the company."

#### **1.3.1** Importance of marketing environment

- The marketing environmental analysis will help the marketer to:
- Become well acquainted with the changes in the environment.
- Gain qualitative information about the business environment; which will help them todevelop strategies in order to cope with ever changing environment.
- Conduct marketing analysis in order to understand the markets needs and wants so as to modify its products to satisfy these market requirements.
- Decide on matters related to Government-legal-regulatory policies in a particular country to formulate its strategies successfully amidst these policies.
- Allocate its resources effectively and diversify either into a new market segment ortotally into a new business which is outside the scope of its existing business.
- Identify the threats from the environment in terms of new competitors, price wars, competitor's new products or services, etc.; and prepare its strategies on the basis of that.
- Identify the opportunities in the environment and exploit these opportunities tofirm's advantage. These opportunities can be in terms of emergence of newmarkets; mergers, joint ventures, or alliances; market vacuum occurred due to exitof a competitor, etc.
- Identify its weaknesses such as lower quality of goods or services; lack ofmarketing expertise; or lack of unique products and services; and preparestrategies to convert its weaknesses into strengths.
- Identify its strengths and fully exploit them in firm's advantage. These strengthscan be in terms of marketing expertise, superior product quality or services, orgiving unique innovative products or services.

### **Identifying Opportunities**

It helps an organization in exploiting the chances or prospects for its own benefit. Forexample, if an organization finds out that customers appreciate its products ascompared to competitors' products then it might encash this opportunity by givingdiscounts on its products to boost sale.

### **Identifying Threats**


It gives warning signals to organizations to take the required steps before it is too late. For example, if an organization comes to know that a foreign multinational is entering into the industry then it can overcome this threat by adopting strategies, such as reducing the product's prices or carrying out aggressive promotional strategies.

# Managing Changes

It helps in coping with the dynamic marketing environment. If an organization wishes to survive in the long run, then it must adapt to the changes occurring in the marketing environment.

# The external marketing environment may be broadly divided into two parts:

- 1) Micro environment
- 2) Macro environment

# **1.3.2 Micro Environment:**

The micro environment is the environment that is closely related to the organisation and has a direct impact on its activities. It is divided into two parts: supply side and demand side. Suppliers, marketing intermediaries, and competitors who offer raw materials or supply products are all part of the supply side environment. Customers who consume products, on the other hand, are part of the demand side environment.

Micro environmental factors which effect the marketing decisions of the company are:

- i) organisation's internal environment
- ii) suppliers
- iii) marketing intermediaries
- iv) competitors
- v) consumers

We will discuss each of these factors in detail:

# **Organisation's Internal Environment**

Organisation's financial, production and human resource capabilities influence its marketing decisions to a large extent. For instance, while deciding about the sales targets, it is necessary to see whether the existing production facilities are enough to produce the additional quantities or not. If the existing facilities are not enough and expansion to plant and machinery is required, it is necessary to think about financial capabilities. You may have a responsive research and development department to develop a new product. So also, the production department may have its own facilities for producing the new product. It is also necessary to consider how non-marketing departments in the organisation cooperate with the marketing department. The top management may not agree with the views of the marketing department on the marketing strategies or their implementation. Besides, the marketing



department must work in close cooperation with the other departments, especially the quality control and production departments. Sometimes it is the sale force that must bear the major task in the strategy.

# Suppliers

For production of goods or services, you require a variety of inputs. The individuals or firms who supply such inputs are called suppliers. Success of the marketing organisation depends upon the smooth and continuous supply of inputs in required quantities on reasonable terms. Hence suppliers assume importance. The timely supplies of specified quality and quantity makes the producer to keep up the delivery schedule and the quality of the final product. The dependence on the supplier is naturally more when the number of suppliers is more. During periods of shortages, sole suppliers may not supply materials on favourable terms. Each supplier may negotiate his own terms and conditions, depending upon the competitive position of his firm. Some suppliers, for example, expect payment in advance, and goods are supplied on the basis of a waiting list, whereas others may be ready to supply on credit basis.

# Intermediaries

Normally, it is not possible for all the producers to sell their goods or services directly to the consumers. Producers use the services of several intermediaries to move their products to the consumers. The dealers and distributors, in other words the marketing intermediaries, may or may not be willing to extend their cooperation. These persons normally prefer well-established brands. Newcomers may find it extremely difficult to find a willing dealer to stock his goods. From newcomers they may demand favourable terms by way of discount, credit, etc., and the producer may find it difficult to satisfy them. There are also other intermediaries like transport organisations, warehousing agencies, etc., who assist in physical distribution. Their cost of service, accessibility, safe and fast delivery, etc., often influence the marketing activities.

# **1.3.3 Macro Environment:**

A macroenvironment is a collection of environmental factors that are beyond an organization's control. These factors have a significant impact on organisational activities. The macroenvironment is constantly changing. Changes in the macroenvironment create both opportunities and threats in an organisation.

The macro environmental factors that exert influence on an organisation's marketing system are:

- physical environment,
- technological environment,
- political and legal environment,
- economic environment,

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- demographic environment, and
- socialcultural environment.

Let us discuss these in detail:

### **Physical Environment**

The earth's natural renewable resources (e.g. forest, food products from agriculture, etc.) and finite non-renewable resources (e.g., oil, coal, minerals, etc.), weather (climatic) conditions, landscapes and water resources are components of an environment which quite often change the level and type of resources available to a marketer for his production. For example, India does not have enough petroleum resources, and imports petrol and other products. Recently, the Gulf War drastically affected the supply of petrol and diesel in the country. This had lot of implications for the companies consuming petro-products.

# **Technological Environment**

Technology is shaping the destiny of the people. The revolution in computers, electronics and communication in general may make one's production out of tune with the current products and services. For example, new printing technology like laser printing and desk top publishing, has already made the labour-intensive type-set printing uneconomical.

# **Political and Legal Environment**

Political changes bring in new policies and laws relevant to industry. Government regulation continues with different intensities and the law and the rules framed are becoming complex. Many areas of business are brought under one law Marketing Environment or the other, and the marketer cannot escape from the influence of these laws. The tax laws for example, the sales tax. excise duty, income-tax, etc., have direct bearing on the costs and prices of the products and services marketed. So also, the policies relating to imports and exports. Since these factors affect all the units, (they do not affect a single marketer alone), these are considered as the forces in the macro environment.

# **Economic Environment**

Under economic environment, a marketing manager generally studies the following factors and trends: i) Trends in gross national product and real income growth; ii) Pattern of income distribution; iii) Variations in geographical income distribution and its trends; iv) Expenditure pattern and trends. v) Trends of consumer savings and how consumers like to hold their savings, i.e., either in the form of bank account, investments in bonds arid securities; purchase of real estate, insurance policies, or any other assets; vi) Borrowing pattern, trends and governmental and legal restrictions; and vii) Major economic variables, e.g., cost of living, interest rates, repayment terms, disposable income, etc. These factors determine the purchasing power, along with savings and credit availability. Study and knowledge of economic forces is essential for preparing effective marketing plans. No firm is



immune to economic forces altogether some are less vulnerable than others. Anticipation of future economic conditions will enable the firm to devise appropriate marketing strategies. Marketing organisations are susceptible to economic conditions, both directly and through the medium of marketplace. Economic conditions affect marketing directly because such organisations are themselves a part of marketplace. For instance, the cost of inputs positively responds to upward swing of economic condition. This will affect the output price and consequently affect the sales. The effect on marketplace (consumers) also influences the marketing through changes in consumer habits. This is an indirect influence. For example, in the event of spiralling prices, consumers often curtail or postpone their expenditures for luxury products. Conversely, during times of relative affluence, consumers are much less conscious of small price differences and would buy luxury products. Demographic Environment Marketers are keenly interested in the demographic characteristics such as the size of the population, its geographical distribution, density, mobility trends, age distribution, birth rate, death rate, the religious composition, etc. The changing lifestyles, habits and tastes of the population, have potentials for the marketer to explore.

# **Demographic Environment**

Marketers are keenly interested in the demographic characteristics such as the size of the population, its geographical distribution, density, mobility trends, age distribution, birth rate, death rate, the religious composition, etc. The changing lifestyles, habits and tastes of the population, have potentials for the marketer to explore. For example, when both husband and wife go for jobs, the demand for gadgets that make housekeeping easier and the semi-cooked food products increase.

### Socio-Cultural environment

There are core cultural values which are found stable and deep rooted, and hence change very little. There are also secondary cultural values which are susceptible to fast changes. Some of them like hair styles, clothing, etc. just fade. Even in each culture, the entire population may not adopt the changes. There are different degrees with which people adopt them. Religion is also an important component of culture which has implications for the marketer.

# 1.4 GOVERNMENT ACTS AFFECTING MARKETING

Several laws affecting business have become operational over the years. The important ones affecting marketing are discussed below:

# The Indian Contract Act, 1872

Regulates the economic and commercial relations of citizens. The scope of this Act extends to all such decisions which involve the formation and execution of a contract. The essentials of a valid contract are specified and examined in detail. A contract is an agreement enforceable at law between two or more persons by which rights are acquired by one or more



to act or forbearances on the part of the other or others. The Act also specifies provisions for the creation of an agency and the rights and duties of a principal and an agent.

# Sales of Goods Act, 1930

Governs the transactions of sale and purchase. A contract of sale of goods is defined as a contract whereby the property in goods is transferred or agreed to be transferred by the seller to the buyer for a price. The Act also lays down rules about passing of property in goods, the rights and duties of the buyer and seller, rules regarding the delivery of goods as well as the rights of the unpaid seller.

# The Industries (Development & Regulation) Act, 1951

It is through this Act that the industrial licensing system operates, in effect, it empowers the government to licence (or permit) new investment, expansion of licensed units, production of new articles, change of location by the licensed units and to investigate the affairs of licensed units in certain cases and to take over the management thereof, if conditions so warrant. The objectives behind these powers are, of course, development and regulation of important industries involving large investments which have an all-India importance. It is in the actual implementation of these objectives that the relevant aspects of the industrial policy are expected to be fulfilled.

# **Prevention of Food Adulteration Act (1954)**

Prohibits the publication or issue of advertisement tending to cause harm to the ignorant consumer by consuming certain food articles. It also ensures purity in the articles of food.

# Drugs and Magic Remedies (Objectionable Advertisement) Act (1954)

This Act prohibits the publication or issue of advertisements tending to cause the ignorant consumers to resort to self-medication with harmful drugs and appliances. Advertisements for certain drugs for preventing diseases and disorders like epilepsy, prevention of conception, sexual impotency, etc., are also prohibited. The Act also prohibits advertisements making false claims for the drugs.

# **Essential Commodities Act (1955)**

This Act provides for the control of production, supply and distribution in certain commodities declared as essential under Section 2(a) of the Act, in the public interest. Under Section 3(a) of this Act, the government can fix the price of such a commodity.

# Companies Act (1956)

It is a piece of legislation which has far-reaching effects on business by regulation of the organisation and functioning of companies. With more than 650 sections, it is one of the longest legal enactments. It is meant to regulate the growing uses of the company system as an instrument of business and finance and possibilities of abuse inherent in that system.

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# Trade Marks Act (1999)

It deals with the trade and merchandise marks registered under this Act. A mark includes a device, brand, heading, label, ticket, name, signature, word, letter, numeral, shape of goods, packaging or combination of colours or any combination thereof. A Trade Mark is a distinctive symbol, title or design that readily identifies the company or its product. The owner of the trademark has the right to its exclusive use and the Act provides legal protection against infringement of this right. A trademark is registered for a maximum period of 10 years and is renewable for a similar number of years, each time the period of 10 years expires.

# Monopolies and Restrictive Trade Practices Act (1969) (MRTP Act)

This Act provides for the control of monopolies, for the prohibition of monopolistic, restrictive and unfair trade practices and for matters connected therewith or incidental thereto. It may be of interest for you to know that the first country to pass such a legislation was the United States which has a free enterprise system. There, such an Act was passed as far back as 1890 and is called the Sherman Antitrust Act,

### Patents Act (1970)

Provisions of this Act are attracted especially where the company intends to produce patented products. A patent is the exclusive right to own, use and dispose of an invention for a specified period. The patent is granted by the Central Government to the first inventor or his legal representative.

### Standards of Weights and Measures Act (1976)

This Act specifies the quantities in which products can be packed. The products covered include bread, butter, cheese, biscuits, cereals and pulses, cigarettes. cigar, cleaning and sanitary fluids, cleaning power, condensed milk, tea. coffee, cooking oils, cosmetics, honey, ice cream, jams, sauces, milk powder, soaps, spices, toothpaste, etc.

# **Bureau of Indian Standards Act (1986)**

Provides for the establishment of a Bureau for the harmonious development of the activities of standardisation, marking and quality certification of goods and for matters connected therewith or incidental thereto. It has been provided that the Bureau of Indian Standards will be a body corporate and there will be an Executive Committee to carry on its day-to-day activities. Staff, assets and liabilities of the Indian Standards Institution will perform all functions of the Indian Standards Institution. It has also been stipulated that access will be provided for to the Bureau's Standards and Certification Marks to suppliers or like products originating in General Agreement on Trade and Tariff (GATT) code countries.

# Agricultural Produce Grading and Marketing Act (AGMARK) (1937)



This Act provides for grading and standardization of agricultural commodities. The main commodities graded are -vegetable oil, ghee, cream, butter; eggs, wheat flour, rice, cotton, gur, maize, honey and ground spices. The graded goods are stamped with the seal of the Directorate of Agriculture, Marketing and Inspection, Ministry of Rural Areas and Employment - AGMARK. The seal is an assurance of quality and purity to the buyers of the agricultural products. In case AGMARK goods are found to be of poor quality or defective, the consumer can complaint to the Agriculture Marketing Advisor at Directorate of Marketing and Inspection. Defective goods are replaced free of cost or money refunded. With amendments of 1986, there is now a provision for penalty for misgrading and counterfeiting grade, designation mark- imprisonment upto 6 months and fine not exceeding Rs.5,000. Consumer organisations have been authorized to draw samples for testing.

# 1.5 MARKETING IMPLICATION OF GOVERNMENT ACTS

### **Impact on Product**

The firm cannot market goods / services which are unsafe for human consumption under defined situations. Deceptive description of quality, improper disclosures on the packaging, use of hazardous raw materials, and sub-standard quality of goods and services are completely prohibited by the Consumer Protection Act. Increasingly, the impact on the environment during the production, usage or the post usage disposal of a product is coming under critical scrutiny and more stringent regulatory guidelines to protect environment are expected in future.

### **Impact on Pricing**

Many products are under the MRP (Maximum Retail Price) regulations. The firm cannot overcharge the customers in these products. In other products also, the customer's perception of the price must match the quality being offered. The firm cannot make deceptive and false claims about its products to get more money from the customers. Moreover, the anticompetitive practices such as price-fixing, output restrictions, bid rigging and market restriction are prohibited by the Competition Act.

# **Impact on Place**

The Restrictive trade practices ensure that a firm does not use its dominant position in the market to dictate terms to the channel members or in any way restrict the free competition to other rival firms. For example, a firm cannot force a retailer not to buy or sell the products of its competitors. The regulations can also prevent the firm to sell to certain class of customers, for example cigarette marketing firms cannot sell their products to customers below 18 years of age. Hence, such firms cannot distribute their products through school or college canteens



### **Impact on Promotions**

The regulations in India talk about prohibiting false claims. This directly impacts the advertising message used by a firm where no deceptive representation about the quality, price, after sales service, and the warranty support etc. of the product or service can be made. Further the regulations prevent any firm to disparage any other firm or any particular class of customers based on their religion, community, region and language. Thus, a firm cannot use derogatory references to any of the groups mentioned above or its rivals in its communication. A firm also cannot give wrong information about its rivals. While running any sales promotion schemes, the firm cannot manipulate the prices or the stocks during the scheme period or announce bargain prices for goods, which are either put on sale or are offered in quantities which are not reasonable with respect to the nature of the trade, offering gifts, prizes or other items with the intention of not providing them as offered.

# **1.6 CONSUMER BEHAVIOUR**

A comprehensive approach to consumer environment should recognise that man is a complex being, and that any explanation of his economic decisions which does not take note of his psychological make-up, the society in which he lives, and the cultural background that flavours his orientation towards life, is likely to result in unsound business decisions by manufacturers and distributors of a very wide range of goods.

Consumers make many buying decisions every day and the buying decision is the focal point of marketer's effort. Most large companies research consumer buying decisions in detail to answer questions about what consumers buy, where they buy, how they buy, when they buy and why they buy.



# Fig: The Model of Buyer Behaviour

People purchase thousands of products and services for their consumption and use. They may purchase these products and services for different purposes and they may have myriad

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objectives, So the term consumer is often used to describe two different kinds of consuming entities: (1) personal consumer and (2) organizational consumer.

**Personal Consumer**: Personal consumer buys goods or services for his 01. her own use (e.g, shaving cream, shampoo, lipstick) are for use for the household (TV, VCR) or family. In each of the above, the goods are brought for final use by the individuals who are referred to as "end users" or "ultimate users".

**Organizational Consumer**: Organizational consumer can be for profit and not-for-profit businesses, government agencies, institutions (schools, colleges, Markets hospitals). In each of the above examples we note that the products/services are being bought in order to run the organization. For example, a travel agency purchasing a computer and printer to render services they sell.

# 1.6.1 Characteristics affecting consumer behaviour

Consumer purchases are influenced strongly by cultural, social, personal and psychological characteristics. For most part, marketers cannot control such factors, but they must take them into account.



# Fig: Factors influencing consumer behaviour

# **Cultural factors**

Cultural factors exert a broad and deep influence on consumer behaviour. Marketers need to understand the role played by the buyer's culture, subculture and social class.

*Culture:* Culture is that complex whole which includes knowledge, belief, art, law, morals, customs, and any other capabilities and habits acquired by humans as a member of society. In the context of buyer behaviour we may define culture as the Buyer Behaviour sum of learned beliefs, values, and customs that serve to direct the buyer behaviour of members of a particular society. It is the most basic cause of a person's wants and behaviour. Human behaviour is largely learned. Growing up in a society, a child learns basic values, perceptions, wants and behaviour from the family and other important institutions.

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*Sub-culture*: In any society as heterogeneous as the one in India, there are bound to be subcultures. Subcultures are groups in a culture that exhibit characteristic behaviour patterns sufficient to distinguish them from other groups within the same culture. The behaviour patterns that distinguish subcultures are based on factors such as race, nationality, religion and urban-rural identification. A subculture takes on importance in marketing if it constitutes a significant part of the population and specific purchasing patterns can be traced to it.

*Social Class*: Social class is a ranking within a society determined by the members of the society. Social classes are relatively permanent and ordered divisions in a society whose member share similar values, interests, and behaviours. Social class is not determined by a single factor such as. income but is measured as a combination of occupation, income, education, wealth, and other variables. The lilies between social classes are normally not fixed and rigid; people belonging to one social class call move to a higher class or lower class

# **Social factors**

A consumer's behaviour also is influenced by social factors, such as the consumer's small groups, social networks, family and social roles and status. In addition to psychological and personal factors, buyer behaviour is influenced by social factors. These social factors influence the buyers in different ways. For some products the influence of social factors is quite pronounced and for others it may not be that pronounced. Important social factors which have certain bearings on buyer behaviour are: reference groups, family, and social roles and statuses.

**Reference Groups**: A reference group is any person or group that serves as a point of comparison (or reference) for an individual in forming either general or specific values, attitudes, or behaviour. From the buyer behaviour perspective, reference groups are groups that serve as frames of reference for individuals in their purchase or consumption decisions. This may consist of all the groups that have a direct (face-to-face) or indirect influence on the person's attitudes or behaviour.

*Family:* A family is a group of two or more people related by blood, marriage, or adoption living together in a household. Because of strong bond and close continuous interaction family members may strongly influence buyer behaviour.

**Roles and Status**: In life a person performs various roles and may belong to many groups such as family, clubs and work environment. The person's position can be defined in terms of both role and status. A role is a prescribed pattern-of behaviour expected of a person in a given situation by virtue of the person's position in that situation. Each role carries a status reflecting the general esteem given to it by society.

### **Personal factors**

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A buyer's decisions are also influenced by personal characteristics. They include: age and life-cycle stage, occupation, economic circumstances, lifestyle and personality.

*Age & Life-cycle Stage*: People change the goods and services they buy over their life time. For example, we all rely on some sort of baby food during infancy, most other foods during growing years and may rely on special diets in later years. The clothes that we wear, furniture we buy, and recreation are all age-related.

*Occupation*: The importance of occupation as a social class indicator is highlighted by the fact that we often "size up" people by enquiring about it. A person's occupation affects the goods and services bought. Marketers frequently think in terms of specific occupations when defining a target market for their products or broader occupational categories.

*Economic Circumstances:* A person's economic situation may greatly affect product choice. People alone do not make a market; they must have money to spend. Consequently incoine distribution is one of the most used bases for segmenting consumer markets. Marketers should analyze the spending patterns of people at different income levels.

*Life-Style:* People belonging to the same subculture, social class, and occupation may exhibit different lifestyles. Lifestyle is defined simply as how one lives in the world, which is expressed in his activities, interests and opinions. It influences all aspects of our consumption behaviour. It is influenced by the factors such as culture, values, demographics, subculture, social class, reference groups, family, and individual characteristics such as motives, emotions, and personality. Individuals and households both have lifestyles.

# **Psychological Factors**

Consumers are being influenced by several psychological factors in the purchase of various products and services. These factors influence consumers in a differential way i.e., some factors may influence more and some less. The influence of these factors may vary from product to product and from time to time. There are four psychological factors which may influence buyer behaviour. They are: motivations, perception, learning, and beliefs and attitudes.

*Motivation:* We may define motivation as the driving force within individuals that impels them to take action. This driving force is produced by a state of tension, which exists as the result of an unfulfilled need, Individuals strive-both consciously and unconsciously-to reduce this tension through behaviour they anticipate will fulfill their needs and thus relieve them of the stress they feel. Two of the most popular motivation theories which are relevant in the context of buyer behaviour are 1) Abraham Maslow's Hierarchy of need theory, and 2)Sigmund Freud's Psychoanalytical theory of personality. These two theories have different meaning and interpretations regarding marketing and consumer analysis:

• *Maslow's Hierarchy of Need Theory of Motivation*: Abraham Maslow tried to explain that people have hierarchy of needs at particular time, which they want to



satisfy. According to him the most pressing human needs are required to be satisfied first and the least pressing are at the last. In terms of hierarchy they may be arranged as 1) physiological needs, 2) safety needs, 3) social needs, 4) esteem needs, and 5) self-actualization needs.

• *Freud's Psychoanalytical Theory of Personality:* According to this theory, which is the cornerstone of modern psychology, much of individual's personality stems from a fundamental conflict between a person's desire to gratify his or her physical needs and the necessity to function as a responsible member of society. This struggle is carried out among the three subsystems of a person's personality. These subsystems he called as is, superego and ego.

*Perception:* Another important psychological factor, which may influence the consumers, is perception. How a motivated person acts depends on his or her perception of the prevailing situation. It has been found quite often that two people with the same level of motivation and in the same situation act differently because of differing perceptions.

*Learning:* Learning involves changes in an individual's behaviour arising from observation and experience. Learning plays an important role at every stage of the buying decision process. No universally workable and acceptable learning theory has emerged. However, from marketing perspective consumer learning can be thought of as the process by which individuals acquire purchase and consumption knowledge and experience that they apply to future purchase related behaviour.

# 1.7 SUMMARY

Understanding of marketing environment helps to shape the marketing decisions of marketers and their delivery methods. The basic marketing concepts like – the marketing concepts, marketing environment, and understanding of consumer behaviour were discussed in the lesson. Buyer or consumer behaviour is the behaviour that buyers or consumers display in searching for, purchasing, using, evaluating, and disposing of products and services that they expect will satisfy their needs. In purchasing various products and services buyers are influenced by host of factors. These are: psychological factors, personal factors, social factors, and cultural factors.

# 1.8 GLOSSARY

**Macro Environment**: Large societal forces which exert influence on firm's marketing system. It includes demographic, economic, natural, technological, political and cultural forces.



**Marketing Environment**: The factors and forces outside of marketing that affect marketing management's ability to develop and. maintam successful transaction with its target customers.

**Marketing Intermediaries**: Firms which help the company in promot~ng. selling and , distributing its goods to ultimate consumers. They include middlemen, transporten. marketing service agencies and financial intermediaries.

**Micro Environment**: The environmental factors that are in the closer circles of the firm. It includes organisation's internal environment, suppliers, marketing intermediaries, customers and competitors.

Suppliers: Firms that supply consumables and raw materials to the company.

# 1.9 SELF-ASSESSMENT QUESTIONS

- 1. What is marketing environment? Describe the macro environment and micro environment of marketing.
- 2. Explain various regulations affecting marketing decision in India.

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# LESSON 3

# **MARKETING INFORMATION SYSTEM**

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Marketing Information System
  - 1.3.1 Concept and Definition
  - 1.3.2 Characteristics of Marketing Information System
  - 1.3.3 Need of Marketing Information System
  - 1.3.4 Importance of Marketing Information System
- 1.4 Market Information
  - 1.4.1 Types of Market Information
  - 1.4.2 Agencies Providing Market Information
  - 1.4.3 Criteria for Evaluating Market Information
- 1.5 Components of Marketing Information System
- 1.6 Summary
- 1.7 Glossary
- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

# 1.1 LEARNING OBJECTIVES

The After reading this unit, you will be able to:

- explain concept of market information system;
- describe need and purpose of Marketing information system;
- Define Market information and agencies providing it.
- Discuss various types of market information;

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• describe components of marketing information system.

# **1.2 INTRODUCTION**

All producers, manufacturers, and all other marketing intermediaries, include the organizations providing marketing facilities, utilise marketing information to run the business more profitability. However, Market information requirement of various groups of people engaged in marketing may vary. Farmers, businessmen, administrators, and legislators have come to rely more and more on statistics to tell them what's happening, to show where their economic problems are, and to assist them in finding answers or serving as a guideline both for current activities and planning ahead.Information for management of commercial farming is very important from profit point of view. In fact, to manage a business very profitably is to plan and manage its future, but to plan and manage future is to manage the relevant information.

# **1.3** Marketing Information System

### **1.3.1 Concept and Definition:**

The marketing information system is a way of gathering and analysing data on the promotion of goods and services. For marketing decision-makers to employ, it includes of people, tools, and processes for gathering, classifying, analysing, evaluating, and disseminating pertinent information. A marketing information system gathers data on different linked elements of the marketing environment, including marketing channels, competitors, prices, new products arriving on the market, grades, and standards, among others. For international marketing, it gathers data on product prices, quality, standards, grades, and legal considerations for sales in importing nations.

All information that affects the marketing of goods and services is included, including facts, projections, views, and other data. Genuine market data is essential to effective marketing and sales. Market information agencies assess the market's temperature (whether prices are growing or declining), the market's pulse (whether prices are high and sales are lively or lethargic), and the market's pressure (whether supplies are sufficient, insufficient, or in excess). The market's past is documented in statistical data sets, and organisations provide a forecast or assessment of the market's future condition. Market intelligence is necessary for a seamless and effective marketing system to operate since market knowledge is a marketing function that facilitates it.

Marketing information systems are intended to support management decision making. Management has five distinct functions and each requires support from an MIS. These are:

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planning, organising, coordinating, decisions and controlling("Chapter 9: Marketing Information Systems," n.d.).

Kotler & Keller, (2006) defines Marketing Information System as "Interacting and continuous structure of people, equipment andprocedures to obtain, classify, analyze, assess and distributenecessary and accurate information in a timely manner to themarketing decision makers, whether the information is internal, external or from other markets, which is made necessary, usefuland sufficient to serve users" (Kotler & Keller, 2006).

The marketing information system refers to the use of technology for the arrangement of the relevant data related to the market, sales, promotion, price, competition and allocation of goods and services. This information is acquired after a proper analysis and understanding of the marketing environment to ensure effective decision-making in the organization(J, 2019).



Fig 1.1: Marketing Information Systems(Source:(Yeung, 2012))

### **1.3.2** Characteristics of Marketing Information System:

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- Computer Based System
- Quick, Selective and Accurate Information
- Easy accessibility
- Inter-related Components
- Future Oriented
- Supports Decision Making
- Consistent Information
- Applicable at All Levels of Management

# **1.3.3** Need of Marketing Information System:

During the past century three developments have taken place that necessitated need for more and better marketing information system.

- 1. Markets expanded from local to national and international marketing. The fast infrastructure development has remarkably expanded the market. The producers can take the advantage of this expanded market. When the commercial farmers expand their business or area of operation to meet demand, they need more formal system for collecting market information and analyzing it. The WTO has opened a new chapter for developing countries for export of agricultural products in global market provided developed countries do follow the code of conduct and help in establishing fair trading system.
- 2. Change from buyers needs to buyer wants. As the income of the buyers increase they become more choosy and need variety of goods. In fact, today, consumers need more diversified food basket. The increase in number of buyer also result in large opportunities. However, seller find it harder to predict buyers response to different features. Obviously more detailed information on consumers' wants can help the business enterprises.
- **3. Change from price to non-price competition.** As sellers increase the use of branding, products differentiation, advertising and sales promotion, they require more information on effectiveness of these marketing tools.

# Need for Marketing Information In India

India has varied agro-climatic conditions which enables it to produce all kinds of agricultural crops in various parts of the country at different period of times in an year. But, the forward linkage is India is very poor and the farmers sell the produce in nearby/local markets or in the village itself. Many a times heavy supplies come to the local market which leads to low price and thus low profit while price in other/distant markets is high. This high price in other



markets can be a fortune for any farmer. But the farmers not have the information on such prices. The local market traders also exploit the poor farmers through various mal practices.

### **1.3.4 Importance of Marketing Information System:**

Its importance for various group of people can be judged from the following:

- 1. Farmer-producers: Market information helps in improving decisionmaking power of the farmer. A farmer is required to decide when, where and through whom he should sell his produce and buy inputs. Price information helps him to take these decisions.
- 2. Market middlemen: Market middlemen also need market information to plan the purchase, storage and sale of particular commodity. On the basis of market information/ data, they project their estimates and take decisions about whether to sell immediately or to stock goods for some time, whether to sell into the local market or go in for import or export, whether to sell in their original form or processed form. The loss/failure of business can partly be attributed to either the non-availability of market information or its inadequate availability, analysis and interpretation of market information. Co-operative marketing societies operating as commission agents make use of market information for advising their members so that they may take decisions on when to sell their product. Processors make use of market information and plan their purchases so that they may run their plant continuously and profitably. They can also work out the inventory of a product that should be maintained for a particular period of time.
- **3. General economy:** In fact, market information is also beneficial for whole economy. There is always need for a competitive market process for all commodities. The competitive process contributes to the operational efficiency of production and marketing. However, a perfectly competitive system is difficult to obtain; but the availability of market information contributes towards the competitive situation. In the absence of this system, different prices will prevail, leading to the profiteering by specialized agencies. The business of forward trading is based on the availability of market information.

**4. Government:** Market information is essential for the government in framing its agricultural production policies, in the regulation of markets, buffer stocking, import-export, prices, mechanization and control policies.



# **IN-TEXT QUESTIONS**

- 2. Markets expanded from local to national and international marketing. True / False
- 3. The system with special equipment, people and methods to gather and analyze information for marketers is called:
  - a) Management Information System
  - b) Marketing Information System
  - c) financial Information System
  - d) corporate Information System

# **1.4** Market Information

Market information is a facilitating marketing function, and market intelligence is essential to a smooth and efficiently operating marketing system. Accurate and timely market information facilitates market decision, regulates the competitive market process and lubricates the marketing machinery.

### **1.4.1** Types of Market Information

Market information is of two types:

1. Market intelligence: Marketing intelligence is different from regular marketing information or marketing research data. It may form part of marketing information system but it is special in the sense that it gives strategic information in a flash and is quite often related to competitors' activities. The nature of the marketing job necessitates a good intelligence system. Broadly, marketing intelligence furnishes information on changes in market conditions, changes in customers' requirement, emerging strategies of competitors and emerging opportunities in the business Marketing intelligence may be gathered by marketing executives directly or through field sales managers. Occasionally, it is also purchased from external agencies which provide marketing intelligence services. In what so whatever manner it is collected, it is essential to have a reliable and efficient system for gathering and using the intelligence. If there is too much delay in the process, the marketing intelligence loses its significance.



2. Market news: This term refers to current information about prices, arrivals and changes in market conditions. This information tips the farmers to take decisions about when and where to sell his produce. The availability of market news in time and with speed is of utmost value. Sometimes, a person/trader who gets the first market news has a substantial advantage over his fellow-traders who receive it late. Market news quickly becomes obsolete and requires frequent up dating.

# 1.4.2 Agencies Providing Market Information

The collected information has no meaning until it reaches the persons who need it. The agencies/ sources through which market information is disseminated are:

- **1. Personal contacts:** This is the most important source of dissemination of market information. Information is given orally, i.e., by one businessman to another businessman, by a businessman to a farmer, or by one farmer to other farmer.
- 2. Post and telephone: Businessmen get information from other markets on the telephones. Commission agents convey the information on the prices of different commodities to their client-farmers on postcards. They fill the rates on these postcards and post them daily or some time at intervals.
- **3.** Newspapers: The newspapers in English, Hindi and regional languages publish the wholesale prices of important agricultural commodities in the selected markets of the country/State. In addition, the Economic Times and the Financial Express contain a lot of information on the various aspects of marketing including prices.
- **4. Magazines:** Magazines, such as the Eastern Economist, Commerce and Capital, are important weekly trade journals, which collect information on trade. e)
- **5. Government agencies' reports:** The regulated markets, the Agriculture Marketing Department in the States, the Directorates of Economics and Statistics in the States, the Directorate of Marketing and Inspection, Government of India, and the Directorate of Economics and statistics, Ministry of Food and Agriculture, Government of India are some of the government agencies which disseminate the collected market information through their regular publications and broadcasts on All India Radio.
- **6. Price bulletins:** These are issued daily, weekly, or every month. The important bulletins through which price information is disseminated are: Bulletin of Agricultural Prices (Weekly), Agricultural Situation in India (Monthly), Agricultural Prices in India (Annual), and Bulletin on Food Statistics (Annual). The monthly situation and outlook ports are published by the Directorate of Marketing and Inspection, Government of India.
- 7. Radio and television: The information on the market situation in respect of prices and arrivals of commodities in major markets are regularly telecasted. Almost all



channels now have the slot for market information. Several State Governments and National Information Centres of theGovernment of India have initiated interlinking the markets with NICNET with view to ensure the quick flow and accessibility of market information on prices and arrivals. The information on this is also available on internet.

- 8. Through internet: Internet has become a main source of market information. All the world major markets' grade-wise prices and arrivals of various commodities on different days are available. Even the origin wise and variety-wise information is also available through internet. Directorate of Marketing and Information (DMI) has been pioneering in this aspect.
- **9. Krishi channel:** Recently a new Television Channel dedicated to agriculture has been proposed. The channel will cover production and marketing including international trade issues. The farmers have high hopes from it. This will also extend the marketing information in future.
- **10. Kisan call centres:** Kisan Call Centres will be spread throughout the country in various states/zones. These will have direct link with experts on various agricultural aspects including agricultural marketing, in State Agricultural Universities/ Research Institutes or a panel of experts at these centres only. Any farmer can seek information/ ask any question related to agriculture at any time by dialling 1551, a toll free number. The solution to his problem will be suggested on line or with in 24 hrs depending upon question and experts availability.

### 1.4.3 Criteria for Evaluating Market Information

For maximum benefits, the market information must meet a number of criteria. Some of those are described below:

- 1. Comprehensive information: The information must cover all agricultural commodities and markets including international markets. A reasonable and comprehensive information includes prices, price trends, production, supply movements, stocks, and demand conditions at each level of the market for a product. Providing such a mass of information, especially under the constantly changing conditions is a formidable and expensive task.
- 2. Accuracy and trustworthiness: Information must be accurate and trustworthy. However by nature, market information can never be 100 per cent accurate, but it must be an honest market appraisal in order to earn the trust of information users. Constant efforts are made to improve the accuracy of market information and news services.
- **3.** Usability: Information also must be relevant and in usable form. It is not enough to simply collect a number of reports. Information must be collected, packaged, and disseminated with the user's interests in mind.Much market information goes unused

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because it is not in usable form. In such case the efforts made in collecting the information go waste.

- **4. Confidentiality:** The information should be confidential to whom it is collected. The information revealed under this situation of confidentiality will be more correct and may assist in drawing policy implications. The names of firms, to whom the market information is collected, should not be leaked out.
- **5. Timeliness:** Market information must be timely, in the sense of being relevant to current decisions, and must be speedily transmitted to users. Much market information is unusable. Futures market traders require minute-to-minute market information.
- 6. Accessibility: Each interested party like farmers, consumers, government officials and marketing agencies should have equal access to all the information relevant to the bargaining and marketing processes.
- 7. Relevance and clarity: Market information must be relevant and clear.
- 8. Objectivity: It should convey objective message.
- **9.** Strategic value: It should be conceived and used as a marketing decision support system.
- **10. Economic:** It must be economical. In other words it should be cost effective.

### **IN-TEXT QUESTIONS**

- 4. Krishi Channel is the source to market information. True / False
- 5. Market information is a facilitating marketing function. Ture/ False
- 6. Criteria for evaluating Marketing Information System are:
  - a) Economics
  - c) Objectivity

b) Timelinessd) All of these.

# **1.5** Components of Marketing Information System

A marketing information system has four components:

- The Internal Reporting System
  - Internal reports include orders received, inventory records and sales invoices.
- ✤ The Marketing Research Systems

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- Marketing research takes the form of purposeful studies either ad hoc or continuous.
- The Marketing Intelligence System
  - By contrast, marketing intelligence is less specific in its purposes, is chiefly carried out in an informal manner
- Marketing Models
  - and by managers themselves rather than by professional marketing researchers.

For Instead of a plethora of unrelated data on market information one needs pin pointed information which farmers/traders/firms combines various inputs with internal information and presents integrated report for him. Thus every farmer or trader must organize a rich flow of information or they must search for relevant information. Conceptually in a competitive world they must study the information need and design marketing information system to meet its demand.

The various components of marketing environment are:

- Target market
- Marketing channels

**DDCY** 

- Competitors
- Publics
- Microenvironment forces and
- Macro environment forces.

They must collect and monitor marketing environment and market trend information and analyze through four subsystems making up the Marketing Information System. These subsystems are presented in the following diagram.





Fig 1.2: Marketing Information System Model By Kotler (Source: (Kotler, 1998))

### Let us take a closer look at above four subsystems:

- 1. Internal report sub-system: Every farm/firm manager produce internal report showing their current production, sales, cost, inventory, profit and capabilities. They plan the information need and design to collect it.
- 2. Market intelligence sub-system: This system provides the farm/firm/coy with happenings data in the commercial environment. The farm manager get the information through reading newspaper, reports, internet, telephone/ mobiles, telegraph, suppliers, distributors, specialist, panel of experts, even purchase the intelligent from outside, or keep their own staff to get information. Farmers normally need the information of standard/grades, prices, transport, channels, strategies, legal system, institutions and competitiveness.
- 3. Marketing research sub-system: It is the systematic design, collection, analysis and reporting of data and finding relevant information specific to situation facing the firm. The managers either get the data analyzed or study the specific situation himself. They measure market potential based on various marketing components and analyze it to take decision.
- 4. Marketing Analytical sub-system: It consists of advanced techniques for analyzing marketing data and problems. The data is available in the farm records/firms data bank. Farm/firm manager try to find out major variables (and their significance) which affect the sales potential. They thus find the potential markets and the segment of the markets through analytical system. Then they plan for marketing of produce. They choose the mode of transport, distributor and channels. Based on analysis of



market information they can plan and execute the plan, monitor and keep control over the business.

	IN-TEXT QUESTIONS
7.	The components of Marketing Environment
	a) Target Market
	b) Marketing Channels
	c) Publics
	d) All of these.
8.	The Marketing intelligence helps to gather
	a) data based on real happenings
	b) data based on results
	c) data based on raw materials
	d) data based on sales
9.	Marketing research is the sub-system of Marketing Information System.
	True / False
10	Marketing analytical is the sub-system of Marketing Information System.
	True / False

# 1.6 SUMMARY

The importance of marketing data in commercial agriculture cannot be overstated. By carefully arranging their domestic marketing, Indian farmers and traders enhance employment and income. Their income will rise thanks to international trade, particularly in the commodities where they have a competitive advantage. Through cooperatives or group actions, small farmers might engage in a collaborative effort for their mutual gain. To increase the revenue of producers, processors, traders, or any other company, marketing information is a potent weapon.

# 1.7 GLOSSARY

**Market Information:** It is the information/data on various marketing aspects that is necessary for taking decision for profitable selling of the products.

**Marketing Information System:**Marketing information system is system of collecting and analysing information related to marketing of goods and services.

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# **1.8 ANSWERS TO IN-TEXT QUESTIONS**

1. (a)	6.(d)
2. True	7. (d)
3. (b)	8.(a)
4. True	9. True
5. True	10. True

# 1.9 SELF-ASSESSMENT QUESTIONS

- 1. Define a market information system.
- 2. Explain various agencies/sources through which the market information in India is available.
- 3. Why marketing information system is needed?
- 4. Define the concept 'Marketing Information System' Discuss its need, use and steps to be involved in designing and developing a MIS for a university library.

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# **LESSON 4 MARKET SEGMENTATION**

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# **STRUCTURE**

- 1.1 Learning Objectives
- 1.2 Introduction
- niversit 1.3 Market Segmentation: Concept and Meaning
- 1.4 Benefits of Market Segmentation
- 1.5 Market Segmentation Variables
  - Geographic Segmentation 1.5.1
  - 1.5.2 Demographic Segmentation
  - 1.5.3 Psychographic Segmentation
  - 1.5.4 Behavioural Segmentation
- 1.6 Market Criteria for Effective Segmentation
- 1.7 Performing Market Segmentation
- 1.8 Summary
- 1.9 Glossary
- Answers to In-text Questions 1.10
- 1.11 Self-Assessment Questions
- 1.12 References
- 1.13 **Suggested Readings**

#### **LEARNING OBJECTIVES** 1.1

After completing the lesson, you will be able to:

- Understand the concept and meaning of Market Segmentation
- List and elaborate on major variables of Market Segmentation •



# **1.2 INTRODUCTION**

Businesses that use segmentation strategies perceive the market as being divided into smaller parts, each of which has more consistent key qualities than the whole. The division of the diverse market into segments is known as market segmentation. Facilitating the creation of distinctive marketing strategies that will work best for these niche markets is the aim. Numerous options exist for market segmentation. A business may opt for concentrated marketing, in which case it would target just one or a small number of market sectors. However, the majority of businesses who divide their markets choose a number of market groups to target with a variety of products, pricing strategies, and marketing initiatives. They may even sell through a variety of distribution channels(Loudon &Bitta, 1984).

# **1.3** Market Segmentation: Concept and Meaning

According to Victor T C Middleton "Market segmentation is the process whereby producers organise their knowledge of customer groups and select for particular attention, those whose needs and wants they are best able to supply with their products".

In marketing, market segmentation is the process of dividing a broad consumer or business market, normally consisting of existing and potential customers, into sub-groups of consumers (known as segments) based on some type of shared characteristics. In dividing or segmenting markets, researchers typically look for common characteristics such as shared needs, common interests, similar lifestyles, or even similar demographic profiles. The overall aim of segmentation is to identify high yield segments – that is, those segments that are likely to be the most profitable or that have growth potential – so that these can be selected for special attention (i.e. become target markets). Many different ways to segment a market have been identified. Business-to-business (B2B) sellers might segment the market into different types of businesses or countries, while business-to-consumer (B2C) sellers might segment the market into demographic segments, such as lifestyle, behavior, or socioeconomic status("Market Segmentation," 2022).

In order to segment a market, it must be divided into distinct groups. It can be summed up as the separation of a market into groupings of segments with comparable needs. This notion contests the idea that reaching a broad market will dilute your efforts. It is founded on the understanding that marketing efforts should be focused on the groups with the most potential in order to sell a product more successfully. According to Philip Kotter, various "competitors will be in the best position to go after particular sectors of the market" and every "organisation, instead of trying to reach everyone, should find the most attractive areas of the market that it could effectively service."

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# 1.4 Benefits of Market Segmentation



Fig: 1.1: Benefits of Market Segmentation: (Sources:("Benefits of Market Segmentation | Top 10 Benefits of Market Segmentation," 2019)





# **1.5 Market Segmentation Variables**

The According to Kotler, there is "no single way to segment a market. A marketer has to try different segmentation variables, singly and in combination, hoping to find an insightful way to view the market structure".

### The major variables used for segmenting the market are:



# **Fig: 1.2: Market Segmentation Variables: (Sources:** ("Market Segmentation Variables Ppt Templates," n.d.)

### 1.5.1 Geographic Segmentation

A company can decide to operate in one or a few geographic areas or operate in all but pay attention to local variations in geographic needs and preferences. The market is segmented in various geographic entities lie country, state, region or city etc. This segmentation is based on the idea that customer needs differ according to geographic regions.

# 1.5.2 Demographic Segmentation

In this case the tourism market is divided into various groups keeping in view the demographic variables. These variables include age, sex, family size, family life cycle, income, occupation, education, religion, race, and nationality. The demographic segmentation is probably the one most frequently used method of market segmentation.

# 1.5.3 Psychographic Segmentation



Psychographic segmentation is the research methodology used for studying consumers and dividing them into groups using psychological characteristics including personality, lifestyle, social status, activities, interests, opinions, and attitudes.Psychographic segmentation's emphasis on characteristics like personality and values differs from demographic segmentation, which uses a specific trait (like gender, age, income, etc.) to categorize potential audiences.

### **1.5.4 Behavioural Segmentation**

In this type of segmentation, prospective buyers of tourism products are segmented on the basis of their knowledge, attitude, use, or response to the tourism product.

### **IN-TEXT QUESTIONS**

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- 6. Psychographic segmentation is based on\_\_\_\_\_
- 7. Geographic Segmentation is based on \_\_\_\_\_
- 8. Demographic Segmentation is based on
- 9. Behavioural Segmentation is based on \_\_\_\_
- 10. Price Segmentation is based on\_

# **1.6** Market Criteria for Effective Segmentation

A decision to use a market segmentation strategy should rest on consideration of four important criteria that affect its profitability. In order for segmentation to be viable, the market must be:

- 1. Identifiable and Measurable: Segments must be identifiable so that the marketer can determine which consumers belong to a segment and which do not. However, there may be a problem with the segment's measureability (that is, the amount of information available on specific buyer characteristics) because numerous variables are difficult, if not impossible, to measure at the present time.
- 2. Accessible: This criteria refers to the ease of effectively and economically reaching chosen segments with marketing efforts. Some desired segments may be inaccessible because of legal reasons.
- **3.** Substantial: This criteria refers to the degree to which a chosen segment is large enough to support profitably a separate marketing program. As strategy of market



segmentation is costly. Thus, one must carefully consider not only the number of customers available in a segment but also the amount of their purchasing power.

**4. Responsive:** There is little to justify the development of a separate and unique marketing program for a target segment unless it responds uniquely to these efforts. Therefore, the problem is to meaningfully define market segments so that they favorably respond to marketing programs designed specifically for them. It is possible for the marketer, using readily available data, to measure differences among market segments in terms of their responsiveness to the marketing decision variables, and these measurements may successfully be used in developing a marketing strategy.

# **1.7** Performing Market Segmentation

This Section reviews the steps involved in a typical market-segmentation study in order to illustrate a successful approach that may often be taken(Loudon &Bitta, 1984).

The eight Steps involved in the process are as follows:

- 1. Define the problem or determine the usage to be made of the research.
- 2. Select segmentation basis.
- 3. Choose a set of descriptors that defines, characterizes, or relates to the segmentation basis.
- 4. Select a sample of consumers.
- 5. Collect data on segment descriptors from the sample of consumers.
- 6. Form segments based on chosen consumer descriptors.
- 7. Establish profiles of segments.
- 8. Translate the results into marketing strategy.

# 1.8 SUMMARY

This Unit gave you an idea about the general market segmentation theory and its correlation with tourism marketing. Market segmentation helps in identifying and understanding the needs of the consumer and also helps in profiling the tourists. Market segmentation is an essential activity to be undertaken for planning, designing and delivering a marketing mix. You have seen that there are different approaches to segment tourism markets alongwith various variables. However, at times these variables are interdependent or simul~aneously applicable. Market segmentation is not only relevant for international tourism markets but also for domestic tourism markets.



# 1.9 GLOSSARY

**Market:**Market stood for the place where buyers and sellers gathered to exchange their goods, such as a village bazaar.

Market Segmentation: The process of dividing market into distinct segments.

# 1.10 ANSWERS TO IN-TEXT QUESTIONS

1. (b)	6. social status, life styles, andlor
2. (b)	personality characteristics
3. (a)	7. the idea that customer needs differ
4. (c)	according to geographic regions.
5. (d)	8. demographic variables
	9.their knowledge, attitude, use, or response
	to the tourism product
	10. Price variable

# 1.11 SELF-ASSESSMENT QUESTIONS

- 1. Write an essay on the application of market segmentation concept in library services and products.
- 2. Discuss major variables of market segmentation.
- 3. Describe in detail the concept of market segmentation.

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# LESSON 5 MARKETING MIX

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niversity

## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Marketing Mix : Concept and Definition
- 1.4 Elements of Marketing Mix
  - 1.4.1 Product
  - 1.4.2 Price
  - 1.4.3 Place
  - 1.4.4 Promotion
  - 1.4.5 Additional P's inContext of Services
  - 1.4.6 The 8th P of Marketing Mix
- 1.5 Summary
- 1.6 Glossary
- 1.7 Answers to In-text Questions
- 1.8 Self-Assessment Questions
- 1.9 References
- 1.10 Suggested Readings

#### **1.1 LEARNING OBJECTIVES**

After completing the lesson, you will be able to:

- Understand the concept of Marketing Mix
- Recognise the important elements of Marketing Mix
- List, explain and interpret each element of Marketing Mix

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#### **1.2 INTRODUCTION**

Marketing is a planned approach to identify and gain the support of users and develop appropriate services in a manner which benefits the users and further the aims and objectives of information centers. Marketing includes selling, advertising, physical distribution, sales promotion, etc. Marketing Mix refers to the collection of controllable elements which an organization uses to influence and focus on the target market. It is a mixture of several ideas and plans followed by a marketing person to promote a particular product or brand. Several concepts and ideas combined together to formulate final strategies helpful in making a brand popular amongst the masses form marketing mix. Historically, there were said to be four Ps of marketing elements, namely: Product/Service, Price, Promotion andPlace. Recently, another three elements (People, Process and Physical evidence) have been added particularly in the context of services marketing(Booms & Bitner, 1981).

#### **1.3** Marketing Mix: Concept and Definition

Numerous activities are involved in marketing. An organisation may choose its target consumer segment as a starting point. Once the target market has been selected, the product must be introduced to the market using the proper distribution, pricing, and marketing strategies. To reach the marketing objective, these must be merged or mixed in the proper ratio. The term "marketing mix" refers to this combination of goods, pricing, distribution, and promotional activities.

Product, pricing, place, and promotion have historically been the four main components of the "marketing mix," which is a foundational business strategy (also known as the "4 Ps"). The "collection of marketing tools that the company use to pursue its marketing objectives in the target market" is known as the marketing mix. The early twenty-first century saw the emergence of marketing theory. First published in 1984, the modern marketing mix has now evolved into the preeminent framework for marketing management decisions. In the marketing of services, an extended marketing mix is often employed, consisting of 7 Ps (product, pricing, promotion, location, packaging, positioning, and people), which are the basic 4 Ps extended by process, people, and physical proof. The 8 Ps, which include these 7 Ps plus performance, are occasionally used by service marketers. They are: product, pricing, place, promotion, people, positioning, package, and performance("Marketing Mix," 2022).

A product or service is sold by using the marketing mix, which is a collection of marketing tools or approaches. It involves selecting how to position a product so that consumers will buy it at the ideal location, price, and moment. In accordance with the marketing and promotion strategy, the product will thereafter be sold. The four Ps—Product, Price, Place, and Promotion—make up the marketing mix's constituent parts. Marketing managers create marketing strategies for the commercial sector while taking into account the four Ps. Today, however, the marketing mix is rapidly including a number of other Ps for critical advancement("Marketing Mix - Definition, 4 P, 7 P of Marketing, Example, Elements," n.d.).



According to Philip Kotler, marketing mix is "set of marketing tools that the firm uses to pursue its marketing objectives in the target market".



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#### **1.4 Elements of Marketing Mix**

The classical framework of marketing mix includes 4P's of marketing which are:

- **1. Product** It includes all the decisions and activities related to product or service which offers benefits to enable the total spectrum of the tourist experience.
- 2. Price It includes all the decisions and activities related to the price to be charged for the product or service.
- **3. Place** It includes all the decisions and activities related to the distribution of the product or service.
- **4. Promotion** It includes all the decisions and activities related to promotion of the product or service.

Table 1.1: Marketing Mix Elements (4Ps)			
Product Decisions	Price Decisions	Place Decisions	Promotion Decisions
Brand name	Pricing strategy	Distribution channels	(push, pull, etc.)
Functionality	Suggested retail price		
Styling	Wholesale price	Market coverage	Advertising
Quality	Various discounts	- intensive	Sales promotion
Safety	Seasonal pricing	- selective	Personal selling
Packaging	Bundling	- exclusive	PR/publicity
Repairs & support	Price flexibility	Inventory	Promotional budget
Warranty Accessories	Price discrimination	Warehousing	
and Services		Order processing Transportation	

Fig 1.2: Marketing Mix Elements (4Ps)

(Source:("Online Study Material Commerce Courses - LPU Distance Education," n.d.))

#### 1.4.1 Product

The organization's goods and services are referred to as its "products." A lipstick, a plate of dahi-vada, and a pair of shoes are all examples of merchandise. All of these were bought in order to meet one or more of our needs. Instead of purchasing a physical item, we are paying for the benefit it will bring. In other terms, a product can be thought of as a collection of advantages that a marketer provides to a customer in exchange for a fee. While purchasing a pair of shoes, we are truly purchasing comfort for our feet, and while purchasing lipstick, we are likely purchasing beauty due to the likelihood that it will enhance



our appearance. The term "product" can also refer to a service, such as air travel, telecommunications, etc.

#### 1.4.2 Price

Price is the cost associated with a good or service. It ranks as the second most crucial component of the marketing mix. Fixing the product's price is a difficult task. While determining the price, a number of elements need to be taken into consideration, including the amount of demand for the product, the cost involved, the consumer's ability to pay, the prices paid by competitors for comparable items, governmental restrictions, etc. Pricing actually plays a key role in making decisions because it affects both the profitability of the company and the demand for the goods.

#### 1.4.3 Place

Products are made to be sold to consumers. They must be made accessible to customers at a location where they may easily make a purchase. Woollens are produced in great quantities in Ludhiana, and you may get them at a shop from the neighbourhood market in your town. The goods must therefore be offered in stores in your town. This involves a network made up of a number of organisations and people, including distributors, wholesalers, and retailers (also called a channel of distribution). Whether to sell to retailers directly or through distributors, wholesalers, etc., is a decision that the organisation must make. Even planning a direct sale to customers is possible.

#### 1.4.4 Promotion

The marketing effort for a product may not be successful if the consumer is not made aware of its pricing, features, availability, etc. despite the fact that it is manufactured with the needs of the consumer in mind, is fairly priced, and is made available at outlets that are convenient to them. Therefore, promotion is a crucial component of the marketing mix since it describes the process of educating, persuading, and influencing a consumer to choose the product to be purchased. Advertising, publicity, personal selling, and sales promotion are all methods of promotion. In order to tell potential customers about a product's availability, qualities, and uses, this is mostly done. It piques a potential customer's interest in the product, enables him to contrast it with similar products, and helps him make a decision. The spread of print and electronic media has greatly facilitated the promotion process.

#### 1.4.5 Additional P's in Context of Services

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In context of services (including tourism), three additional P's have been added, which are as follows:

- 1. **People** It includes all the decisions and activities related to human factors who participate in the service delivery process and the interactions between the customers and service providers.
- **2. Process** It includes all the decisions and activities related to the procedures and mechanisms adopted by the service provider by which the service is delivered.
- **3. Physical Evidence** It includes all the decisions and activities related to the environment and space where the service occurs.

# 1.4.6 The 8<sup>th</sup> P of Marketing Mix

In addition to these 7 P's, as discussed above, Kotler and Keller added the following P's which form part of the modern marketing realities:

- 1. **Programmes** It includes all the decisions related to consumer directed activities which are not encompassed into the traditional marketing mix. Keeping in view the digitalisation of the marketing processes, it includes all the online and offline activities which are directed towards consumers.
- 2. **Performance** This P captures the range of all the possible outcomes of marketing activities. This includes both financial and non-financial implications of marketing programmes and decisions.

#### **IN-TEXT QUESTIONS**

- 6. List the four components of marketing mix.
- 7. \_\_\_\_\_classified "marketing mix variables" in terms of 4Ps:
  - (a) Prof. E. Jerome McCarthy (b) Albert Frey
  - (c) William lazer(d) Bernard Booms

a) Productc) Place

8. \_\_\_\_\_\_is the only marketing mix variable can be altered quickly:

b	) Price	
---	---------	--

d) Promot	io
d) Promot	io

9. 4Ps includes which one of the following?

a) Process	b) Prize
------------	----------

c) Place d) Packing

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### 1.5 SUMMARY

Any business or organisation uses a combination of marketing strategies and tactics known as the marketing mix to achieve its marketing goals. The 4Ps of marketing—Product, Price, Promotion, and Place—are included in the traditional framework for the marketing mix. The conventional marketing mix was augmented with three new Ps for services marketing. The three categories are People, Process, and Physical Evidence. The eighth P of the marketing mix is also a topic of discussion among practitioners in contemporary marketing, as technology has completely altered the marketing landscape. Performance marketing is the subject of this article's discussion of P-8. To accomplish the organization's marketing goals, a marketer must decide on marketing strategies for each of these marketing mix components individually.

## 1.6 GLOSSARY

**Marketing:**Marketing is a societal process by which individuals and groups obtain what they need and want through creating, offering, and freely exchanging products and services of value with others

Marketing Mix: Marketing mix is a model of crafting and implementing marketing strategy.

# **1.7 ANSWERS TO IN-TEXT QUESTIONS**

1. Marketing Tools	5. Product, Price, Place, Promotion
2. True	6. (a)
3. (d)	7. (b)
4. (a)	8. (c)

#### 1.8 SELF-ASSESSMENT QUESTIONS

- 1. What do you understand by the concept of Marketing Mix.
- 2. Discuss the role of Marketing Mix in the marketing of LIS products and services.
- 3. List the elements of Marketing Mix and elaborate it.

## **1.9 REFERENCES**

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## **UNIT II: Strategies and Techniques**

# **LESSON 2**

## **Marketing Research**

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## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction

1.3

- What is Marketing Research?
  - 1.3.1 Concept and Definitions
  - 1.3.2 Why Marketing Research?
  - 1.3.3 Components of Marketing Research
- 1.4 Steps in Conducting Marketing Research
- 1.5 Types of Marketing Research
- 1.6 Role of Librarian and Research Agency
- 1.7 Market Research Problems and Limitations
- 1.8 Summary
- 1.9 Glossary
- 1.10 Answers to In-text Questions
- 1.11 Self-Assessment Questions
- 1.12 References
- 1.13 Suggested Readings

## **1.1 LEARNING OBJECTIVES**

In this lesson, the students will study the concept of Marketing Research which is the crucial element in understanding markets. After reading this lesson, the students will be able to define and explain What marketing research is? The students will also study the various steps involved in conducting Marketing Research along with the advantages and disadvantages of Marketing Research. This lesson will also highlight the components of Marketing Research and the role of librarians and research agencies in Marketing Research.

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# **1.2 INTRODUCTION**

Marketing research and market segmentation are the critical elements in understanding the markets. Marketing Research is the process that links marketers to the market by providing information and insights to assist in marketing decision-making. Marketing research both drives the market segmentation process and is influenced by it. Marketing Research is crucial to understanding the processes of relationship marketing and customer relationship management. Marketing Research is concerned with the whole marketing process. Marketing Research is market research (McDonald and Christopher, 2005). Thus, in this lesson, we will study the concept of ' Marketing Research.

# **1.3 WHAT IS MARKETING RESEARCH?**

#### **1.3.1** Concept and Definitions

#### Research

Research is a Systematic exhaustive, and intensive investigation of new knowledge Investigation of logical basis is called research. According to ALA glossary, 'Research is the systematic exhaustive and intensive investigation and study usually through hypothesis and laws'. It is a studious inuring or examination especially critical or especially critical or exhaustive investigation or experimentation having for its aim the also convey of new facts and their correct interpretation the revision of accepted conclusions theories of laws in the light of newly discovered facts of practical applications of new of revised conclusion there and laws. Through research, knowledge grows and develops, leading to the extension of the boundaries of knowledge and scholarship. Research is a rational process aiming at discovering the relationship among the phenomena.

#### **Marketing Research**

'Marketing Research' is a function that links the consumer, customer and public to the marketer through information. Information is used to identify defined marketing opportunities and problems to generate, refine and evaluate marketing actions, to monitor marketing performance, and to improve understanding of the marketing process. Marketing Research engages in various activities, ranging from market potential and market share studies assuments of customer satisfaction and purchase behavior to studies of pricing, product distribution, and promotion activities.

**Philip Kotler says-** "It is a systematic, problem analysis, model building and fact-finding for important decision making and control in the marketing of goods and services."



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According to American Management Association, "It is the systematic gathering, recording and analyzing of data about problems related to the marketing of goods and services."

**Marketing research** is the systematic and objective search for analysis of information relevant to the identification and solution of any problem in the field of marketing.

**Marketing research** is sometimes defined as applying the scientific method to marketing problems. Particular emphasis must be given to maintaining objectivity on the part of the investigator, emphasizing accuracy in measurement and making exhaustive investigations.

So, marketing research is a method to find a solution to a problem, and it has become very essential in today's competitive environment. Therefore, it should be done carefully so that the result will be reliable.

These definitions emphasize on systematic approach in the search and analysis of information when research can be conducting, gathering record and analysis, then research could be get fruitful results, but if decisions are wrong then industry will collapse.

The purpose of marketing research is a reality to get an objective assessment for improved marketing decisions rather than to prove or disprove as the systematic design, collection analysis and for understanding the marketing phenomenon in any marketing situation and is useful for the marketing of any organization's information products and services. Additional information is needed to improve decision-making in the various areas of products and services.

The decision to be made an identification and selection of marketing strategy for tapping the selected opportunity, design of marketing mix element i.e. products, price, promotion and distribution, designing and introducing new products and feedback and control of the market effort.



Fig. 1. A Framework for Marketing Research

#### 1.3.2 Why Marketing Research?

In decision-making process related to the marketing mix, product design and distribution, advertising and promotion, pricing etc. the specialized skills and research techniques are required (Rao & Rao, 1999). Thus, in this reference, Marketing research is useful for improving marketing decisions and for understanding the marketing phenomenon in any marketing situation. It is very useful for the marketing of library and information products and services. The importance of marketing research for librarians is enhanced because of their current background and working. Firstly, librarians or information managers rarely venture out to assess the requirements of their clients as they are used to clients coming to them. Secondly, they are usually managers of a storehouse of information sources and thus have only occasionally been proactive in understanding the requirements of even those coming to the library. Thirdly, the librarians are not able to process the available information as per the client's requirement due to a lack of sufficient resources. Finally, if the librarians wish to acquire those resources to provide the services to the clients, then they face budget constraints. Thus, the important areas of research for marketing of information products and services are the areas of strategy and plan formulation and control.

#### 1.3.3 Components of Marketing Research

1. The Classification of marketing tasks to be performed for the scope of the research has to be analyzed then the routines problems must be analyzed. There are two types of problems.



a) Short Term Research Problem.

#### b) Long-term research problem.

- 2. The classification based on subject should be done for their distribution sales methods, Price, competition, and Production.
- **3.** Then, the research on the market is to be done potential sites should be analyzed for consumption and observed.
- 4. **Product:** The idea that consumers will favor products that offer the quality performance and futures and that the organization should two devote its every to making continuous product improvements A detailed version of new product idea stated in consumer elements as packaging coverage, currency, format, frequency of issue, graphic, indexing systems and products and services required by the target group for the supply-driven appeared research should gather user feedback on products and research.
- 5. Place: the right product and service are available to target Customers In the right place and right time. Place element has a major impact on the levels of customer satisfaction. The place should be designed to provide preplanned levels of customer service at the minimum cost for each level of service. Place utility of the product should examine the distribution method and the cost of distribution of the product place or distribution channels and service the specific objectives is to discover the case and difficulty of obeying the products and services and the timeliness of the information supplied.

**6. Promotional Opportunities:** under this, research should aim to discover the media and other communication channels powered by users and buyers to acquire information.

# 1.4 STEPS IN CONDUCTING MARKETING RESEARCH

#### The Steps in Conducting Marketing Research are:

- 1. To define the purpose of research and social problems with it.
- 2. The needs should be broken down into information needs and specific variables collected from different sources.
- 3. The value of such additional information needs is to be assessed to decide how much to spend on conducting the research.
- 4. Then, the research plan is prepared, consisting of a research design to achieve the objectives and methods of data collection so that the needed information is obtained and a method of analyzing the collected data to achieve the research objectives and resolve the decision problem.





- 5. Then there is the research plan implementation for collecting the required data.
- 6. The last step is interpreting the results and preparing a research plan to use the results, followed by preparing the research report.

## 1.5 TYPES OF MARKETING RESEARCH

Marketing Research can be 'ad hoc' or 'ongoing'. The 'Ad hoc' marketing research refers to situations where the identification of a research problem leads to a specific information requirement. For example, When a French manufacturer of pharmaceutical company found that the sales of its long-established cough remedy were declining, it decided to survey consumer attitudes and beliefs about cough remedies and used the information gathered by consumers to relaunch the brand.

The 'Ongoing' marketing research provides more of a monitoring function which results in a flow of information about the market place and the company's performance. For example, The Confederation of British Industry (CBI) maintains regular monitor based on surveys of business confidence and investment intentions in the UK.

There are many forms of marketing research but the four basic types of marketing research are as follows:

- **i. Internal marketing research:** This is based on an analysis of company data gained from information such as sales trends, and changes in the elements of marketing. For e.g., price and advertising levels.
- **ii. External marketing research:** This is conducted within the market and the broader competitive environment in which the company operates. It generally accounts for the majority of total market expenditure. External information gathering should always complement internal information as it cannot be an alternative to information gathered through internal market research.
- **iii. Reactive marketing research:** This constitutes information about the marketplace and the customers who inhabit it. It involves asking questions during surveys or an interview, or it can involve experiments.
- iv. Non-Reactive marketing research: It involves the interpretation of observed phenomena, for example, filming customers in a shopping complex or store and listening to customer panels etc.

There are pros and cons for each type. Thus a combination or mix of one or more types can be useful. For example, sales records can provide valuable insights but are not good predictors of future performance as they are restricted to historic performance. Telephone interviews are quick and inexpensive, but a minimal amount of technical information can be obtained.



## 1.6 ROLE OF LIBRARIAN AND RESEARCH AGENCY

The role of the research agency becomes quite significant in preparing a research plan which is the first step. The role of librarian and information manager is to primarily see that the information intended to be collected through the prepared methods would actually help him to resolve his decision objectives. Thus, the librarian and information manager is supposed:

- To understand the research designs sampling method.
- Methods of data analysis.
- To be Expert in handling the task,
- Task relating to brief description of deciding the research and decide the maximum budget
- Decide the information agency. Agency is hired, then seek their proposals evaluates them and divide in the intended of library Basic objective of the library help constituents unit of a institution.

There may be a need to undertake the marketing research through research agencies who have proficiency in undertaking marketing research. While a research agency might conduct the research by using the most appropriate methods but it is the responsibility of the library or information centre or librarian to take specific decisions based on the research results. The step of problem definition is the primary responsibility of the library or information centre. Then the role of the research agency is to prepare the research plan, which is the second significant step. It is the responsibility of the librarian or information manager to see whether the information intended to be collected through proposed methods would be useful for him to resolve his decision problem or objective. The research agency almost entirely conducts the next third step of collecting and analyzing the data. Lastly, the interpretation of results may only be proposed by the research agency. However, the major responsibility for the interpretation of research results and preparing an action plan lies on the decision maker (Yoon & Jain, 1999).

## 1.7 MARKET RESEARCH PROBLEMS AND LIMITATIONS

The classification of Marketing research problems can be done considering the characteristics like routine and non-routine problems, short-term and long-term problems based on the subject etc.

#### **Advantages of Marketing Research**





- (i) Marketing research facilitates paused production as it enables firms to forecast the demand for its product.
- (ii) It helps judge the acceptance of new products.
- (iii) It provides valuable information about the marketplace, which helps to remove wasteful expenditures and reduce costs.
- (iv) It helps to understand consumer behavior and discover new markets and lines of production.
- (v) It helps in improving relations with dealers/consumers.
- (vi) It helps to overcome various problems and helps to explore an effective solutions.

#### **Disadvantages of Marketing Research**

- (i) It involves a considerable expenditure of time, money, and effort on the collection and analysis of data. Small business firms may not be able to effort Marketing Research.
- (ii) Marketing research studies human behavior, so it cannot be 100% accurate.
- (iii) Marketing research results depend upon the quality of research staff; it is not always possible to recruit and train the required staff.
- (iv) The results of a Marketing research study may not be accurate due to the bios or closeness of the research staff. Investigators may be unable to collect, analyze and interpret the data accurately.
- (v) There is usually a time lag between a marketing research study and the implementation of the findings.
- (vi) It is tough to measure the effectiveness of marketing research.

#### **Limitations of Marketing Research**

(i) Marketing research does not provide solutions to problems; it only provides indicators.

(ii) Marketing research and even the results are disproportionate to the benefits of research results.

(iii) There is sometimes the influence of government controls and various external factors.

## 1.8 SUMMARY



Marketing research should not be viewed simply as an input into better decision making rather, when it is used correctly, it becomes a significant marketing asset, conferring competitive advantage. Many companies have demonstrated an awareness of the value of marketing research by extending the remit of their market research teams to cover marketing information systems or even knowledge management (McDonald & Christopher, 2005). Marketing research can be defined as applying the scientific method to marketing problems. In general, this means the application of valid and reliable research methods. Particular emphasis must be given to maintaining objectivity on the part of the investigator, emphasizing accuracy in measurement and making exhaustive investigations.

The ever-increasing complexity of marketing business activity made marketing research more complex. Marketing research techniques have proven very useful in understanding the various problems of the information market. Marketing research provides pertinently accurate information; thus, it should be systematically carried out to facilitate the process of decision-making. Marketing research reports facilitate the introduction of new and innovative products and services.

#### **IN-TEXT QUESTIONS**

- 1. \_\_\_\_\_\_\_ is function that links the consumer customer and public to the marketer through information.
- 2. Marketing Research is the systematic gathering, recording and analyzing of data about problems related to the marketing of goods and services. True/False
- 3. The \_\_\_\_\_\_marketing research refers to situations where the identification of a research problem leads to a specific information requirement.
- 4. The\_\_\_\_\_marketing research provides more of a monitoring function which results in a flow of information about the marketplace and the company's performance in it.
- 5. \_\_\_\_\_\_is based on an analysis of company data gained from information such as sales trends, and changes in the elements of marketing.
- 6. \_\_\_\_\_\_is conducted within the market and the wider competitive environment in which the company operates

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## M-106- MARKETING OF LIBRARY AND INFORMATION PRODUCTS AND SERVICES

# 1.9 GLOSSARY

Advertising: the activity or profession of producing advertisements for commercial products or services.

**Consumer:** a person who purchases goods and services for personal use.

**Marketing:** the action or business of promoting and selling products or services, including market research and advertising.

**Marketing Research:** It is the process of determining the viability of a new service or product through research conducted directly with potential customers.

**Product:** an article or substance that is manufactured or refined for sale.

**Production:** the action of making or manufacturing from components or raw materials or the process of being so manufactured.

**Promotion:** the publicizing of a product, organization, or venture so as to increase sales or public awareness.

Sales: the exchange of a commodity for money; the action of selling something.

# 1.10 ANSWERS TO IN-TEXT QUESTIONS

		)
1. Marketing Research	3	4. Ongoing
2. True		5. Internal marketing research
3. Ad hoc	0	6. External marketing research

# 1.11 SELF-ASSESSMENT QUESTIONS

- 1. What is Marketing Research? Explain in detail with definitions.
- 2. What are the significant steps involved in Marketing Research? Give a detailed description.
- 3. What is the role of librarian and research agency in Marketing Research?
- 4. What are the advantages and disadvantages of Marketing Research?
- 5. Write a short note on the need and types of Marketing Research.

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M-106- MARKETING OF LIBRARY AND INFORMATION PRODUCTS AND SERVICES

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## **UNIT II: Strategies and Techniques**

## **LESSON 3**

## **Marketing Process**

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## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 What is Marketing Process?
  - 1.3.1 Concept of Marketing Process
- 1.4 Steps involved in Marketing Process
- 1.5 Summary
- 1.6 Glossary
- 1.7 Answers to In-text Questions
- 1.8 Self-Assessment Questions
- 1.9 References
- 1.10 Suggested Readings

## **1.1 LEARNING OBJECTIVES**

In this lesson, the students will study about the concept of the Marketing Process which includes the key steps in understanding the Marketing Strategy. After reading this lesson, the students will be able to explain the Marketing process. The students will also study the various important steps involved in the Marketing process and their importance in the context of Library and Information Science.

## **1.2 INTRODUCTION**

The marketing process means a series of action or steps involved in the marketing. The marketing process typically involves identifying the viable and potential marketing opportunities in the environment, developing strategies to effectively utilize these

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opportunities, evolving suitable marketing strategies and supervising the implementation of these marketing efforts.

## **1.3 WHAT IS MARKETING PROCESS?**

#### **1.3.1** Concept of Marketing Process

Whenever managers feel uneasy or uncertain about making a decision, they may decide together additional information that will reduce certainty. The procedure used to collect the information should be one that will result in information that is both valid and reliable. To help acquire valid and reliable information, they will likely use a series of steps defined as the marketing research process.

#### In brief, the process of Marketing Research involves the following steps:

- (i) **Problem Formulation:** This is the first step in the research process. Research must first define the problem in a precise manner. Because comprehensive research depends on this step and specifies the purpose of the study and objectives of the research.
- (ii) **Preparing a list of Needed Information:** After defining the problem and stating the objective, it is necessary to prepare a list of the information needed to attain the objective and evaluate the usefulness of the needed information.
- (iii) **Developing a Research Design:** After preparing information requirement, the researcher should plan to carry out the task or study. It should be prepared by considering many efforts like time, money etc.
- (iv) Selecting a Sample Type: After designing the research design, the researcher should select a sample or the population from which it wants to collect data. As it is impractical to collect data from all members of such large populations so the sample should be selected from the whole population. The sample is also called the representative population of the study.
- (v) Determining Sample Size: The researcher should also determine/decide how large a sample to select means the size or nor. of people included for the sample. Marketing research samples vary from fewer than 10 to several thousand. The researcher must consider the problem at hand, the budget, and the accuracy needed in the data before the question of sample size can be answered.
- (vi) Collection of Data: Collection of data involves field work, survey. This is the method of obtaining information from a sample of respondents. The method used in the field are very important, for they usually involve a subsistent part of the research budget and are a potential source of error through lack of both validity and reliability.



- (vii) Analysing and Interpreting the Data: After all interviews and observations have been made, the completed data collection forms must be processed to lead the information the project was designed to obtain. This stage is critical as the correct interpretation of data makes the research meaningful and purposeful. If that wrong or improper interpretation of facts is done. All study would become useless.
- (viii) **Report Preparation:** The final step in marketing research is summarizing the result and making a report. The findings and recommendations are put in such a manner that the recipient of the report can understand them enough to use them effectively. The reporting of research findings represents the end product of the research process. The variation in the type of report greatly depends on the nature of the project and the audience for which it is prepared.

So, in brief, the above steps constitute the marketing research process.

## 1.4 STEPS INVOLVED IN MARKETING PROCESS

# THE MARKETING PROCESS CAN BE BROADLY CATEGORIZED INTO FOUR STEPS:

#### I. ANALYZING THE MARKETING OPPORTUNITIES

The marketer must try to understand the target market's needs, wants, and demands. Needs are the basic human requirements. People need food, air, water, clothing, and shelter to survive. People also have strong needs for recreation, education, and entertainment. These needs become wants when they are directed to specific objects that might satisfy the need. E.g., An American needs food but wants a hamburger, French fries, and a soft drink. A person in Mauritius needs food but wants a mango, rice, lentils, and beans. Wants are shaped by one's society. Demands are wants for specific products backed by an ability to pay such as many people want a Mercedes but only a few are able and willing to buy one. Companies must measure not only how many people want their product but also how many would actually be willing and able to buy it. Thus, sound marketing requires a careful analysis of consumers. Every company has to analyze its marketing opportunities based on its area of significance, position, and sales in the market.

Organizations need to map customer needs and wants with their products. If the products do not fulfill customer's needs and wants, organizations need to take the initiative to improve their products. Customers should be an integral part of the product development and improvement process. As customers needs and wants do not remain constant, organizations also need to monitor the trends in the changes in customers needs and wants continuously so that they can modify their products and services continuously to satisfy their customers in the long run.



#### **IN CONTEXT OF LIS:**

The Library and Information Centers must try to analyze the needs, wants and demands of their users or its clientele, which includes students, faculty, staff, other users and non-users. The basic need of the user is to get the required information, which is relevant to him, through books, periodicals and some other documents etc. The students must be provided information according to their level of understanding and not of high level otherwise it will mislead them "and they will not be satisfied whereas satisfaction is the ultimate aim of the Library and Information Centers.

The wants of the user includes the exact and pinpointed piece of information without any unnecessary details.

The demands of the user include the information required by him in his desired format or manner on paid basis. He owns the information based on power, i.e., money or anything else.Here the information is provided to the user in the desired format exhaustively. The user seems more satisfied in this stage because he enjoys the authority here.

#### II. SELECTING TARGET MARKETS AND MARKET SEGMENTATION

Market segmentation is a process of dividing the total market for goods and services into several groups such as that the members of each group are similar with respect to the factors that influence demand. It is a marketing effort that identifies and analysis differential characteristics of various segments and helps in defining and determining the market potential for a service or product offered by the organization.

But According to E.E. De Saez "market segmentation is the division of individual market into smaller, more manageable groups which have clear, like characteristics." Each of these segments, which are accorded priority in marketing jargon, may be termed as Target Groups. A market segment consists of consumers who respond in a similar way to a given set of marketing efforts. For e.g. In a car market, consumers who choose the biggest, most comfortable car regardless of price make up one market segment—another market segment would-be customers who care mainly about price and operating economy. Every market has market segments, but not always of segmenting a market is equally useful.

Also, market segments should have following 3 characteristics:

- 1. They should be measurable: Measurability is essential if marketing objectives of a quantifiable nature are to be monitored and controlled.
- 2. They should be accessible: Accessibility means that each segment should be capable of being reached in a cost-effective way.
- 3. They should be viable: Viability means that the segment should be big enough to warrant attack in line with the corporate objectives set.



After a company has defined market segments, it can enter one or many segments of a given market. Market targeting involves evaluating each market segment's attractiveness and selecting one or more segments to enter. A company should target segments in which it can generate the greatest customer value and sustain it over time.

#### **BASIS FOR MARKET SEGMENTATION:**

Markets can be segmented on the basis of demographics, geography, psychographics, and behavior analyses of customers at large.

- 1. Demographic Segmentation: In this type of segmentation, the market is divided into groups based on demographic attributes such as age, gender, income, occupation, religion, race, nationality, social class, family size, family life cycle, etc. For e.g. AGE: Marketers believe that people of the same age group behave in a similar manner and this belief has led them to segment the market according to the age and market their products or services accordingly. E.g. A "12 year old child might like chocolates very much but may slowly start disliking it after he attains the age of 30.
- 2. Geographic Segmentation: In geographic segmentation, the market is divided according to geographical areas such as localities, regions, cities, states, countries etc. For e.g. The Times of India publishes local editions for different regions, such as The Hyderabad Times for Hyderabad edition. Further, markets can be segmented on the basis of density of population or the climatic conditions across regions.
- 3. Psychographic Segmentation: Through psychographic or lifestyle segmentation, marketers aim to find out the basic characteristics of a consumer that could influence his purchase decisions. In this type of segmentation, marketers divide the market based on the lifestyle and personality of their customers. For e.g. Life Style: Different people lead different lifestyles depending on their income, social groups, etc. People usually buy products which suit their lifestyle such as sportspersons always like to buy trendy products while top managers usually buy formal wear.
- 4. Behavioral Segmentation: Organizations can divide markets on the basis of behavior that customers show towards the usage of the products. This type of segmentation shows what customers have purchased in the past. It covers areas like the benefits sought by customers, purchase occasion, user status, degree of usage, customer loyalty, readiness stage and marketing factor sensitivity. For e.g. Purchase Occasion: Markets can be classified on the basis of various occasions that customers encounter because people need different products for different occasions such as Archies came outwithspecialcardsforFriendshipday,Mother'sday,Teacher's day, Diwali greetings etc.

#### IN CONTEXT OF LIS: MARKET SEGMENTATION



The market segmentation process in LIS focuses on the library's present or prospective user, rather than the customer and library's well-balanced collection, rather than the product. A market segment may be defined here as a group of customers with similar or related characteristics, who have common needs and wants, who will respond to like motivations, and who can be expected to use a service that fulfills these needs. Library market segmentation takes into account the fact that library user who request a product or a service are all individuals who are unique in some way. No library or any other agency can reach all members of the community. Therefore it is essential that libraries, like other non-profit and for-profit organizations, identify those parts of the mass market, which they can most effectively serve.

#### **III. DEVELOPING THE MARKETING MIX**

Kotler (1997) defines Marketing Mix as a set of controlled, tactical marketing tools that the firm blends to produce the response it wants in the target market. Marketing mix consists of 4 variables known as the "four Ps" i.e. Product, Price, Place and Promotion.

1- **PRODUCT:** A Product is a physical good or service offering that is of value to the customer. Kotler and Armstrong define the product as anything offered to a market for attention, acquisition, use, or consumption that might satisfy a want or need; it includes physical objects, services, person, place, organization, and ideas. In simple words. Product means the "goods and service" combination that company offers to the target market.

#### **IN CONTEXT OF LIS:**

Product in LIS context might include physical goods, such as books, catalogues, compact disks, microforms, audio/videocassettes, periodicals etc. Services can include provision of a photocopy of a document, information searching, indexing, reference service, document issue and return, etc. A product can be a person, like Kishore Kumar or Michael Jackson as their concerts or records can be marketed. We can look at places as products in the tourism business. Hence, product in a broad term refers to anything that can be marketed, like physical goods, services, persons, places, organizations, or ideas etc.

In a Library, the core product is the information content of the books. The range of products that a library provides needs to be revised regularly. Every year one must check if these products are being used or not, whether the benefits are reaching the users or not, and what does the users think of it. Thus it is always better to ask the users directly rather than making guess work. Products, which have no demand at all among users, should, be eliminated.

2- **PRICE:** Price is the amount customers pay to obtain the product. Price has various names in the society; fare for taxi, train travel; tuition fee for education, honorarium for a



lecture, rent for a house, and wage for a worker. From the customer's point of view, it is cost, and it is important to note that price is the only element in the marketing mix that generates revenue, and all other elements contribute towards cost for the organization. The common basis for pricing is primarily based on the pricing objectives set by the manager. One of the problems associated with pricing a service is the difficulty in defining the service purchased. To overcome this difficulty, most of the services are priced based on the quantity of inputs rather than the service output. For e.g. Professional services, such as management consulting, architecture and tutoring are priced on hourly basis, consulting doctor's charge based on number of visits.

#### **IN CONTEXT OF LIS:**

**Price** is the charges imposed on the library products on the basis of usage or use of documents. This is a source of revenue to the library. This tool of marketing mix is always subject to polemics in a non-profit environment. Charging fees, in libraries and information centers is seen as being incompatible with the ethics of the profession. But libraries, which want to move towards self-sufficiency, should consider that the pricing of information services and products is the sole source of financial support. But KOTLER contends that price always does not imply cash value, it could be in terms of time, energy, opportunity or any other activity foregone.

There are 2 compulsions, which really force the library manager to consider pricing as a strategic element:

- **1.** Consumers would not realize and recognize the value of the product/service unless they pay for the service.
- 2. Moreover most of the organizations are asked by the government to become financially self-supporting. Hence, pricing has a crucial role to play in the context of libraries and information products and services in the future.
- **3. PLACE:** Place is where products/ services are exchanged with the customer for the price. In marketing mix elements, place refers to the creation of special utility to the consumers. It comprises of management of distribution channel, physical distribution of products and logistics.

## **IN CONTEXT OF LIS:**

Place is where a product or service is made available to the users or potential users. Place usually implies physical location. But in marketing it refers to all the channels of distribution- direct mail to e-mail and fax etc. It is the way you get the information one wants. It is the channel that links product and consumer. Traditionally, the library building was the sole outlet and the users were expected to seek services by personally visiting it. But the computer and communication technological marvel has opened the doors for multiple accesses making the concept of place more complex.

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For e.g. An electronic database can be accessed and used anywhere throughout the world, provided there is a network connectivity.

- **4. PROMOTION:** Promotion involves communicating with the target market to provide information about the product/service and persuade target customers to buy it. Managers use a variety of promotion mix, which is categorized into 4 main tasks, namely:
  - 1. Advertising: it includes Print advertisements, radio jingles, house magazines, booklets, logos, trademarks, etc.
  - 2. Sales promotion: it includes sampling; discount coupons, gifts, rebates, and demonstrations.
  - 3. Publicity: it includes press releases, seminars, and annual reports, community relations.
  - 4. Personal selling: it includes sales presentations, sales representatives, and presentations in fairs.

The purpose of promotion is to communicate, to convince, and to compete.

#### IN CONTEXT OF LIS:

Promotion involves the mechanism by which the target groups are informed about the resources available, services and products offered by library arid information center. The LIS professionals widely practice this concept. Promotion not only helps in communicating the users about the products offered by the organization but also it can build up a strong image of the library. A well-planned promotional effort can stimulate potential users to use its products.

#### MAIN PURPOSES OF PROMOTION IN LIS:

- To create and maintain awareness among users about the library services.
- To launch a new service- Internet or CD-ROM.
- To reach new groups of users.
- To convert awareness into active use of the library.
- To improve future Campaigns.
- To sell benefits rather than selling features.

#### **MEANS OF PROMOTION IN LIS:**

Promotion in LIS can be taken care of in the following ways:



- 1. Impersonal contact: it is like personal selling. We must talk to people and also listen to them. People need encouragement. Tell them that you are there to solve their problems and what you can do for them.
- 2. Public relations: it is an interaction between the library and its actual and potential users.
- 3. Advertisement: it is the most expensive promotional effort of all as it is paid publicity. It attracts consumer's attention. It can reach users through newsletters, brochures, catalogues, displays posted in important areas etc.

#### IV. MANAGING THE MARKETING EFFORT OR MARKETING MANAGEMENT

The company first develops company-wide strategic plans, and then translates them into marketing and other plans for each division, product, and brand. Through implementation, the company turns the plans into actions. Control consists of measuring and evaluating the results of marketing activities and taking corrective action where needed. Finally, marketing analysis provides information and evaluations needed for all the other marketing activities.

#### The marketing management process consists of four steps:

- 1. Marketing Analysis: Management of marketing function begins with a complete analysis of the company's situation. The company must analyze its markets and marketing environment to find attractive opportunities and avoid environmental threats. It must analyze the company's strengths and weaknesses and current and possible-marketing actions to determine which opportunities it can best pursue. The market analysis enables decisions on product design and strategies, including whether to introduce a new product, promotional methods, and the priorities that need to be assigned to market segments, products, and the marketing mix components.
- 2. Marketing Planning: Through Strategic Planning the company decides what it wants to do with each business unit. Marketing planning involves deciding on marketing strategies that will help the company to attain its overall strategic objectives. A detailed marketing plan is needed for each business, product or brand. Marketing strategy means selecting various techniques in proper portions and balance to fulfill the customer needs of that very market.

# **Benefits of Planning:**

The benefits of planning have received widespread attention in the literature on management and decision-making. The planning allows a manager to:

- a) Minimize risk
- b) Reduce uncertainty
- c) Avoid surprises
- d) Superimpose order
- e) Facilitate control

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**3. Marketing Implementation:** Marketing implementation is the process that turns marketing plans into marketing actions in order to accomplish strategic marketing objectives. Implementation involves day-to-day, month-to-month activities that effectively put the marketing plan to work. Successful marketing implementation depends on how well the company blends its people, organizational structure, decision and reward systems, and company culture into a cohesive action program that supports its strategies. At all levels, people who have the needed skills, motivation, and personal characteristics must staff the company.

Finally to be successfully implemented, the firms marketing strategies must fit with its company culture, the system of values and beliefs shared by people in the organization.

4. Marketing Control/Audit: Marketing control involves evaluating the results of marketing strategies and plans and taking corrective action to ensure that objectives are attained.

In Control Process, management first sets specific marketing goals. Then it measures its performance in the marketplace and evaluates the causes of any differences between expected and actual performance. Finally, management takes corrective action to close the gaps between its goals and its performance. This may require changing the action programs or even changing the goals. Hence, marketing audit can be defined as the process of reviewing and evaluating the/marketing operations of an organization. Organizations face many problems like reduction in market share, underutilized capacity and decline in profitability, which lead to be tackled by the management immediately. The management, therefore, attempts to resolve these problems by cutting down prices, restructuring departments, and laying off employees. Marketing audit helps the management to identify the root of rises of existing problems.

## **IN CONTEXT OF LIS:**

• MARKET ANALYSIS: Market analysis is an intensive investigation of identifying the market of actual and potential users. It also includes an evaluation of existing products and services. Each one of the large numbers of services offered by a library should have a separate market evaluation. The user surveys and studies should be conducted with a marketing perspective; as it is always the 'need satisfaction of users which determines the marketing program's success. The needs and wants of users are never static. Hence market analysis should not be a one-time affair; rather it should be carried out regularly to monitor the market for each and every product offered by the library and to examine the needs, which influence the market.

Market Analysis also includes a study of the extent of awareness, knowledge, and desire in each segment of the market for different products, alternative products being

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used, and the degree of satisfaction in using present products or services and the channels used to learn of products and services.

Analysis of competitor's products also plays an important part. For libraries, this refers to analyzing the services of other libraries and information centers and that of database vendors and commercial companies. The more active and demanding users get more priority and attention therefore it is required to identify the real users and to study their demand characteristics. It is also provide interesting insights into their expectations and the kinds of services that would make them users.

- MARKETING PLANNING: New product planning and development usually begins after market analysis, consumer research, needs assessment and competitor and resource analysis. It is not necessary that new products are continually being put out. Very often analysis may point to a repackaged product, or an old product to be promoted in a different place, or for a new segment or consumers, or the design of a new promotion strategy. In LIS, Standardizing library services and repackaging them is a good idea. Most of the requests of the users should be met with standard products. How to best provide a service with spending the minimum time and cost involvement is a skill to be mastered by the librarians. The distribution of products/services should be kept in mind. How to get the product into circulation and make the product accessible to the target market, i.e., if users are located far from the library, postal or mobile, or telecommunication channels may have to be explored.
- MARKETING IMPLEMENTATION: While implementing a marketing program in a library, the first step should be to formulate a Marketing Division in the library. The marketing division should also appoint a 'Marketing consultant' to advise the division on different marketing strategies. The marketing consultant should be responsible for carrying out a 'Marketing Audit'. To implement a marketing programme, it is necessary to evaluate how far the programme has been able to achieve the set objectives.

**MARKETING CONTROL/AUDIT:** It is an evaluative step which studies the results of the marketing program by using different measures. It appraises the organization of its marketing performance closely to enable it to take a corrective action. An audit usually explores external factors like users' needs, community patterns, and internal factors within the organization; it maps the organization's current position.

It allows the management to signify and evaluate decisions relevant to the organization- it is something to build on (strength), something to eliminate (weakness), something to anticipate (opportunity), or something to outmaneuver



(threat), i.e., SWOT analysis. Hence, it identifies the external threats & opportunities and internal strengths and weaknesses to develop their strategies. Thus marketing audit sets the stage for the next cycle of planning, implementing, and reviewing the marketing programme. Therefore, marketing is not a one-time activity. It is a continuous process and it has a relationship with all other activities.

#### **IN-TEXT QUESTIONS**

- 1. \_\_\_\_\_\_\_ is the first step in the research process.
- 2. The final step in \_\_\_\_\_\_is summarizing the result and making a report.
- 3. Management of marketing function begins with a complete analysis of the company's situation. True/False
- 4. \_\_\_\_\_\_is an intensive investigation of identifying the market of actual and potential users.
- 5. \_\_\_\_\_\_is an evaluative step which studies the results of the marketing program by using different measures.
- 6. Kotler (1997) defines\_\_\_\_\_as a set of controlled, tactical marketing tools that the firm blends to produce the response it wants in the target market.

## 1.5 SUMMARY

The marketing managers engage in many diverse activities, which range from creating new strategies to evaluating whether existing strategies are effective and efficient. The term strategic marketing process thus refers to the entire sequence of managerial operational activities required to create and sustain effective and efficient marketing strategies. Therefore, we can conclude that Marketing is not a one-time activity rather it is a continuous process which is related with several activities to be performed actively.

## 1.6 GLOSSARY

Market Analysis: the activity of gathering information about conditions that affect a marketplace.

**Marketing Control:** Marketing controls are a set of procedures used to monitor the success of marketing activities set forth in a company's marketing plan.

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**Marketing Management:** Marketing management is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational goals.

**Marketing Mix:** a combination of factors that can be controlled by a company to influence consumers to purchase its products.

**Market Segmentation:** It is a marketing strategy in which select groups of consumers are identified so that certain products or product lines can be presented to them in a way that appeals to their interests.

**Marketing Opportunities:** Marketing opportunities are openings for a company to sell something to a certain type of customer.

## 1.7 ANSWERS TO IN-TEXT QUESTIONS

1. Problem Formulation	4. Market Analysis
2. Marketing Research	5. Marketing Control/Audit
3. True	6. Marketing Mix

## 1.8 SELF-ASSESSMENT QUESTIONS

- 1. What is Marketing Process? Explain in detail.
- 2. What are the major steps involved in Marketing Process? Give a detailed description.
- 3. What is Marketing Mix and Market Segmentation? Explain in detail.
- 4. What is Marketing Management?
- 5. What are the basic steps involved in Marketing Management?

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# LESSON 1

# LIS Products and Services as a Marketable Commodity

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## STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 LIS Products and Services: A Marketable Commodity
  - 1.3.1 LIS Products and Services
  - 1.3.2 How is Marketable Commodity?
  - 1.3.3 Who to serve: Users or Customers?
- 1.4 Concept of Marketing in the LIS Field
  - 1.4.1 What is Marketing?
  - 1.4.2 Information Marketing and LIS Field
- 1.5 Promotion of Library Sources and Services: Need of the Hour
  - 1.5.1 How academic organisations like NISCAIR (now NIScPAR) promote their Sources and Services
- 1.6 Summary
- 1.7 Glossary
- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

## **1.1 LEARNING OUTCOMES**

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The concept of promotion is widely acceptable and applicable in the LIS field. This concept has a different meaning in different environments even in library and information science. In recent time library and information centres are facing unprecedented changes and challenges and trying to create new forms and platforms of information. In this technological era, there has been a lot of pressure to mobilize sources and services to become self-reliant. The present lesson will indicate how the library and information products and services are marketable commodities in the present environment. After reading this lesson, you will be able to understand :

- the meaning of the promotion of LIS products and services;
- how LIS professionals mobilize resources;
- how are promotional activities applicable to LIS; •
- how to focus on users' issues and resolve them via the promotion of LIS products and services.

# **1.2 INTRODUCTION**

Now the day's library users are transforming into customers with rising expectations, diverse needs, wants and choices. Now the real challenge for library and information professionals is not only to manage the collection, staff and technology but to turn these resources into services. The notion of services has also changed from basic to value-added, from staff assisted to self-service, from-in house to out-reach, from free to priced, from reactive to proactive, and from mass-customization to individualized service. They, as the information service providers are under pressure due to various reasons such as they have to mobilise resources, compete with the Internet and Internet support services and meet the rising user's expectations, improvise their professional image and so on. Therefore, libraries and information centres need to evaluate their activities concerning the external environment, get in touch with the users' needs and integrate them into the day-to-day working of the library as well as offer / adapt services as per users' needs to integrate the concept of marketing in libraries. "The first requirement for effective and successful implementation of the promotion of library and information sources and services is that the librarian should have a clear



appreciation for what marketing is all about and how it can enhance the value of library and information services. People usually relate marketing to an increase in sales, profit, market share, etc"(Carpenter, 1999, p.258).

As you know that libraries and information services are non-profit services, therefore, "there is a general perception that libraries do not need marketing. But the fact is that marketing is all around us and it is essential for all kinds of organisations and individuals. Professionals like lawyers, accountants and doctors also need to use marketing skills to create and manage the demand for their services" (Dongardive, 2013, p.238). Therefore, the libraries and information service providers should make efforts to:

- inform users about their role as an information service provider;
- attract users, understand users and their needs;
- motivate users to use the resources and services in different formats; and
- educate users with the help of the latest tools and techniques in managing information in libraries and information centres.

If a librarian is performing all the above-stated functions, one can say without any doubt that s/he is thoroughly involved in the marketing of information services.

# **1.3 LIS PRODUCTS AND SERVICES : A MARKETABLE COMMODITY**

These days World Wide Web (WWW ) is the biggest challenge for all library professionals. Libraries are facing competition not only from other information service providers but also from Google. Users get information which they required get with a simple click on the mouse. So, library professionals need to make daily decisions on the form and formats for acquiring and archiving information. Library professionals are struggling with the increasing expectations of the users. They are implementing promotional techniques to be more efficient managers and effective information service providers.

Library sources and services are valuable in themselves but are underestimated because of their lack of visibility among users. "LIS products and services are marketable commodities these days because only promotion can help in improving the image of libraries and



information centres. For a long time, LIS professionals had engaged primarily with suppliers and thus lost interest in working for the users/customers. But it must be kept in mind that only satisfied users come back and there are greater chances that dissatisfied users will find some other suppliers of information to meet their information needs"(Arumuru,2015).

### 1.3.1 LIS Products and Services

The products are a cluster of both documentary and non-documentary sources of information traditionally the service such as information service resources sharing service, current awareness service, learners' advisor service, circulation services, and online catalogue services. The LIS products are issued and distributed by Libraries, Information Centres, Information Analysis Centres, Referral Centres, Documentation Centres or similar organisations, as promotional materials for their user groups. These products are newsletters, house journals, reports, magazines, bulletins, prospectus, manuals and so on. These sources and services are demanded by users like other commodities. The demand for products and services is affected by factors like preferences, price, income, expectations, population, seasons, technology, and the price of other goods. The information sources and services are demanded only when there is a value or utility to the user (Coote, 1994).

Some important LIS products are as under:

- Books (Print and Electronic)
- Journals (Print and Electronic)
- Directories (Print and Electronic)
- Dictionaries (Print and Electronic)
- Encyclopedia (Print and Electronic)
- Yearbooks (Print and Electronic)
- Newspapers (Print and Electronic)
- Magazines (Print and Electronic)
- Monographs (Print and Electronic)
- Reports (Print and Electronic)
- Manuals (Print and Electronic)
- Online Database

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### • Offline Database

### ACTIVITY

Visit University/College library of your area and list the sources and services provided by them.

### **1.3.2 How is Marketable Commodity?**

Commodity means a product or material that can be bought and sold. Library functions as a knowledge organisation, for example, purchasing/acquiring knowledge resources after theses are suitably identified and located, organised and disseminated, analysed, interpreted and granted the outcomes to its users in the way they like other than exhibiting the units of the knowledge/resource as they may need, demand and require. The tusk of "Putting knowledge to work" deals with the task of marketing/promoting a service.

In the LIS field, the role of marketing manager/information provider can be linked with the job of library professionals like buying vs acquisition of library documents, selling vs dissemination or circulation of products and services, marketing vs promotion, transporting vs access to knowledge resources, storing vs preservation and conservation of documents, market information function vs. statistics and reports and so on.

Marketing Functions	Library Functions
Buying	Acquisition
Selling	Circulation/Dissemination
Transporting	Access to knowledge resources
Storing	Preservation and Conservation of information
	sources
Standardisation and grading	Organising
Financing	Financing
Risk-taking	To meet the future demands of the users
Market information function	Statistics

Table 1.1: Marketing H	<b>Functions of the Library</b>
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(source: Halder & Saha, 2017)



### 1.3.3 Who to serve: Users or Customers?

To meet users' needs satisfactorily, the first thing the LIS professionals need to understand that, Whom are they trying to serve? What are the user's interests? What can the librarians provide to serve these interests? Under what conditions can the librarians offer services and products? How do the librarians communicate with the users? How do users communicate their needs to the LIS professionals? Librarian knows well about the library in terms of its resources, facilities, services, products, and so on.

In the marketing concept, the libraries and librarians want the user to come again and fully utilize their resources and services. But here marketing attitude plays a vital role as library professionals, we need to understand that the users will come again only if their present needs or requirements are well met.

Every day the information world is changing dramatically and moves faster, relies on technology and competes more intensely. In this connection, there is no harm if library professionals ask every user of the library how may I help you in achieving your desired information. However, librarians must capitalise on their expertise in meeting users' needs through the available resources. It is to remember that no library "owns" its users to the extent that it determines their likes and dislikes.

### Self Check Exercise

- 1. What do you understand by the term 'Promotion'?
- 2. What do you understand by the term 'Commodity'?

**Note:** i) Write your answers in the space given below:

ii) Check your answers with the answers given at the end of this Unit.

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# 1.4 CONCEPT OF MARKETING IN LIS FIELD

### **1.4.1 What is Marketing?**

Library professionals are using different techniques and strategies of marketing for the promotion of LIS products and services over the globe.

Philip Kotler opines that "marketing is an act of planning, analysis, implementation and control of carefully formulated programmes designed to bring about voluntary exchanges of values with target markets to achieve organizational objectives" (Kotler & Armstrong, 1996).

### 14.2 Information Marketing and LIS Field

Traditionally libraries and information centres disseminate a variety of services, for example, information service, resource sharing service, current awareness service, circulation service, online catalogue service, CD-ROM database service, reprographic service and many more. Now with changing world the expectations of the users are diverse they expect a wide range of choices, easy access, and speedy delivery of information in the desired format. They want to access ample services, such as Online Public Access Catalogue (OPAC), Web OPAC, electronic information systems like bibliographic as well as full-text online databases, current awareness in dept enquiry and research services, user education programs, and information skill enhancement programs.

Marc Porat defines that "Information is a collection of many heterogeneous goods and services that together comprise an activity in the economy". Information as a commodity is thus, represented by the products, services, and channels that carry information. Like other goods in the market, LIS products and services are also based on demand and supply rules.

Philip Kotler presented the five types of demands which can also apply to the LIS field :

- i. **Functional requirement:** Basically, this type of need is generated by task-related activities like a researcher needs information for research activities.
- **ii. Emotional requirement:** Emotional requirements may arise when a person has strong attachments to a particular discipline, author or publisher.



- **iii. Problematic need:** Problematic need is not absolute but conditional upon a set of situational contingencies or antecedents, for example, textbooks are relevant primarily for a particular text or subject.
- **iv. Social requirement:** Social requirement is created not because of its intrinsic value, but because of its association with certain social roles and stereotypes.
- v. Epistemic requirement: This type of requirement arises when a user requires information to further his knowledge base.

### Self Check Exercise

- 3. Write down the names of prominent sources and services of an academic library.
- 4. What is marketing? Elaborate with some examples.

Note: i) Write your answers in the space given below:

# 1.5 PROMOTION OF LIBRARY SOURCES AND SERVICES : NEED OF THE HOUR

As we all know that there have been many developments at the national and international levels, which have directly or indirectly added marketing to the LIS field. It is not a new concept it is as old as modern librarianship. Even Ranganathan's Five Laws of Library and Information Science have been seen in the light of today's marketing concept. Some important reasons for promoting/marketing library sources and services identified are as under:

- i. founding missions are increasingly ill-suited for the demands of the marketplace;
- ii. budgets are becoming tight;

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- iii. the recruiting and fund-raising arenas having become extremely competitive;
- iv. the rising competition among similar information service providers;
- v. an introduction and availability of freely and openly sources and services.

So, we can say that there is always a need for library professionals to develop a more responsible attitude towards their users because it helps in managing libraries in a better way, also brings a commitment to the users, and publicize the utilities of library sources and services." It brings the users close to the library and feels better that they use the library on regular mode, at last, it improves the image of the library because it ensures credibility and a positive attitude to face increasing challenges as well as opportunities.

### 1.5.1 How academic organisations like NISCAIR (now NIScPAR) promote their Sources and Services

Not only in India but over the globe, libraries and information centres are realising the need for marketing their information products and services. They are paying more attention to the identification of user needs and the promotion of information products and services. NISCAIR (now NIScPAR) for example, has taken significant steps in this direction.

Some important products in form of their publications are as follows:

- Annals of Library Science and Documentation (ALSD)
- Directory of Scientific Periodicals
- Directory of Science and Technology Awards in India
- Directory of Scientific Research in India
- Indian Science Abstracts (ISA)
- National Union Catalogue of Scientific Serials in India (1998) (CD-ROM version available with latest data)
- Union Catalogue of Scientific and Technical Conference Proceedings: Banglore 1977-90)

Some important services are as follows:

- Chemical Abstract keyword Index service (CAKIS)
- Competitor Watch Service (CWS)



- Global Tender Watch service (GLOBTEND)
- Literature Search
- Translation Services
- Reprographic Services
- Full-Text Journal Service (FTJS)
- Standing Order Abstract Services (SOAS)

Organisations like NIScPAR use different promotional activities, for example, training and education, direct marketing, personal sales, advertising and participation in exhibitions/book fairs for creating awareness among users regarding their products and services".

# **1.6 SUMMARY**

In the present unit, we have seen that :

- the meaning of promotion/marketing;
- how LIS products and services are a marketable commodity;
- how LIS professionals mobilize sources and services;
- how are promotional activities applicable to LIS;
- how to focus on users' issues and resolve them via the promotion of LIS products and services;
- how academic organizations promote their sources and services.

# 1.7 GLOSSARY

Commodity	: A product or material that can be bought and sold
Consumer	: A person who buys things or uses services
Marketable	: A thing that can be sold easily because people want it
Marketing	: Marketing refers to all activities a company does to promote and sell products or services to consumers

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- Product
   : Something that is made in a factory or that is formed naturally
- **Promotion** : Things that you do to advertise a product and increase its sales

# **1.7** ANSWERS TO IN-TEXT QUESTIONS

- 1. Things that you do to advertise a product increase its sales.
- 2. A product or material that can be bought and sold.

# 1.8 SELF ASSESSMENT QUESTIONS

### Self Check Exercise

- 5. How promotion is helpful in LIS Field?
- 6. How do academic organisations promote their sources and services?

**Note:** i) Write your answers in the space given below:

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### **LESSON 2**

### Pricing, Distribution, Channels and Communication Strategies

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### **STRUCTURE**

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 What is Pricing?
- 1.4 Pricing and LIS Products and Services
  - 1.4.1 Income Generating Activities in Libraries
  - 1.4.2 How to Market Library Products and Services?
  - 1.4.3 Key Approaches to Pricing in LIS Field
- 1.5 Distribution Channels in Libraries
- 1.6 Communication Strategies in Libraries
- 1.7 Glossary
- 1.8 Self-Assessment Questions
- 1.9 References
- 1.10 Suggested Readings

# **1.1 LEARNING OUTCOMES**

# **1.2 INTRODUCTION**

The concept of marketing, promotional activities, distribution channels, and so on are not new but LIS professionals have only recently become aware of the need to market their products and services. The products and services of the library are now being recognised as commodities that can be purchased, sold, exchanged, borrowed and passed on. Today, the " survival of a library depends among other things on its image in the minds of the users and fund allocators"(Narayana, 1991, p.187). Libraries must also communicate with existing and potential users to make them aware of better and more competitive products and services offered, and also to build and maintain the best relationship. However, to communicate effectively library professionals must understand the user's field of knowledge because users' needs are varied subject to subject. Distribution channels and communications strategies play an important role in identifying the prominent users, and their needs and developing effective relationships.

The use of distribution channels and communication strategies is very much applicable to libraries and information centres as they are service providers. But it is also important to select an effective means of communication. So that libraries adopted several methods of communication to promote their sources and services. Apart from traditional methodologies, library services can be channelised with the help of smartphones, mobile apps, e-mails, blogs, social platforms, websites, and many more. Librarians should make a habit of writing a daily column in the newspaper to give information about new sources and services and update users as well.

### **1.3 WHAT IS PRICING ?**

In general, the cost is a fact and the price is a policy. "Price is the amount of money charged for a product or service" (Kotler, et.al.2010,p.247). Price is important in every sphere of life because you need money/price to promote your products and services, and to establish the channels of distribution and survival.

Price is the most flexible marketing mix element in the marketplace. "Price can be expressed in currency; however, it can use goods or services. In the library, the price can be used to express the value of information sources and services, for example, online databases, e-journals, e-books, e-magazines and so on, other online services like digital reference services, ask a librarian service, web forms, online document delivery, interlibrary loan, online help, online information skills tutorials, online current awareness bulletins, email-based services, online scholarly journals and other sources, physical products like a CD-ROM and many more (Brindley,1993).



Figure 1: Pricing Objectives in Market and Libraries

# **1.4 PRICING AND LIS PRODUCTS AND SERVICES**

Libraries are known as service-oriented organisations, not profit-making organizations, but these days the increasing cost of sources like online databases, scholarly journals and others forces

libraries to sell their products and services. "Marketing is only an instrument through which the objectives of the library can be achieved" (Brindley, 1993, p.298).

### **1.4.1 Income-Generating Activities in Libraries**

On average about 10-20% of funding for academic libraries comes from income generation activities. Libraries can charge for the below-given services:

- Reprography/photocopy
- Inter Library Loan like DELNET
- Online database service
- Training courses
- Indexing service
- Publications charges like NISCAIR and other organizations

Some organizations like INFLIBNET, DELNET and many more are charging money for their sources and services, such as organizational publications including newsletters, magazines, and so on. A wide range of factors should be taken into account when determining price and moving towards pricing such as:

Delermine pricing objectives to cover costs or to make a profit and reflect on the level of risk that is acceptable 10 respect of any losses.

Calculate the cost of production, including any physical production costs and if deemed appropriate, staff time devoted to the project.

Estimate sales. based on the sale of previous publications. or the size of the potential users. Size may depend on the potential outlets. such as whether sale will be through a special event or library bookstand.

Estimate sales revenue at different levels of sales such as 25%, 50 %,75 % and 100%.

Calculate unit cost and unit sales revenue and taking into account the pricing objectives.

Fig 2: How to price a library publication

#### 1.4.2 How to Market Library Products and Services?

Typically, the organization will use some of these in complex pricing models designed to achieve the pricing objectives of the organization. For "some products, such as books or the user market for CD-ROMs, there will be a list price for the item, which is set after consideration of the pricing objectives, including financial and marketplace performance objectives. Pricing strategies for e-resources are particularly more complex, and several approaches to pricing and payment for access to databases and electronic document delivery have been tried. The early online search services based pricing on combinations of connect time charges, display/print charges, telecommunication charges and charges for special services" (Brindley, 1993, p.302).

This model has to some extent been outmoded by approaches based upon subscriptions, contracts with consortia, and pay-as-you-go. Another very significant difference between print-based information products and electronic information products, where payment is based on access (rather than subscription), is that the customer pays for the print product in advance; online information on a pay-as-you-go basis is paid for when it is retrieved, or after.

#### 1.4.3 Key Approaches to Pricing in the LIS Field

#### i. Item-Based Pricing

It is very common in the information market that the price of any document or service can be varied based on different prices in different countries, and different versions (for example a large-print version or a talking-book version). It is very evident in the market for e-resources that, different publishers/suppliers may set their prices differently and based on different negotiations. So, even though the price level may vary, and different prices are set for different versions and different market segments, the /library consumer pays an agreed price for the item.

#### ii. Pay-For-Use

Pay-For-Use is basically set up for electronic resources in libraries. "A variation on item-based pricing that is used for e-resource is where the user pays for the information when it is accessed. Open access or google, for example, may provide access to some information free, but should an individual wish to download a list of several thousand addresses for marketing purposes, the user will be charged for this based on the information that has been downloaded" (Synder & Davenport,1997). Similarly, document delivery services allow consumers to order journal articles through their Web-based services. The end-user or library will be charged for the item ordered/accessed, for example,

#### a) Dialog Alert Service

Charges for Dialog Alert profiles vary, depending on the source database, frequency of Alert run (e.g., daily, weekly), and delivery method. Up to 20 prints per profile per update are included. except as noted in the Database Rates section of the Price List (https://dialog.com/commercial-databases/).

#### **b) Dialog Interactive Alerts**

"Dialog provides an interactive alerting service with subscriptions to predefined strategies covering top publications and newsletters. "The pricing for this service has two components: the 'Flat Delivery Fee for distributing Interactive Titles Lists' and articles to recipients' e-mail boxes and the 'Article Fees for the specific articles ordered'. Dialog Interactive Alerts charges are part of your total Dialog usage and are billed on the monthly Dialog invoice. See our Web site for more information" (https://dialog.com/commercial-databases/).

#### iii. Contracts with Publishers

Access to e-resources, such as bibliographic databases, e-journals collections and other databases, is increasingly provided to the end-user through libraries or consortia which are increasingly functioning as powerful mediators in negotiation with publishers. "Contracts, which hold price and licensing arrangements, and specify how the information that has been acquired may be used, are agreed upon and reviewed, typically on an annual basis. Individual libraries then have contracts with the consortia for access to all the negotiated products, or an agreed subset. The advantages of such contracts to the publishers are guaranteed visibility in the marketplace through association with significant academic and public libraries. In addition, licensing arrangements include controls on the use of the information, which ensures the advantages of the consortium arrangement are wider access to electronic information and support in its acquisition and use from the consortium and other members of the consortium.

#### iv. Open Access/Free Information

Academic libraries may offer basic access free to registered users but charge for other more personalized services." Many publishers have commercial reasons for providing free information resources/open access. Increasingly information is provided to consumers as part of the augmented product, or to lubricate the wheels of the relationship between the consumer and the retailer or producer" (Weingand,1999). The use of information in building communities and attracting attention is most evident in the Web portals that are being established by increasing numbers of organizations. Such portals are interested in increasing traffic to their site and use information among other features to entice consumers to make repeat visits.

#### v. Promotional Pricing

Special pricing tactics may be adopted in association with a promotion that is designed to draw attention to a product. From the customer relationship point of view, promotional pricing is designed to encourage switching from a competitor's products. Major current awareness services based on the contents pages of journals are offered free to encourage the purchase or acquisition of journal articles or books from the document suppliers.

#### ACTIVITY

Visit libraries of your area or campus and make a list of sources and services which have cost/price in market.

### **1.5 DISTRIBUTION CHANNELS IN LIBRARIES**

Distribution is a type of marketing activity concerned with distributing the products from the manufacturer to the customer, making the product available and easy to buy. So, distribution channels are the methods or intermediaries by which companies deliver products and services to end users. Some companies directly reach their end users, while others might use a retailer or wholesaler to serve as an intermediary. Companies may also use agents or brokers to facilitate the movement of products to distributors that sell those wares to the customer. Past time remembered when promotion was done through government-claimed 'Radio Stations' where a little bit of sound used to be played about the item.

There are some prominent channels and distribution are as follows:

- Interpersonal delivery
- Direct selling/Inhouse dissemination
- Selling through intermediaries
- Dual distribution and reverse logic
- Local depositories

- Mass media
- Mail

In libraries, the marketing and promotion of the library services have a huge impact on the users and that is going to remain for many years. The information provided to the user within the time using different modes of communication defines the way we do the marketing of the LIS products and library services. This process involves technology, machinery and manpower. The technology does not dictate everything to the librarians to serve the users because it is merely a medium which supports the LIS products and services.

Usually, the librarians use the following distribution channels :

#### Annual Reports

The annual report of the library is a written document submitted by the librarian to inform the users keep informed on the aspects of the library's services, achievements or regress along with possible reasons for shortcomings.

#### • Handbook

Small handbooks are a valuable device to instruct and assist users. It contains factual information, a diagrammatical representation of the main services, the locations of main collections and service points, the location and arrangement of books, the method of issuing returning documents, the rules and regulations of the library and so on.

#### **Printed Catalogue/OPAC**

A printed catalogue/OPAC is an important means of publicising library content. It may include total holdings of the central as well as branch libraries or may be restricted to special collections of the library.

#### • Websites

Those librarians who cannot even afford the promotional expenses may promote their sources and services through websites. They can highlight news regularly related to the latest 'additions', statistics of readers and issues, changes in the issue methods, changes in the working hours, special and collections, improvement in the facilities to the public, arrangement of exhibitions and occurrence of events about which special bibliographies may be prepared.

#### • Posters and Bulletin Boards

A striking poster may have an appeal comparable to that of a beautiful piece of sculpture or a nicely printed book. Posters, pictures, book jackets, maps, slogans, and notes on special days, authors, and events, constitute the display material for the bulletin board. An effort should be made to connect national, educational, scientific, and local campus events with the use of library materials. To command attention, and to be more effective, displays should be neat, simple and visible.

#### • Personal Talk

Direct personal talk is the simple and the least expensive method of publicity. It can convert nonusers into regular users of the library. Oral publicity is in effect PR tool for acquainting the people with the contents and services of their libraries, and also the informational and bibliographical works undertaken by their staff. The university and college librarians are expected to talk about libraries to new entrants, students' organizations, faculty members, and often to outside bodies as well.

With the traditional methods of promotion, libraries these days are using social media for the marketing of their products and services. Today, social media (below given) alone can handle promotional activities to advertise products and services. Some prominent examples are as below:

- i. Facebook
- ii. Twitter
- iii. Blog
- iv. LinkedIn
- v. YouTube
- vi. Instagram



Fig 2: Social Networking Sites

### **1.5 COMMUNICATION STRATEGIES IN LIBRARIES**

Libraries must inform their users about the latest and existing sources and services and try to maintain a holistic approach between the library and the user. First of all, it is important to know the need, desires and requirements of library users because they are too varied which affect their needs.

In libraries, modern marketing calls for more than just developing good sources and services. Also, library professionals must communicate with current and potential users, and what they communicate should be well arranged. Communication works as a central element of the way users relate to and cooperate because it is concerned with sending and receiving knowledge, ideas, facts, figures, goals, emotions and values. In libraries, communication is more than a marketing tool because it's not just sending and receiving information to cooperate but equivalent to that they are constantly communicating their self-images to all around them. A marketing communication strategy helps to create clearer, sharper messages appropriately directed to users in the libraries. Different stages in the design of communication strategies :



Figure 3: Stages in Designing Communication Strategies

#### Stage 1 Identify the target/prominent users:

The first stage in communication is to identify prominent/target users. Library professionals must find the prominent categories of users, the sources and services they want and the benefits they are looking for. However, users always require an easy, comfortable, and convenient way to get what they want. The libraries also recognize the user's needs for a place where they can meet other users with the same interest or people from different backgrounds and skills.

#### Stage 2 Determine Communication Objectives:

Once the target user has been defined, the library professionals must decide what response is sought. They need to know the level of user's awareness, knowledge, liking, preference, conviction, and so on. The user may be unaware of the availability and how to access the sources and services in the library. Ideally, they should get attention, hold interest, and obtain action. In addition, library professionals have to figure out the product and service that will produce the desired responses.

#### Stage 3 Message Designing:

Each communication strategy should have a message that is consistent with its communication objectives. The essentials of the message that need to be considered are:

- Content of the message: It should be clear what message to communicate, for example, the Library is going to organise a book fair;
- Structure of the message: How to express the message, for example, want to learn how to browse the web for free?;
- Format of the Message: How to represent the message in symbols for example, whether to include pictures, more complete text details, embedding the message in catalogues, posters, or presentations);
- Source of the message source: Who should communicate the message, or act as the spokesperson, either in person or by signature; the options are another user, significant public figures, or the service agent, for example, would you like to try our new Web service?.

#### Stage 4 Selecting of Communication Channel:

There are two types of communication channels: (a) personal communication channels, and (b) non-personal communication channels. In personal communication channels, two or more people communicate directly with each other. They might communicate face to face, over the telephone, through the mail, or even through the internet "chat". "Non-personal message channels are media that carry messages without personal contact. They include major media (newspapers, magazines, direct mail, radio, television, billboards, signs, posters, online services, websites), atmosphere (designed environments that create the client's leanings toward buying a product), and events are staged occurrences that communicate messages to prominent users" (Rowley,1998,p.3384). Libraries can design media prints, such as booklets, leaflets, notices and posters. They can propose a nice and comfortable atmosphere to satisfy their users. Some special events like user orientation, short-term courses, books exhibition, discussions on specific topics, and so on programs should be organised regularly to make their users aware of the library.

#### Stage 5 Establish a promotional budget

The available budget has a noteworthy effect on the range of communication activities that can be pursued. For many libraries marketing budgets are extremely limited, but commercial organizations in the information marketplace have marketing budgets that are consistent with (if not sufficient for) the market segments with which they need to establish and maintain communications. Managers must be aware of the costs of communication activities, even when they do not generate a separate invoice, and should continually monitor the value and impact associated with marketing communications activities.

#### Stage 6 Decide on promotional mix

The promotional mix will normally include a selection of strategies from more than one of the following: advertising; direct marketing; sales promotion; public relations and publicity; personal selling; and sponsorship. The factors that should be considered in establishing an appropriate promotional mix include:

- The available budget
- The marketing message
- The complexity of the product or service
- Market size and location
- Distribution of the product
- The stage in the product lifecycle
- Competition

So, libraries will use a combination of these strategies, indeed, one promotional strategy may be used to support another promotional activity or event.

### **1.7 SUMMARY**

Libraries are being forced to promote and market their sources and services and to explore the possibilities of cost recovery and profit potential for their survival. Libraries need to develop inspiring ways of communication and a feedback mechanism to improve service. Even though the concept of marketing of information as a marketing item particularly in India, is a difficult task, libraries must consider what, how and where funds can be generated this way. It must be carefully considered which services can have only a minimum price, which one covers a

reasonable share of the cost, and which generates revenues. The impact of the information technology and the adoption of the marketing approach will help improve services for users and enhance the reputation of the library and information services and professionals.

# 1.8 GLOSSARY

Advertising		: Advertising is a marketing communication that employs an openly sponsored non-personal message to promote or sell a product service or idea.
Approach	:	To begin to deal with a problem, a situation and so on.
Channels	:	To make something move along a particular path or route.
Communication	:	The act of sharing or exchanging information, ideas or feelings.
Market	:	A place where people go to buy and sell things

# **1.9 SELF ASSESSMENT QUESTIONS**

1. What is Pricing? How libraries can generate income?

2. Define Key Approaches of Pricing in the LIS field.

3. What do you understand by Distribution Channels in Libraries. Elaborate with suitable examples.

4. How do you define Communication Strategies? How it can be applicable in LIS Field?

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# LESSON 3

## Advertising, Sales Promotion

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Advertising and Publicity in Libraries
- 1.4 Use of various means of Advertising in Libraries
- 1.5 Sales promotion in Libraries
  - 1.5.1 Meaning and Definition of Sales Promotion
  - 1.5.2 Prominent Media for Sales Promotion
- 1.6 Summary
- 1.7 Glossary
- 1.8 Self-Assessment Questions
- 1.9 References
- 1.10 Suggested Readings

# 1.1 LEARNING OUTCOMES

Advertising in very common definitional term is "any paid form of non-personal communication of information about products or ideas by an identified sponsor through the media to persuade or influence behaviour of the people in such a manner as to induce them to buy". You will be able to understand:

- principles and practice of advertising;
- understand the advantages;



- objectives and limitations of advertising;
- help facilitate the use of different media and techniques of advertising;
- analyse the various appeals used in advertising;
- apply various advertising concepts and models, and
- plan and evaluate advertising effectiveness.

# **1.2 INTRODUCTION**

Advertising is considered a creative marketable message aimed at selling products and services. It can also be used to increase sales or publicise social messages. It is the means of support of media for their continued existence. At the same time, some people think that advertising is just a waste of money and manpower. The very common terminology of advertising is "any paid form of non-personal communication of information about products or ideas by an identified sponsor through the media to persuade or influence behaviour of the people in such a manner as to induce them to buy".

A question is arrive to mind despite so many other forms of promotion, why do we need advertising of products and services in libraries? The answer is that production is incomplete without consumption and in libraries, there is no value in products and services if users don't utilize them. Library professionals need to make aware of the availability of the sources and services. Through advertisements, library professionals draw user attention to the product.

# **1.3 ADVERTISING AND PUBLICITY IN LIBRARIES**

Communication is an important aspect of marketing especially in libraries because it is a two-way process between the user and the library. It assists to develop a better understanding of users, their needs, and requirements. Interactive sessions with users consist of important



dialogues and allow one-to-one contact with the user. AIDA model for advertising includes the following four elements in the context of the library:



Fig 1.2: AIDA Model

AIDA Model was developed by Elias St. Elmo Levis in 1898 and defines as "an advertising effect model that identifies the stages that an individual goes through during the process of purchasing a product or service".

- Awareness: When users are aware of all sources and services of the library.
- Interest: When the users are interested in the products and services of the library.
- Demand: When the customer develops an insist on/want for the service.
- Use: When users use the sources and services.



### ACTIVITY

Visit any public library in your locality and college/university library in your campus and collect the information regarding that how these libraries use AIDA model for advertising their products and services? How they attract users to use the library?

# 1.4 USE OF VARIOUS MEANS OF ADVERTISING IN LIBRARIES

In libraries, advertisements work for publicity and create awareness among the users and also use for image building of the library. Advertising can be defined "as any paid form of nonpersonal promotion "(Kotler, 2000). There are several ways for advertising, for example, printed and non-printed flyers, instruction manuals, broachers and booklets, posters and leaflets, directories, reprints of ads, billboards, display signs/signboards, audio-visual material, PowerPoint presentations, symbols, logos and so on.

In libraries, most advertisements are placed in magazines and newspapers, on notice boards, websites and bulletin boards. With the help of such media, users can select what are their requirements, what is available in the respective library and how to use them. Libraries can develop simple advertisements with short messages, using bold headlines and captions.

Advertising	Sales Promotion	Publicity
Print advertisements	Sampling	Press release
Radio jingles	Discounts on books	Seminars
Inserts/pamphlets	Increase timings of the	Workshop
	library	
Movies	Rebates	Online meet
Magazines	Demonstrations	Alumni meets
Manuals		Videoconferencing
Booklets		Community relation
Logos		

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Brochures	
Prospectus	
Annual Reports	

*Source:* Kotler, P., & Armstrong, G. (1994). *Marketing management, analysis, planning, implementation, and control, Philip Kotler*. London: Prentice-Hall International.

# **1.5 SALES PROMOTION IN LIBRARIES**

### 1.5.1 Meaning and definition of Sales Promotion

"Sales promotions are those incentive schemes which aim at encouraging product/service usage at the consumer level" (Chopra, 1998, p.476). "A sales promotion is a marketing strategy in which a business uses a temporary campaign or offer to interest or demand its product or service" (p.477). In the marketing environment, the most frequently used tools in this category are "contests, games, exhibitions, sweepstakes, lotteries, demonstrations, premiums, gifts, sampling, fair and trade shows, rebates, low-interest financing, entertainment, trade-in allowances and trading stamps etc".

In libraries, an exhibition of rare books, and manuscripts of historical importance can enhance the use of such collections. Display of online services, bibliographical services, abstracting services and the use of online gadgets can be helpful in sales promotion.

# **1.5.2** Prominent Media for Sales Promotion

• Atmospherics: Kotler and Andersen define it as "the conscious design of space to create or reinforce specific effects on buyers such as a feeling of well-being, safety, intimacy or awareness" (Kotler & Armstrong,1994). The library building should be well maintained with a service orientation atmosphere, comfortable furniture, research cabins, user-friendly lights,



decorative inners, and so on. This type of atmosphere provides a positive and satisfying environment. The inner ambience should have basic facilities, adequate signage (signs) system which promotes the utility of a library.

- Brochures, Flyers, and Posters: In libraries, professionals can use brochures, flyers, catalogues, posters, manuals and so on. These are effective communication, and media with user groups. It is observed that we get various brochures inserted in newspapers. Often we find them quite attractive and attention-grabbing, and directly or indirectly motivating one to see and read them. "The language and message wording, used for a brochure, should be so absorbing that it motivates the reader to read till it ends" (Rowley,1998,p.3385). Posters should be displayed prominently throughout the organization.
- Newsletters: Libraries can bring out periodical newsletters to inform their users regarding forthcoming activities or information. "The newsletter must contain information about the latest books/information, any new services added, any library event organized, workshops/seminars/ conferences held or planned, computerization of services, and so on. "Newsletters should represent their professional style and may also cover professional information" (Rowley, 1998, p. 3385), for example, new appointments, promotions, and award presentations.
- Extension Activities: All libraries especially academic libraries should act as active centres for various academic and cultural activities to promote their membership. They can organise different programmes like user orientation, information literacy, lectures, workshops, seminars, debates, quiz competitions, book exhibitions, etc on a regular mode. "Regularly hosted activities can quickly catch the users' attention and improve the image of the library. Exhibitions of products and services during conferences/seminars, etc. are helpful to publicize the initiatives taken by the library for their


users"(Rowley,1998,p.3387).

- Mail Shots: Mail shots are "a dispatch of mail, especially promotional material, to a large number of people/user. It is a personal approach to reaching prominent users of the library" (Rowley,1998,p.338). It can be a piece of information, announcement/reminder, alert and so on. Publishers usually send mail shots to users about their new sources.
- **Personal Selling:** Personal selling is a type of face-to-face interaction with users to maximize the usage rate of sources and services. This type of interaction is best for products and services which are worthy, for example, sales promotion, sales meetings, incentive programmes, samples, fairs and trade shows, free browsing hours for online searching, and samples of CD-ROM searches may help in attracting more subscribers.
- **Personal Talks:** It is the best technique to develop good personal relations with users in the library. This two-way beneficial approach will not only help the libraries and the library professionals to improve their image but also create a place among the users for wider acceptance.
- **Sponsorship:** Although libraries happen to be social institutions, it is very important for getting sponsorships that the library creates awareness among the users about the need and importance of various sources and services they have for them to use, especially due to dynamic changes taking place in the world of information and knowledge to keep aware of the users with the help of organizing several activities. "As the librarydeals with numerous books, periodicals, electronic resources, suppliers, booksellers, vendors, and publishers, and they are being the beneficiary of library purchases come forward willingly to financially support the libraries to give momentum to the use of information resources" (Gedenk, Neslin, & Ailawadi, 2010, p.293).



• Press Conferences and press releases: "A press conference is nothing but a meeting in which representatives of the media participate in learning and publicizing the event or new item they are representing and a press release is a written communication sent to a selected set of press and broadcasting media" (Blattberg & Neslin,1993,p.553). So, a library and when organising a press conference should provide media written/printed support material, photographs etc. to attract the attention of the larger people. Therefore, a well-presented press release which is timely, interesting and accurate has a wider impact on promoting the image of the library among the ample of users.

### **1.6 SUMMARY**

Users are an important part and parcel of any library and the ultimate satisfaction is important for library professionals. Advertising may play a significant role in its performance and user satisfaction. This may possible when the libraries have a positive sales promotion attitude based on the user's requirements and deliver value to their information needs and expectations. Thus, we can conclude that advertising and sales promotional activities can improve the image of libraries and also help to increase the use of library sources and services in a very effective way.

### 1.7 GLOSSARY

Advertising	•	It is a means of communication with users of a product or service.
Brochures	:	A small book with pictures/illustrations and information about something.
Promotion	:	Things or activities you do to advertise a product and increase its sales.
Sales	:	The action of selling or being sold or the occasion when something is sold.
Sponsorship	:	This is a form of advertising where a company will sponsor some event or organization.

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### **1.8 SELF-ASSESSMENT QUESTIONS**

- 1. Explain the concept of Advertising. Discuss the factors that influence advertising in libraries, with suitable examples.
- 2. Define the term Sales Promotion. Discuss some effective means of sales promotion in libraries with relevant examples.
- 3. Discuss the extension activities that libraries used to promote users.

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### **LESSON 4**

### **PUBLIC RELATIONS**

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### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Public Relations in LIS Field
  - 1.3.1 Public Relations in Libraries
  - 1.3.2 Objectives of Public Relation in Libraries
  - 1.3.3 Prominent Forms of the Common Core of Information
- 1.4 Public Relations on National and International Level
  - 1.4.1 Public Relations on National Level
  - 1.4.2 Public Relations on International Level
- 1.5 Public Relations on University Level
  - 1.5.1 Vice Chancellor
  - 1.5.2 Library Committee
  - 1.5.3 Faculty Members
- 1.6 Get Others (Off-campus groups) involved in PR 1.6.1 Alumni
  - 1.6.2 Professional Friends
  - 1.6.3 Professional Associations and Organizations
- 1.7 Glossary
- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

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### **1.1 LEARNING OUTCOMES**

This lesson aims to make understand the role of public relations in the promotion of LIS products and services. After reading this lesson you will be able to understand :

- How PR works in LIS education;
- role of national and international organizations to project the image of libraries;
- role of media in PR work, and
- sources used for PR

### **1.2 INTRODUCTION**

The aim of public relations in libraries and information centres is to build up a strong connection with users, make users active, forward-looking, quickly responsive to public demands, interested in progressive methods and economy, operated by devoted and highly skilled staff and busy in helping more citizens in every category. Public relations helps to discuss your success/achievement, distinguish you from the competition from the other information providers, and also provide a stream of ideas for the audience/users. It also explains the objectives and vision of the library, problems, plans, projects, personnel, standards and accomplishments,

### **1.3 PUBLIC RELATIONS IN LIS FIELD**

#### 1.3.1 Public Relations in Libraries

The Public Relations Society of America defines public relations as "a strategic communication process that builds mutually beneficial relationships between organizations and their publics".

In LIS education public relations means the act or process of putting the library into a friendly and understanding relationship with users of all categories, for example, faculty members, research scholars, students and other staff of the organization. It helps to understand every citizen about the functions, policies and procedures, the extent and warmth



of the community's goodwill toward the library, and its appreciation for the quality and morale of the library's staff and services.

#### **1.3.2 Objectives of Public Relations in Libraries**

So, the main objectives of the library PR programme are:

- to create library consciousness among the people of the community;
- to spotlight the existence of libraries, where they are located what they contain, and
- to identify the services they provide to help people in their learning and teaching;
- to make constructive use of their leisure hours,
- to help people remain well-informed;
- to increase their theoretical knowledge of their resources.

#### **1.3.3 Prominent Forms of the Common Core Information**

The common core information is often publicized in the form of :

- Press release;
- all types of information flyers;
- advertisements for open positions;
- announcements of new appointments and retirements;
- media advertisements;
- articles;
- manuals;
- programme announcements

#### ACTIVITY

Make a list of activities that an academic library might carry out locally in users interest to obtain goodwill. Look around your campus and in the newsletters of colleges/universitiesfor ideas.

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#### 1.4 PUBLIC RELATIONS ON NATIONAL AND INTERNATIONAL LEVEL

#### **1.4.1 Public Relations on National Level**

Looking at the national level, one finds that the governments own national, parliament, state assemblies and departmental libraries. They also give financial aid directly or indirectly for the maintenance and development of public libraries. They also provide financial aid to academic libraries. "Therefore, becomes obligatory that the members of national, parliament and state assemblies and the bureaucrats be kept informed on the vital role of the libraries. Financial stringencies must be opposed.

At their national level library association like ALA and Library Association (London) have magnified library images at the international level" (Russo,2001,p.3). They have promoted participation in international conferences, the establishment of fellowships for librarians of developing countries, making arrangements for visiting librarians, and publications of international value.

#### 1.4.2 Public Relations on International Level

International bodies like UNESCO, FID, and IFLA have played a vital role in projecting library image on the international scene. UNESCO has been playing a vital role in the development of libraries in many parts of the world. Even though, Unesco is concerned with all kinds of libraries it has paid special attention to the development of public libraries in those countries which have been fortunate enough to have them. "The initiation of the pilot public library projects at Delhi, Enugu (Nigeria), Medellin (Columbia), and Latin America demonstrate Unesco's faith in public libraries as institutions where everyone can obtain knowledge in the way one ikes best. Unesco has generated the idea that public libraries can bring about an intellectual, social and economic revolution through the dissemination of the human mind, librarians, particularly in the less privileged countries, have gained a better idea of the great potentialities of the public 'library'; while the government authorities and the decision-makers are convinced of the utility of these institutions in life-long education and as effective information centres for the whole community; hence their greater support for these institutions of public mental health.



IFLA operates sections for national and university libraries, public libraries, special libraries, parliamentary libraries and administrative libraries. "There are also subsections working for libraries in hospitals, children, astronomical and geographical libraries. IFLA Committees perform work relating to library education, rare books, periodicals, statistics and library buildings. LIBRIS is a powerful journal. Similarly, FID has made great contributions to spreading the latest developments in documentation, information science and UDC throughout the world"(Baldock,1993,p.7).

### 1.5 PUBLIC RELATIONS AT UNIVERSITY LEVEL

The support of the Directors and other library administrators can be powerful advocates for a library's resources, programmes and services. Everyone on the university campus must be kept informed about the library's sources and services.

#### **1.5.1 Vice-Chancellor/President**

The librarian has to inform the Vice-Chancellor of the university about the library's progress and problems. If the library is poorly or brilliantly organized, the Vice-Chancellor will come to know about it from the faculty, students or even the alumni. But if the librarian requires new types of equipment for initiating new services, he/she must keep the Vice-Chancellor informed. The Vice-Chancellor is also kept informed about:

- book funds;
- means employed in integrating the library with instruction, teaching and extension programmes;
- the library costs involved in starting new courses;
- building's expansion for accommodating new acquisitions, and new types of equipment;
- new activities like the computer application to libraries which call for modifications or extension of buildings or unusual expenditure of funds;
- the advantages and disadvantages of decentralising collections and services;
- the wisdom of separate undergraduate libraries:
- the money earmarked for the purchase of special and rare collections;

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- the quality of staff and costs involved to operate a first-rate library; and
- the aspirations of staff for recognition and appropriate faculty status, etc.

To get wholehearted support from the Vice Chancellor of the University the librarian should be careful to present all sides of his recommendations and problems.

#### 1.5.2 Library Advisory Committee

Library Advisory Committee is another possible way for the librarian to interpret his sources and services. Advisory committees should be advisory, and consultative for the library and can be greatly helpful in promoting the source of the library. The library advisory committee can be representative and can collect the requirements of the students and faculties.

#### 1.5.3 Faculty

In addition to library committees, the librarian must work in close cooperation with the faculty for projecting the library image in the university and among students. Since faculty and students are the primary users of a university library, their needs must be extremely important to the library in setting goals. Faculty dependence on recorded knowledge in their teaching and research is the foundation of university librarianship. This dependence can be translated into appreciation or criticism. A wise and visionary librarian would make an effort to turn constructive criticism of collections or services towards greater library support. As a participant in the university educative programme, the librarian operates the library on the teaching and research level.

For faculty, the common denominator of the library lies in getting the books they want and getting them as fast as possible. The daily association of library staff with faculty and students is more important than any other type of library interpretation. Courtesy, conscientiousness, understanding, sympathy and adaptability at reference and loan desks are the pre-requisites for selling the library idea.



#### **IN-TEXT QUESTIONS**

- 1. UNESCO playing vital role in the development of libraries. True/False
- 2. UNESCO has generated the idea of Public Libraries. True / False
- 3. FID has made great contribution to the spreading the latest development in documentation, information science and UDC throughout the world. True /

#### 1.6 GET OTHERS (OFF-CAMPUS GROUPS) INVOVED IN PR

The off-campus groups, for example, alumni, professional friends, and professional forums, associations and organizations can be a powerful source for set public relations

#### 1.6.1 Alumni

The Alumnus is given a special status; he/she should always be welcome for brief periods. Alumni who live near the university may make use of its library directly; others may seek by mail; they may also ask for reference and bibliographical services. "The PR with the alumni assumes greater importance when the librarian is interested in build-up a library through their help. The alumni can be of vital help to the library by forming a 'Friends' Group, making donations, and listing the support of persons in a position to be of genuine assistance to the librarian. To cultivate friendly relations with the alumni, the librarian may organize exhibits for Alumni Day and try to meet as many alumni as possible and keep them informed about library services and needs, outstanding acquisitions, memorial book gifts, special services, and news likely to be of interest to the alumni"(Baldock,1993,p.6).

The alumni groups, to a large extent, represent their college and university libraries; public library groups contain a cross-section of members of the community. The former generally carry on efforts to aid the growth of the library collections using gifts or contributions, the later is more concerned in:

- stimulating increased awareness and resulting use of the library;
- stimulating increased financial support-public and private;
- coordinating the effort of all groups and individuals interested in the library;

Name of the Course



- promoting the greatest possible use of the library; sponsoring cultural and related programmes for the community: and
- sponsoring and stimulating voluntary service for the library.

#### 1.6.2 Professional Friends

Friends look upon the library as an informational and cultural force in the community, as a source of inspiration and as a tool to promote individual, civil, and national development. Friends organizations are established for promoting understanding of the library-its limitations, its services, its physical facilities, and its resources. More specifically, they may and frequently do promote and encourage gifts to the library either in kind or cash.

### 1.6.3 Participation of Librarians in Professional Associations/ Organizations

Wilson and Tauber enumerate five groups of organizations, with which the university librarian has at one time or another, worked. These are:

- Library association-local, state, regional, national, and international;
- Educational associations;
- Government offices and departments;
- Educational foundations; and
- Learned societies.

The type of activities of these organizations which appeal most to the librarians include the following:

- the development of international cultural relations;
- the compilation and publication of major catalogues and union lists;
- the establishment of regional union catalogues and bibliographical centres;
- the description of the holdings of individual libraries and groups of libraries;
- the improvement of college and university book collection;
- the improvement and support of education for librarianship,
- the development of physical facilities for the photographic reproduction of materials;
- the reduction of costs of library technical operations;



• the accomplishment of other undertakings-all of which are intended to contribute to the promotion of research and the advancement of scholarship and librarianship.

So, the participation in professional meetings of the state or the national associations or the learned bodies may encourage and refresh the participants and they may return home with new experiences, new vision, new ideas and new methods to try, which ultimately improve services having their impact on the educational role of the library. Confident and enthusiastic staff members, receptive to hopeful professional thought and the latest techniques of operating libraries and disseminating information, gain the confidence and respect of their teaching colleagues.

### 1.7 SUMMARY

The public relation and extension programme aims at converting the library into a dynamic part of community life. The librarian discloses the sources, analyses the contents of documents for the uninitiated and leads them to use the documents for themselves. Having done this the librarian enters the fields of PR and extension services to spread the news of his service to make his library a living force in lifelong education and the intelligent use of leisure. All the way through public relations the librarian wants to announce the purpose of the library.

### **1.8 ANSWERS IN-TEXT QUESTIONS**

- 1. True
- 2. True
- 3. True

### **1.9 1.9 SELF-ASSESSMENT QUESTIONS**

- 1. Explain with examples, how Public Relations works on a National and International Level.
- 2. How do Public Libraries Work at University Level?

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3. How others (off-campus groups) can be helpful to set up Public Relations in libraries?

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# LESSON 5 E-MARKETING

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- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 E-marketing in Libraries
  - 1.3.1 Sub-Section 1
  - 1.3.2 Sub-Section 2
  - 1.3.3 Sub-Section 3
- 1.4 Process of E-marketing in Libraries

1.4.1 Planning of E-marketing

1.4.2 Requirements for E-marketing

- 1.5 Sources of E-marketing in Libraries
- 1.6 Functions of E-marketing in Libraries
- 1.7 Summary
- 1.8 Glossary
- 1.9 Answers to In-text Questions
- 1.10 Self-Assessment Questions
- 1.11 References
- 1.12 Suggested Readings

### **1.1 LEARNING OBJECTIVES**

The present lesson defines the concept of e-marketing in the field of LIS. The power of "E" has profoundly affected the way of marketing. The entry of "E" helps marketing by anyone, from anywhere and anytime with just a click of the mouse. Basically, "E" refers to the



paperless exchange of business information using electronic gadgets. Generally, libraries are service-oriented not profit-making organizations but special products and services need to be promoted through an exchange of price for a fund which helps towards the growth and development of document collection in libraries. Still, in the 21<sup>st</sup> century, the concept of e-marketing is not fully understood by many library professionals. Each library and library professional needs to identify the primary target markets and the composition of needs that it would like to serve as its key constituency. After reading this lesson you will be able to understand:

- to establish the need and significance of e-marketing for information products and services; demonstrate your understanding of the related terms in e-marketing;
- to describe the benefits of e-marketing both for the users and the providers of information products and services;
- to explain the classification of e-marketing activities and how these are different from other types of e-marketing;
- to address the key issues in the development of e-marketing strategies in the LIS field.

### **1.2 INTRODUCTION**

Like all other spheres of life, the electronic has profoundly affected the way marketing is adept today. In the earlier lessons, you have learned the promotional activities, communication channels, and promotional strategies to promote LIS products and services. It is proven that marketing in libraries is primarily concerned with the objective of creating user value. The users, towards whom the products and services of the modern-day libraries and information service providers are directed, change their lifestyles and methods of utilising, storing and retrieving information. "Use of the World Wide Web and rapid developments in broadband connectivity, supporting back room technologies, and constant endeavours to aide programme integration of communication and information technology have broadened the perspective of access to information and the possibilities of the search for it to undreamt of levels". Providers of information products, therefore, need to think in terms of a new

paradigm, that of an empowered and informed consumer, with several choices, and an everwidening reach of enabling tools, like the internet and web browsers. Research suggests that the application of the massive powers of the internet and supporting technologies to the practice of marketing is referred to as electronic marketing or e-marketing.

In this lesson, we would see how the electronic age has influenced the planning, designing and implementation of strategies for promoting LIS products and services.

#### **1.3 E-MARKETING IN LIBRARIES**

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The idea of marketing library services is not new. At ALA Conference in 1896, Lutie Stearns talked about advertising the library. Thereby the word advertising was added to the librarians' vocabulary. Fialkoff (2006) focused on the problems by which libraries are failures in marketing. "Library authorities to some extent neglect the things and fail to communicate with their users and their requirements, especially now that their audience is being attracted or to expect a wide range of sources and services. By keeping these things in mind, libraries can utilize computer technology to improve marketing efforts or to promote their sources and services. But first, a library must need to get a better understanding of the requirements of the users with the help of market research. In the process of market research, they can use transaction log analysis, circulation records, user surveys, focus group interviews, and informational interviews" (Krishnamurthy, 2005). This research process will be helpful to get an insight that what your users expect from your library. In several environments, e-business has increased, and the value of digital information in the process of e-marketing has increased. One of the features of information is that when it is demanded as a product it creates a new marketing approach and that is information e-marketing.

"E-marketing refers to the application of marketing principles and techniques via electronic media and more specifically the Internet. E-marketing allows librarians to help patrons (users) access information in a virtual environment, using various methods such as e-mail, chat, website, and so on. Three main factors, namely the information explosion, the technology revolution, and growing library costs are responsible for encouraging the library profession to develop an e-marketing approach in its operations and services. One essential role of e-marketing is to create a series of exchanges.



"The prefix `e-`, is generally attached to any application that is associated with the revolutionary tool of the internet. "In the context of e-marketing of information products and services for a modern-day library let us first try to understand the various related terms and concepts".

E-marketing is a process of planning, executing, and promoting products and services by using Information Communication Technologies (ICT) to meet the users' needs. "The concept, E-marketing of information and services of libraries is quite innovative because the traditional concept has been changed from marketing to 'E', for example, E-marketing". Now, today's "world is preferring to have a digital environment, and libraries are also no exception and trying to achieve their goals" (Marcial, 2013, p.336). This lesson focuses on how libraries can adopt and implement e-marketing aspects to utilize and improve information products and services more effectively by applying different information communication technologies.

#### ACTIVITY

Visit your local public libraries, campus college and university libraries to collect the information how these libraries promote their sources and services using e-marketing strategies ?

### **1.4 PROCESS OF E-MARKETING IN LIBRARIES**

#### 1.4.1 Planning of E-marketing

In the LIS field before preparing an e-marketing plan libraries should research their user groups' needs and demands. Then they can use this information to develop a plan for the targeted group of users. In an electronic era of information, libraries can't stand and work alone. They work closely with consortia, vendors, suppliers, other libraries, and their users to meet their responsibilities not only in the library but also out of fancies. Regularly library



professionals are researching that in a world where the majority of our users are not coming into physical libraries, how do we build strategies to meet the users where they are and get them to good resources? Where are users on the web and how can we get to them?

#### **1.4.2 Requirements for E-marketing**

The first requirement for successful e-marketing in library and information services is a clear appreciation for what marketing is and what it can do. Satisfying the users is the primary concern in the marketing/e-marketing process. "Users will only come back for more service if they are satisfied; if they are not, they will find a different resource. Thus, the philosophy of the library should value user satisfaction, and everyone should have a role to play in reproducing maximum satisfaction" (Haruna, Madu & Adamu, 2017). A library has to have a sufficient understanding of existing and potential users to create superior value for them. This value comes through increasing the benefits to the users. "One way to do this is at a user orientation, which requires that the library understands the value to the users as it is today and as it will evolve. This makes e-marketing more than just finding users for the available information sources, services, and technologies. It makes marketing a partnership with the user, who becomes a central part of the total service efforts.

The Ohio Library Council defines the e-marketing process:

- Begin the marketing process by examining your library's mission or purpose;
- Assess library capabilities with a marketing audit and an internal assessment.
- Find out what products (services) your users want, and how they perceive the library, through market research.
- Develop goals and objectives based on your mission and the results of your internal audit and external research into what customers want.
- To meet goals, select strategies to promote your products that will work best, be affordable, and reach your customers.
- Create a plan of action that describes all the steps needed to carry out the strategies for meeting goals.
- Evaluate how well you have done, for example, in a digital public library, the first part of your plan is to arrange a statement of your library's mission or purpose.



To fulfil this purpose you need to:

- select one service or one user group for this sample plan, for example, an annual event,
- pre-schoolers, non-English speaking users, and retirees;
- describe how the marketing of this service or to this group will contribute to the library's mission". For example, if part of your mission is to serve the community, you could say that marketing will let the community know how you can serve them.

### **1.5 SOURCES OF E-MARKETING IN LIBRARIES**

There are several sources of e-marketing :

- i. **E-mail:** Using this tool library can provide virtual reference services, selective dissemination of information (SDI) and so forth.
- ii. **Users' opinion:** Through such services, users' opinions, as well as feedback, can be easily and speedily determined.
- iii. **Newsletter:** Providing general information about activities and news of the library. Also, this plays a current awareness service (CAS).
- iv. Websites: Websites can be the best source to attract users to the sources and services.
- v. Library Blog/Social sites: These are useful to inform and entertain readers.
- vi. Viral marketing: To do this, visitors are asked to introduce the library site to others.

#### **IN-TEXT QUESTIONS**

- 1. Libraries can utilize computer technology to improve marketing efforts or to promote their sources and services. True / False
- 2. E-marketing more than just finding users for the available information sources, services, and technologies. True / False

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### **1.6 FUNCTIONS OF E-MARKETING IN LIBRARIES**

At the functional level electronic media, websites, e-mails, and social media/blogs cover the whole process of marketing.



So with the help of recent advancements, libraries have a provisioned to move information products and services out of the restrictions of physical barriers. Now sources and services are fully utilized by users with electronic gadgets. Libraries can offer more services effectively. However, e-marketing requires a fresh look or widening the vision of the

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components of the marketing mix and the implementation of the marketing effort. Emarketing in libraries for the promotion and utilization of sources and services is an essential component of value-added services.

Young library professionals find innovative methods of promotion through 'engaging' library users using online social media such as blogs and webinars. Marketing is more than library displays and designing library websites for new professionals; "it involves all characteristics from book selection, professional "stock arrangement" and social media in addition to new add-on services like refreshments and entertainment facilities". Librarians need to consider many aspects of marketing including library branding, providing quality service, sustainability issues and e-marketing.

Libraries and other organisations that are dealing with information society must be trained and learn new skills to promote their library sources and services similar to the other product marketed. "Traditional methods in libraries, for example, newsletters, display boards, announcements and others can go together with social marketing using Facebook, Twitter, RSS Feeds, blogs and YouTube to engage with the target group of users in the library"e Bonde & Khande, 2015,p.3). "Social media provides a collaborative virtual community, a two-way dialogue that is facilitated by "Virtual Community Managers", elevating the services and activities of the library to "design robust, enjoyable and memorable experiences for their community" (Neville, 2014,p. 366).

It is recommended for any academic library desiring to improve the promotional activities of their library. "The discussion of e-marketing using blogs, online advertising, viral marketing, webinars and other types of social media is especially useful for the library professionals hoping to engage younger library patrons using innovative, low-cost methods". E-marketing can be relatively cost-effective and as simple as the use of online promotional calendars that highlight new resources, services, news items and activities that complement the core services.

### 1.8 GLOSSARY

Name	of	the	Co	ours	e
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E-business	:	Electronic business is any kind of business or commercial
		transaction that includes sharing information across the internet.
E-marketing	:	E-Marketing (a.k.a. electronic marketing) refers to the marketing
		conduct over the internet.
E-gadget	:	An electronic device has transistors or silicon chips which control and
		change the electric current passing through the device.
Physical Barrier	:	Physical barriers are structural obstacles in natural or manmade
		environments that prevent or block mobility (moving around in the

### 1.9 ANSWERS TO IN-TEXT QUESTIONS

environment) or access.

- 1. True
- 2. True

### 1.10 SELF-ASSESSMENT QUESTIONS

- 1. Define E-marketing in libraries. Elaborate with suitable examples.
- 2. What is the process of e-marketing in libraries?
- 3. What are the sources of e-marketing in libraries? How do sources of e-marketing function in libraries?

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### **UNIT IV: Management Consultancy**

### **LESSON 1**

### **Evolution, Need and Objectives**

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### STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 What is Management Consultancy?
  - 1.3.1 Concept and Definitions
  - 1.3.2 Qualities of Good Consultant
- 1.4 Evolution of Management Consultancy
- 1.5 Need and Purpose of Management Consultancy
- 1.6 Objectives of Management Consultancy
  - 1.6.1 Management Consultancy and Library Science
  - 1.6.2 Application of Professional Library Consultant
  - 1.6.3 Futuristic Approach
- 1.7 Summary
- 1.8 Glossary
- 1.9 Answers to In-text Questions
- 1.10 Self-Assessment Questions
- 1.11 References
- 1.12 Suggested Readings

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### **1.1 LEARNING OBJECTIVES**

In this lesson, the students will study the concept of Management Consultancy and its evolution. After reading this lesson, the students will be able to define Management Consultancy and its application in Libraries. The students will also study the primary objectives, needs and purpose of Management Consultancy along with the futuristic approach.

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### **1.2 INTRODUCTION**

Management consultancy has long been recognized as a valuable professional service that helps managers to analyze and solve practice problems faced by their organization, improve organizational performance, learn from the experience of other managers and organizations and seize new business opportunities.

In the general sense, 'management consultancy' is treated as a method for improving management and business practice first of all. Even a manager can act as a consultant if he or she provides advice to peers and subordinates.

### **1.3 WHAT IS MANAGEMENT CONSULTANCY?**

#### **1.3.1** Concept and Definitions

The concept of consultancy is a common phenomenon for many professions and institutions. The help of an expert- consultants are often sought in many institutions to make improvements in existing systems and advise desirable changes in case of grave difficulties and problems. Over the last two decades, the management consulting industry has grown considerably and developed into big business. The consultancy firms now offer all kinds of different services. The more traditionally services like corporate strategy, operation management and human resource management are included. During the last decade, ICT services have become an essential new product, and in the last three years, consultancy firms have not only offered advice. However, they have also advertised themselves as venture capitalists. It has become more and more obvious that the growth of management consulting as a industry is far outrunning the developing perception of management consultancy as a profession.

The definition of consultancy can be distinguished by two different approaches. The first approach considers consultancy as an activity in which a person attempts to change or improve a situation, although this person does not have any direct control over this activity. In this definition of consultancy, everything is in fact 'consultancy' as long as there are no direct competencies involved. According to this view, any person can be a kind of advisor in a particular position or role. For instance, a manager coaches his staff, and this could then be called consulting(a method of practical advice and help). In the second approach consulting is directed specifically at organization and management.

**Peter Block** suggests that "you are consulting any time you are trying to change or improve a situation but have no direct control over the implementation ...... Most people in staff role in organization are consultants even if they don't officially call themselves consultants".



A second approach can be distinguished if consulting is directed specifically at organizations and management. Consulting is seen as special professional service with specific requirements that this service must meet.

According to Larry Greiner and Robert Metzger, 'Management consultancy is an advisory service contracted for and provided to an organization by specifically trained and qualified persons who in an objective and independent manner, assist the client organization in identifying management problems. Analyze such problems, recommend solutions to these problems and help when requested in the implementation of solutions.

According to the International Council of Management Consulting Institute (ICMCI), "Management consulting is the provision of independent advice and assistance about the process of management to client with management responsibilities."

According To Kubr, 'Management consulting is an independent professional advisory service assisting managers and organization in achieving organizations purposes and objectives by solving and business problems, identifying and seizing new opportunities, enhancing, learning and implementing charges'.

#### **1.3.2 Qualities of a Good Consultant**

The personality of the professional consultant can make or break a relationship with the client. The kind of attributes/qualities which a good consultant must possess includes the following:

- i. Warmth and Friendliness
- ii. Pleasantness
- iii. Enthusiasm
- iv. Optimism
- v. Tactfulness
- vi. Willing to help and to meet people and situations more than halfway
- vii. perception about the situation in feelings
- viii. Sincerity
- ix. Self Confidence
- x. Patience and Tolerance
- xi. Honesty and Integrity
- xii. Courage and Convictions
- xiii. Ability to win people
- xiv. Ability to make people feel at ease
- xv. Sensitive to the feeling of others and their needs for acceptance etc.

### 1.4 EVOLUTION OF MANAGEMENT CONSULTANCY



The consultant, throughout history, has been used as a source of advice and guidance, usually based on some actual perceived or claimed specialist knowledge, skills or expertise. The essential nature of the consultancy process and the role of the consultant remains unchanged even today.

The use of consultants and consultancy in many areas of our lives and activities has increased. There are many reasons for this; the main reason is that in today's society, life is increasingly complex. We are beset by a potentially wilding series of problems and issues that we must deal with and manage to survive. This increasingly complex world entails that no one can be an expert in every area and have all the skills and information to hand needed to complete every task which we have to perform during our lives; because of this, we all have to call in the expert from time to time for help and advice. Such help and advice may involve many different types of experts or consultants being used, and indeed the type of consultants and the areas they consult in are diverse and wide-ranging.

#### 1.4.1 Developments In Management Consultancy: Approaches and Techniques

The main development and trends are as follows:

- i. More Powerful Tools And Techniques: Today's management consultant has access to many more powerful tools and techniques. In particular, improvements in data collection, storage, and analytical techniques. Developments in management info systems and in particular, data manipulation techniques such as data mining offer powerful analytical tools to the contemporary management consultant,
- **ii.** Less Prescriptive/Softer Methodologies: As we have seen, the traditional model of consultancy roles and styles has in the past tended to be of the prescriptive type, and although this traditional model is still appropriate for many client situations, there has been a gradual movement towards the less perspective styles of consultancy with an emphasis more on process interventions which are very client focused. This, in turn, often involves softer methodologies and approaches being adopted by modem day management consultants.
- iii. More Professional/ Ethical Approaches And Practices: Today's management consultant is more professional than ever and is increasingly aware of some ethical issues surrounding the management consultancy process. Many consultants are increasingly required to belong to a professional body or association encompassing and often prescribing their consultancy activities. There is also increased legislation that can be used to seek legal redress against incompetent or unprofessional consultants.

#### CONCEPT OF CONSULTANCY INCLUDES

• Certification- certification is an instrument that attests that a person is qualified and eligible to become a member of a profession. The purpose of certification of librarians is to assure the consumer of the services that a standard for the protection of the user of the



libraries is being preserved. Such certification of librarians is being granted in India by universities and some recognized institutions. The holders of such certifications are working as librarians.

• Licensing- the instrument of occupational or professional licensing permits only licensed persons to practice under the law. A degree in the discipline of library and information science or documentation gives the necessary proficiency to work in .a library, but to practice as an authorized library consultant, instrument of licenses may function independently as consulting library professionals.

### 1.5 NEED AND PURPOSE OF MANAGEMENT CONSULTANCY

#### Need

- Due to a lack of time and personnel, a management consultant is required as a problemsolving service.
- Due to lack of expertise or technical assistance and this is required to have effective performance.

#### Purpose

A manager may turn to a consultant if he or she perceives a need for help and he feels that the consultant will be the right source of this help. The purpose of using a consultant in an organization can be categorized broadly into five major areas:

- 1. Achieving organizational purpose and objectives.
- 2. Solving Management and business-related problem.
- 3. Identifying and seizing new opportunities.
- 4. Enhancing Learning.
- 5. Implementing Change.

### **1.6 OBJECTIVES OF MANAGEMENT CONSULTANCY**

The consultancy field is pervasive, covering a broad range of activities. Turner suggests that the purpose of consultancy should be focused on and discusses consulting eight fundamental objectives arranged hierarchically.

1. Providing information to the client.

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- 2. Solving a client's problems
- 3. Making a diagnosis, which may necessitate a redefinition of the problem.
- 4. Making recommendations based on the diagnosis,
- 5. Assisting with the implementation of recommended solutions,
- 6. Building a consensus and commitment around corrective action.
- 7. Facilitating client learning is teaching clients how to resolve similar problems in the future. 0°
- 8. Permanently improving organizational effectiveness.

#### **Management Consultancy and Library Science** 1.6.1

A consultant can perform various functions to help resolve problems, improve performance, or secure action. The services of library consultants may be utilized for achieving desirable results in library management, administration, maintenance and others. Such professionals and their expertise constitute the concept of consultancy services for libraries and persons authorized to practice such consultancy may be called library consultants.

The role of a library consultant can be explained with the following points.

- i. **Objective assessment of the situation**
- ii. Technical advisor: Here the consultant is a technical expert who may be engaged to determine technological needs, design a system, device currently existing system or implements a new system.
- Organizational problem solver: Here, a specialist is called to assist, resolving a iii. particular problem. For example, In the performance area, the library's collection or services may be found lacking, a unit's productivity may be declining, the libraries coverall capacities may be severely limited by a stable budget., or the users may be demanding new services, better accommodations or improved collection.
- iv. **Training and Educating Function:** In this capacity, external resources are employed to plan or operate various training activities. Some consultants specialize in helping clients assess the training needs of their organization.
- **Process Councilor:** In this capacity, consultants advise and assist the client in defining v. and implementing developmental processes. These processes may be planning, problemsolving, training, or conflict-negotiating activities.

#### **1.6.2** Application of Professional Library Consultant

stock verification/audit of library resources/weeding



- standardization/certification
- library management
- interior space management
- designing library furniture
- library equipment and accessories
- preservation and conservation
- collection organization and shifting of libraries
- wedding program and computerization
- total quality management and ISO
- staff development
- union-management relations and many others

#### 1.6.3 Futuristic Approach

wersity of Delhi It has been observed that in the past two decades, the profession, instead of improving, had come down from its earlier position in spite of recommendations made by various commissions and committees that a high position be granted to this profession. Such a situation seems to have arisen because self-consciousness of the profession could not show this profession a way to come- up with the expectations of the society. There is every possibility that other sections of society concerned with the use, development, and growth of libraries and members of the library profession may accept the purposefulness. Here is every possibility that other sections of society who are concerned with the use, development, and growth of libraries and members of the library profession may accept the purposefulness and need of the concept of consultancy for libraries. Earlier, the concepts of documentation officer and information scientists did develop in this country with the progress of library movement. When developed, a new concept of library consultant can play the role of an advisor, pleader, auditor for many libraries. It may put the library movement in the right direction.

Until now the concept of consultancy appears to be something applicable to organizations except libraries, yet it is made clear that concepts like professional. Library consultancy is to be framed by the Indian Institute of chartered librarians or some competent bodies. So there is a great need for various institutions like UGC or Ministry of education, culture and/or finance etc or association. Like ILA, IATIS or various schools and departments to come forward and lend a supporting hand so that the prepared institution of certified and licensed professional library consultant are made available to and given a welcoming acceptation by the library management.





### 1.8 SUMMARY

Management consultancy to the management of libraries intends to serve the purpose of making library more effective to the growing need of the society today. Library activities have to develop due to level of advancement, in education technology business establishments etc . it also observed that despite of recommendations made by various commissions and committee to grant higher status to the profession, this profession seems to have come down to its lowest position therefore the acceptance of consultancy should come from both studies i.e. The people from the field of library science and other section of the society who are aware of the use, development and growth of libraries.

#### **IN-TEXT QUESTIONS**

- 1. Management consulting is the provision of independent advice and assistance about the process of \_\_\_\_\_\_to client with management responsibilities.
- 2. The consultant throughout history has been used as a source of \_\_\_\_\_ and \_\_\_\_\_, usually based on some actual perceived or claimed specialist knowledge, skills or expertise.
- 3. Many consultants are increasingly required to belong to a professional body or association encompassing and often prescribing their \_\_\_\_\_.
- 4. \_\_\_\_\_provide advice and the assistance to the client in defining and implementing developmental processes.
- 5. \_\_\_\_\_\_is a technical expert who may be engaged to determine technological needs, design a system, device currently existing system or implement a new system.
- 6. A consultant can perform a variety of functions to help and resolve problems. improve performance. or secure action. True/False

### 1.9 GLOSSARY

**Certification:** the action or process of providing someone or something with an official document attesting to a status or level of achievement.

**Consultant:** a person who provides expert advice professionally.

**Consultancy:** a professional practice that gives expert advice within a particular field.

**Licensing:** relating to the granting of an official licence.

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**Management Consultancy:** a professional practice that gives advice about how to run a company or organization more effectively.

**Process Counsellor:** It is a process where an individual, couple or family meet with a trained professional counsellor to talk about issues and problems that they are facing in their lives.

**Technical Advisor:** A technical advisor works with a business when a project falls outside of their area of expertise.

### 1.10 ANSWERS TO IN-TEXT QUESTIONS

1. Management4. Process Councilor2. Advice and Guidance5. Technical Advisor3. Consultancy activities6. True

### 1.11 SELF-ASSESSMENT QUESTIONS

- 1. What is Management Consultancy? Explain by giving various definitions.
- 2. What are the qualities of a Management Consultant? Explain Briefly.
- 3. Write a short note on the Evolution of Management Consultancy.
- 4. What are the needs and purposes for having a Consultants?
- 5. Write a short note on Management Consultancy and Library Science?

### **1.12 REFERENCES**

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### **1.13 SUGGESTED READINGS**

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## LESSON 15

# VOLUNTARY VERSUS AUTHENTICATED CONSULTANCY

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### STRUCTURE

- 15.1 Learning Objectives
- 15.2 Introduction
- 15.3 Concept of Consultancy 15.3.1 Library Consultancy
  - 15.3.1.1 Need of Library Consultancy
- 15.4 Voluntary versus Authenticated Consultancy
  - 15.4.1 Objectives of Authenticated Consultancy
  - 15.4.2 Characteristics of Authenticated Consultancy
  - 15.4.3 Areas of Authenticated Consultancy
  - 15.4.4 Library Consulting Process
- 15.5 Information Consultancy 15.5.1 Need for Information Consultant
- 15.6 Summary
- 15.7 Glossary
- 15.8 Answers to In-text Questions
- 15.9 Self-Assessment Questions
- 15.10 References
- 15.11 Suggested Readings

### **15.1 LEARNING OBJECTIVES**

The objectives of the lesson are to learn Library Consultancy as a profession. The origin of library consultancy, their objectives, characteristics and different prospective areas are discussed in detail. After completion of this unit, readers will be able to learn the following things.

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- Consultancy works
- Professional Library Consultancy
- Process of Library Consultancy
- Key areas of Professional Library Consultancy
- Voluntary versus Authenticated Consultancy
- Information Consultancy

# **15.2 INTRODUCTION**

Management consultancy is an advisory service delivered by trained and qualified professionals to the client organisations which are in need of solutions. Professional consultancy means expert and reliable advice, but the work of consultant has no formal authority. Librarians must play a pivotal role in making library profession as an authenticated consultancy service to become sustainable and to arrest alienation from change management.

Voluntary and authenticated library management play two different roles in library consulting process. Some librarians do not have specialised training in consultancy but they perform consultancy services voluntarily. In the field of S&T, consultancy is very much popular than in the field of Library and Information Science. There are three core areas in consultancy services- client, consultant and problem. To become authenticated library consultant, many good qualities have to be adopted to become successful. Authenticated consultancy services are asked when voluntary consultancy services fail to deliver desired result.

Certification and licensing are two areas where voluntary and authenticated consultancy can be segregated. A law graduate and a library and information science graduate have certificates in their own field as professionals. In a law library, a librarian can work but cannot practice law as he/she does not have valid license. But a law graduate with certificate in law and license from bar council can practice in court. This is the basic difference between voluntary and authenticated consultancy.

# **15.3 CONSULTANCY**

According to the Cambridge Online Dictionary "consultancy" refers to "the activity of giving expert advice on a particular subject". Every organization is susceptible to problems and pressures and library also faces the same thing. The role of librarian in dotcom world is very challenging and methodical. The demand of information and method of document delivery system have changed very abruptly. The fundamental characteristics of libraries have to be redesigned, policies have to be remodelled and operations have to be redirected according to the need of the hour to become sustainable. The executive judgement is the key in decision making process and solving complex problems which occur in



managerial level within an information centre or more precisely in a library and documentation centre. "Consultancy" is the term which is becoming louder and the services of a consultant is becoming more demanding and daunting in crisis management of libraries.

#### **15.3.1 Library Consultancy:**

Authenticated as well as voluntary consultancy take the centre platform today in solving problems, implementing afresh setting, refurbishing old structure and redirecting advanced methodology to solve latest problems. Librarians' job is also consultative in nature like the jobs of lawyers, social workers and any other service providers in a society.

Librarians are sometimes termed as non-professionals because librarians fail to project their consultancy skills outside their domain and organisations. Some librarians do not have training or specialization in consultancy. Therefore, they lack proper understanding of the consultancy work which is required in today's library environment. The job of a consultant is very sensitive. A consultant has to comprehend the need of the society, client and present scenario in which he is dealing in. In the field of science and technology, consultancy is very much popular term because maximum number of people does not have basic understanding about the procedure and problem solving mechanisms of S&T. The job requires a sophisticated consultant to implement. But in the field of Library and Information Science, Library Consultant is a new term.

In every consultancy process, a trinity can be seen – one is client who is in need of solution, a consultant who is a problem solver and a guide and the last one is the problem itself.



Fig. 15.1: Trinity of consultancy process



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# ACTIVITY

Explore some areas of library activities where consultancy services can be practised except the following areas.

- Human Resource Management
- Collection development Management
- Information Technology Management.

#### **15.3.1.1 Need for Library Consultancy**

The need of consultancy services in Library and Information Science domain are discussed below.

- As library is still considered a place to store books and lending service is the only service a librarian can give, ergo, consultancy services have to be adopted by the Library professionals in authenticated way to change the notion.
- Marketing techniques have to be refurbished.
- Users' satisfaction and perception levels have to be changed.
- Monetary hindrances have to overcome by pursuing higher management.
- Library Professionals have to train themselves as professional consultant to solve their own problem.
- Marketing consultancy has to be adopted to showcase the library products and services to a larger community. This will bring laurels to the profession.

#### **IN-TEXT QUESTIONS**

- 1. Certification is essential in authenticated consultancy. True/False.
- 2. Librarians are termed non-professionals by Business Management people. True/False.
- 3. Library products and services have not showcased properly to larger community. True/False.



# **15.4 VOLUNTARY VERSUS AUTHENTICATED CONSULTANCY**

Voluntary consultancy is frequently seen in most of the library and information centres where library professional himself/herself solves their problem every day to run organisations smoothly. The consultancy may be of good quality or average but for time being monetary involvement of the organization is very less as outside professional consultancy services are not sought.

Voluntary consultancy is provided when someone wants to provide the consultancy service in the specific area without any obligation. Voluntary consultancy may come from an expert or a professional with a little knowledge on particular field. Non-profit organisations generally provide voluntary consultancy for the benefit of the society at large. Many voluntary consultancies bring out satisfactory result. But voluntary consultant has less obligation to solve problem, therefore, liability lacks.

A Library and Information Science graduate with formal training in library and information services can do a job in law library but he/she lacks knowledge about law, the procedure to defend client in a court of law; whereas a law graduate having certificate in law and license from bar council can practise. Here two points are oozing out. One is certification and another is licensing. The law graduate gets a license from bar council to practice law in a court but the Library and Information Science graduate working in the law library has not been permitted to practice as he has no license. This is the basic difference between voluntary consultancy (Library Science graduate working in a law library) and authenticated consultancy (law graduate practicing in a court of law). Certification makes a person eligible to become something, whereas licensing is given after certification to a person who has proficiency in the particular disciple.

	Voluntary Consultancy	Authenticated Consultancy
Certification	Yes	Yes
License	No	Yes
Experience	Very less	Experienced
Monetary Involvement	Less	High
Liability	Less	High
Training	Professional training	Skilled and trained
Examples	Librarians are installing and	IT company has been hired
	using LMS without much	for automation and
	knowledge	digitization works in a library

 Table 15.1: Voluntary and Authenticated Consultancy

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#### 15.4.1 Objectives of Authenticated Consultancy:

A client seeks the advice of a consultant to achieve his goal within least time. If the client goes to a wrong consultant, the result will be different. So, the role of a client is also very important in choosing the right consultant to get right result at the right time. The role of consultant has to be determined first prior to initiating consultancy process. The authenticated consultancy brings fruitful result when chosen prudently. The objectives of authenticated consultancy are-

- Satisfy the client with required information.
- Provide successful result to the client.
- Understand the core problem and alter the questionnaire according to the need.
- Give solution as per diagnosis.
- Help clients to get solution as prescribed.

#### **15.4.2 Characteristics of Authenticated Consultancy:**

Library consultancy requires a specialized knowledge along with professional education. Raymond M. Holt (1984) identifies some basic qualities an authenticated consultant should possess. They are-

- Discretion to decide.
- Integrity and trustworthiness towards profession.
- Patience and perception for clients.
- Will power to achieve goal.
- Innovativeness in problem solving.
- Instinctual towards customers' problems.
- Compassion towards customers.
- Tenacity for work.

#### 15.4.3 Areas of Authenticated Consultancy:

Consultancy is a survival method in changing scenario of library marketing and management. It is a specialized field of study and altogether a different profession coming from Management study. Library consultancy is not known term still to the Management and Marketing people. Though, the field has not flourished like other profession, it is the need of the hour that authenticated library consultancy is required to sustain in prospect market of change management. There are some areas which are important for authenticated consultancy services and they can be termed as ABCDPM2.



#### • Automation

In the age of dotcom bubble, technological knowhow of library professional is not sufficient to automate a library. Authenticated Library Consultant should be hired for automation works. Library professionals cooperate with the outsourcing agency in implementing automation project.

#### • Building

Though IS 1553:1989 (Revised in 1992) has specified the design of library building, experience is the pivotal factor to become building consultant. Architectural and interior knowledge must be correlated with professional knowledge of library and information science. Library is a growing organism. Therefore, designing of a library building is very complex work which needs a great vision to see future to accommodate new arrivals on interval. Budget is also a major constraint, so designing must be at par budget. Building consultant has to convince higher authority to inflow funds, approving design, etc. Time and again library building consultant has to review building plan, change location, improve space utilization and expand horizon of library.

Interior designing, lighting, ventilation, air condition, etc. are all important aspects that should be taken care of while designing library building. As a qualified librarian, library building consultant knows which materials are required inside a



library for modern day requirement of users. A library building consultant guides properly in making custom made furniture aligning need of customer of library.

#### • Collection Development

Collection Development is one of the planned aspects in terms of library consultancy. Library consultant's role is to assist librarian in selecting required documents for collection development. A policy has to be enforced with the help of library consultant in selecting documents. Subscription of journals is a very complex process which needs negotiation with publishers. Collection Development Consultant comes to rescue in this situation. Professional advice in weeding out documents is very much essential. A good library professional always plans according to need of users in collection development process.

#### • Digitisation

With the advent of digitization initiative by Government of India, digitization becomes an essential task in every sphere of documentation. Government has launched National Digital Library of India in collaboration with IIT Kharagpur and Ministry of Education (formerly Ministry of Human Resource Development). The sophisticated technology that has been used in digitization process makes librarians puzzled as everyday new technologies are emerging and disappearing. Library consultants who are well versed in digitization or digital technology can easily perform digitization works in libraries. Cloud computing, big data analysis, internet of things, etc are very sophisticated and hot topics for library consultancy.

#### • Personnel

Human Resource Management is already a key position in government and business organizations. Library personnel management is a crucial area where technical and technological expertises are required. Therefore, library personnel consultant has to formulate very challenging management system in elaborating job description of each professional engaged in specialized library. After all it is the trained librarian who will do the job in a library. So, library personnel consultant must be hired in such a way that information centre can run very efficiently and hassle free with the advice and guidance of authenticated consultant

#### • Management

Management of a library is very weak as most the people in management come from other background, not from library and information science. They fail to understand basic nature and functioning of library and library professional. Budget is also a constraint in managing library. Library has to run with very least budget. Library consultant's job is to streamline workflow by reducing cost and increasing productivity. Library management consultant uses retrospective databases to understand past scenario to prosper in future. Library management consultancy is a lucrative job but the tragedy is that upper management is hijacked by bureaucrats and other officials. Therefore, library has to run according to instruction already



prescribed by higher authority. The scope in library management consultancy is very less in comparison to other library consultancy jobs.

#### • Marketing

Last but not the least; library marketing is an aspiring sector for library consultant. The products and services of library have to be showcased; so that everybody gets its benefits. Many a time library products are not marketed well and client do not get proper information about the products and services they are searching for. Clients do not know what they can get from library. Maximum use of resources is needed to get optimum result. The library consultant has to study market and should have a good public relationship to become a successful library marketing consultant. A good marketing strategy is needed to maximize use of library products and services.

Every reader his book and every book its reader sound library marketing strategy. A good library marketing consultant connects readers/users with his preferred products and services in a right way. The consultant acts as a mediator and become reliable.

Other consultancy services where Library Professional can flourish are-

- i. Financial Resource Management
- ii. Services Management
- iii. Maintenance Management
- iv. Outsourcing Management
- v. Total Quality Management
- vi. Preservation and Conservation Management
- vii. Intellectual Property Right Management

#### 15.4.4 Library Consulting Process:

Any consultancy process starts with a problems and ends with a solution. If voluntary consultancy process can handle the situation, then authenticated consultancy services are not sought. The work process is shown with flowchart where it is shown that when a problem is arises it first goes to voluntary consultant for resolving. If voluntary consultant fails to address the issue, the matter is transferred to authenticated consultant and after that various process has been followed. The help of a consultant has been sought at the stage of query formulation too. Investigation of different alternatives has been asked prior to finalization of exact consultant. Preferences of earlier works, suitability for the job and availability have been taken into consideration for assigning job to professional consult. The firm and consultant get in touch till the buyer or information and seller of information, i.e., client and consultant respectively for future assignment and engagement.



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# **CASE STUDY**

TERI Library has been providing many consultancy services in the field of Library and Information Science.

- Setting up specialised information centres.
- Developing and maintaining databases.
- Handling information by electronic means.
- Library automation.

### **IN-TEXT QUESTIONS**

- 4. A library science graduate working in a law library can practice in a court of law. True / False
- 5. Trinity of consultancy process have three areas. They are-----
- 6. Compassion is necessary to become a successful consultant. Who said this?
- 7. What does "D" denotes in ABCDPM2 model?
- 8. If problem is solved by voluntary consultant, need of authenticated consultant still arises. True/False.
- 9. Name the IS standard for designing a Library Building.

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# **15.5 INFORMATION CONSULTANCY**

Information Consultancy plays a very important role in the age of information explosion where quantity of published data is growing exponentially. The way traditional librarians work has to be changed to adopt new technologies and to change the image in society and management field. Information consultancy is seen mostly in academic libraries and special libraries. It is a very potential and interactive field. A value added information when supplied, the role becomes shifted from librarian to information consultant. To be effective as consultant, librarians must be very efficient and relevant. In an academic institution, librarians have to actively participate with students, scholars, teachers and other academicians in scholarly communication process to become an indispensible organ of the institution.

Information consultancy increases active participation of information seeker and simultaneously librarians come in the "information loop". Though the reliance on librarians becomes less due to greater access of information online, it is the duty of information consultant to make scholarly community aware that value added services and reliable information can only be provided by authenticated information consultant only. As the environment of information seeking behaviour changes, information consultant shifts their strategy accordingly. Information consultant has to perform the routine traditional work as they are librarians in addition to new assigned jobs of consultant.

#### 15.5.1 Need for Information Consultant:

Technology has changed the way we think, we ask and we act. Information consult has to act in the same way an academic community thinks and asks. A lot of factors are responsible for emergence of information consult. They are discussed below.

- i. Emergence of interdisciplinary subjects.
- ii. Pattern of information seeking behaviour.
- iii. Omnipresence of information.
- iv. Changing nature of scholarly communication.
- v. Low usage of traditional library.
- vi. Librarians are not considered indispensible in information seeking process.

Therefore, the need for library information consultant arises to increase footfall in the library where academic community will get world enriched knowledge and augmented information with personalised assistance. Lastly, information consultant must possess the three qualities to become successful in the above path.

- i. Analysis- to provide solution and productive ideas.
- ii. Management to place solutions into implementation.
- iii. Relationship to listen and communicate to build public relation.

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#### **IN-TEXT QUESTIONS**

- 10. Information consultant provides value added services. True/False
- 11. Information explosion is related with growth of data exponentially. True/False.
- 12. Name some terminologies which are related to information consultant.

# 15.6 SUMMARY

The role of librarians in change management is very challenging and methodical. Demand of information and method of document delivery system have changed. Consultancy becomes louder and services of consultant become more daunting and demanding. Librarians are termed as non-professionals in the field of management consultancy. Library professionals must be trained in consultancy services. Voluntary consultancy services cannot solve every problem; therefore, authenticated library consultancy is required in the field of library and information science. Role of a client is also very important in choosing right consultant to get right result at the right time. Govt. of India's Digital India initiatives expands new horizon in information consultancy. Library consultancy has to be strengthened in the line of management consultancy to become a world class profession.

# 15.7 GLOSSARY

**Certification:** Earning an official document to become eligible for something.

Consultancy: To provide expert advice on a specific subject.

**Digitisation:** To convert text, pictures, etc. into digital form.

**Information Explosion:** Abundance of data due to rapid growth of published Information.

**Information loop:** a chain of events which are repeating continuously until certain condition is reached.

IS 1553:1989: Indian Standard/ Bureau of Indian Standard code for designing Library Building.

License: To give permission officially to do something.



# **15.8 ANSWERS TO IN-TEXT QUESTIONS**

1.	True

- 2. True
- 3. True
- 4. False
- 5. Client, Consultant and Problem
- 6. Raymond M. Holt

- 7. Digitisation
- 8. False
- 9. IS 1553: 1989 (rev. 1992)
- 10. True
- 11. True
- 12. Information specialist, Information counsellor

# **15.9 SELF-ASSESSMENT QUESTIONS**

- 1. Explain the concept Library Consultancy.
- 2. Differentiate between voluntary and authenticated consultancy.
- 3. Discuss Library consulting process.
- 4. Discuss on the areas on Library Consultancy.
- 5. Write a brief note on Information Consultancy.

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# **LESSON 3**

# IMPACT OF MANAGEMENT CONSULTANCY ON LIBRARIANSHIP

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Consulting Defined
  - 1.3.1 Types of Consultancy
  - 1.3.1.1 Functional Consultancy
  - 1.3.1.2 Spatial consultancy
- 1.4 Types of Library Management Consultancy
  - 1.4.1 Competencies of Successful Management Consultants
  - 1.4.2 Library and Information Management Consultant in the Age of Google

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- 1.4.3 Principles and Practices of Library Management
- 1.5 Role of Librarians in the Management Consultancy Service
  - 1.5.1 Basic Skills needed in Managing a Library
  - 1.5.1.1 Change Management
  - 1.5.1.2 Entrepreneurship
  - 1.5.1.3 Strategic Planning
  - 1.5.1.4 User Centered Management
  - 1.5.1.5 Management of Technology
  - 1.5.1.6 Project Management
- 1.6 Summary
- 1.7 Glossary
- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

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# 1.1 LEARNING OBJECTIVES

- Insight about Spatial and functional Consultancy
- Understanding on the types of Library Management Consultancy
- Foundational idea about Competencies of Successful Management Consultants
- Role of Librarians in the Management Consultancy Service

# **1.2 INTRODUCTION**

The management consultancy on librarianship is usually supposed to deal with a definition of consulting and explain the way of profiting through marketing one's skill and advice to others. But in case of librarianship, consulting as a profession is ill-defined. A physician must graduates from medical institution, spends years in internships and residencies, and maintain duty to practice, consultants have no such requirements. Till many farms for-profit and not-for-profit firms hire consultants to facilitate change, acquire knowledge, or influence others. "Consultants" value is admitted by businesses as they consistently deliver results by communicating their value to the constituents they serve. This discipline is imperative for consultants' survival, and librarians can learn from their example. This chapter focuses on defining consulting and identifying the similarities and parallels that currently exist between successful consultants and successful reference librarians. It argues that reference librarians in essence are already functioning as consultants, sharing their expertise surrounding the structure and function of information and the library organization itself. It presents the reasons why a consumer may be interested in using a library and information management consultant's services while discussing her value in the Age of Google. It follows by identifying the talents and characteristics of successful consultants, which also apply to a successful library and information management consultant. It concludes with a discussion of the myths and realities surrounding the adoption of business practices in libraries and other nonprofit organizations to show that repositioning librarians as library and information management consultants will not detract from the library profession itself.

Chapter of this book introduces many tools and concepts covered during the course of a traditional MBA program to reposition librarians as library and information management consultants. This Chapter highlights the act of defining management consulting and its importance for libraries and Librarian in particular. It addresses some myths and concerns librarians have for adopting business practices and frames the potential utility for library and information management consultants in the Google Age. It also states the skills and characteristics of successful management consultants that can be applied to library practice, 'Having armed with an understanding at the tools and concepts driving consultants' model of



practice, reference librarians may better engage library consumers performing their role as library and information management consultants.

# **1.3 CONSULTING DEFINED**

The library profession truly understand that the librarian's skills or appreciate the years of education and work experience required to become an effective, proficient purveyor of information. While one Oxford English Dictionary definition for a consultant begins with "a person qualified to give professional advice or services," it ends with "a private detective." Another definition in the same dictionary entry refers to a consultant as "(an oracle)." Any reference librarian, whether in a public or academic library setting, functions both as a private detective and an oracle, yet these terms are not used to describe her work or profession. Consultants focus on results, helping clients to define their needs, acquire the competencies and skills to address these needs, and take action. In the process, the consultant leads the client from a state of unconscious incompetency to unconscious competency. As advisors, consultants rely on the information and knowledge they've acquired over their careers to identify solutions and guide their employers in implementing them. They have many roles. Some are hired for their knowledge of and experience with a particular product or process, such as retail design consultants, who focus on helping stores maximize aesthetics and layout to stimulate sales. Others are hired for their ability to affect change, helping an organization to realize its strategic plan, or successfully redesign services following the implementation of new technology.

#### **1.3.1** Types of Consultancy:

Consultancy may be classified by two angles – Spatial and functional Consultancy:

### **1.3.1.1 Functional Consultancy:**

It may be divided into function areas like management consultancy, financial consultancy, marketing consultancy, etc.

- Economic Consultancy Services: These services include region/area development studies, market surveys, determination of economically viable plants, inter-relationship among real resources etc.
- Management Consultancy Services: These services include manpower planning, material management, computerization, operation research, work study and modernization studies.

#### **1.3.1.2 Spatial consultancy:**

It may take such shapes as consultancy for launching a new product, consultancy for sick units, consultancy for exports etc.

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• Consultancy for Launching a New Product: Identification of project ides is the most critical step in the process of entrepreneurial counseling for industries. Small entrepreneurs, especially those coming from backward areas, face three types of risks: personal, financial and know-how.

### **IN-TEXT QUESTIONS**

- 1. Consultancy may be classified by \_\_\_\_\_
- 2. Management Consultancy Services include manpower planning. True / False
- 3. Management Consultancy Services is include:
  - a) Work study and modernization studies b) Mark
  - c) Region/Area development studies
- b) Market surveys d) Launching a New Product
- 4. \_\_\_\_\_ consultancy for launching a new product.

# 1.4 TYPES OF LIBRARY MANAGEMENT CONSULTANCY

The legal framework for engaging in private practice requires registration with the consultancy company is that the consultant is taken more seriously as a business concern, and government and international agencies are likely to deal more with such companies. Library and Information Science professionals can engage in different types of consultancy services. Some of the most common tasks that library management consultants are:

- Establishment of a library/resource centre from the scratch (e-library or hybrid or manual)
- Re-engineering existing aspects of library services such as automating circulation services
- Implementing new technologies such as a new library management software
- Training/Continuing Professional Development programmes such as "Use of Internet Resources in LIS Services"
- Evaluation of existing services such as reference services, analysis of the collection
- Acquisition of books, equipment and furniture
- Cataloguing, classification and indexing of materials
- Creation of library database, portal, gateway or federated search facility
- Design of Website and creation of Listserv, social networks and other discussion groups
- Development of Institutional Repositories, Electronic Thesis and Dissertations (ETDs), Open Source Systems
- Editorial work & Report Writing
- Publishing and Book sales



- Consolidation of materials especially local publications
- Book indexing, including surveys of users, community, etc
- Knowledge Management
- Solicit donation/low cost books, computers, etc
- Proposal writing, Grant seeking & Fundraising Private, Public Partnership eg to record local history
- Project Management
- Conflict Resolution e.g. between management & staff, communication improved
- Recruitment.

#### 1.4.1 Competencies of Successful Management Consultants

- Listening: Actively hears and clarifies client's needs, as stated in client's own words
- Investigative: Systematically seeks data or information
- Analytical: Examines the data collected to identify sources of variation, solutions, and/or opportunities for improvement
- Action: Implements solutions manages change

### 1.4.2 Library and Information Management Consultant in the Age of Google

Why should a librarian function as a library and information management consultant? Consumers have a financial incentive to act on a management consultant's advice. In purchasing a consultant's services, they have invested a considerable amount of time, staff resources, and money. They expect the advice they receive will be of value and result in a measurable return on their investment. Consumers also invest in library services when seeking an answer to a question. Although their incentives for seeking advice may differ, their motivations usually involve saving time, minimizing frustration, and maximizing understanding. This is especially true in the Age of Google, where tidbits of information can be retrieved at any time, in any location. It is of interest to examine librarians' value to consumers by evaluating the strengths, weaknesses, and opportunities of the profession, and the library as a cultural entity itself. This is especially true as libraries struggle to adapt in an era of rapid, transformative change.

As Google, eBay, Craigslist, and other services have revealed the Internet's remarkable potential for serving the diverse interests of the general public, such an evaluation may enlighten, inform, and provide the impetus for librarians to perceive themselves differently. Demand for library materials in this environment, for example, has transformed, as services such as Google Books have demonstrated their utility by serving both broad and niche interest groups. Web 2.0 technologies have also demonstrated their utility, enabling individuals to Google cannot and will not replace library services. Yes, consumers can obtain some factual information on their own, without library mediation. The sheer amount of information retrieved via Internet searches, however, often intimidates, rather than empowers the consumer. The librarian who both functions as and promotes himself as a library and

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information management consultant is better positioned to communicate her skills as an experienced expert who can seamlessly navigate both the Internet and the library, saving the consumer time and energy by matching him with the desired information regardless of format. Funding instead may be the library's greatest threat for future survival, as funding enables libraries to sustain the innovative services and programs, collections, and facilities that consumer's value. In such an environment, libraries must become more consumerfocused, defining customer needs in customer terms to develop and customize services and market new and existing products. An additional challenge is overcoming our preference for forcing consumers to seek our assistance only after exhausting Internet search options. As noted by Michael Baldwin, "We must stop being enablers for garbage information and become tough-love interveners with real information." In this role, "We need to see our jobs as actually informing people rather than as simply making information available."

#### **1.4.3** Principles and Practices of Library Management

niversit The following skills are required by the library staff:

- Library and information handling skills
- Service orientation
- ICT knowledge skills
- Communication and training skills
- Marketing and presentation skills
- Understanding of cultural diversity •
- Knowledge mapping skills

#### **IN-TEXT QUESTIONS**

- 5. Re-engineering existing aspects of library services such as circulation services.
- 6. Library and Information Science professionals can engage in different types of consultancy services. True / False
- 7. ICT knowledge skills is not required by the library staff: True / False

#### 1.5 **ROLE OF LIBRARIANS IN THE MANAGEMENT CONSULTANCY SERVICES**

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Libraries have traditionally focused on acquiring externally produced work to make available to the local communities. Libraries perform as the connector between information producers and information seekers. This function is performed in two distinct ways:

From information producers, the library takes out the institutional subscription from which materials are distributed to end users. In many cases administrative intermediaries such as booksellers and subscription agents handle the distribution of publications. Through the system the publisher only has to deal with a limited number of purchasers, whereas libraries can handle their acquisitions through a limited number of supplies.

For the end user, librarian is an efficient person to supply relevant publications out of the enormous publications. The librarian acts as a filter to the user to give him/her the information which has the quality and may fruitful to the particular user. The information seekers have no need to keep themselves updated about the information markets and they also need not acquire materials from publishers and producers. This is another facility that users generally get the information in free of cost, whereas library acquires it through library funds.

With the advancement of technology, the academic librarians also will play a major role to provide all types of related information in meeting the user expectations. The roles may be as follows

Librarian will continue to refine their client-centered function as intermediaries and facilitators.

- Librarians can help in the design of technology based information services and share their intimate knowledge of what users want and need. As an example, the users could benefit greatly from database help screens that have been designed with input from library professionals.
- They must collaborate more with personnel from other departments of the institution. There must be a strong communication and an effective partnership between the institution's library and its computing service. Librarians need "technologists" system, computing, network, and other technical expertise, while information technologists can learn much from the library's knowledge of users' needs.

• Librarians need to be polite, friendly and always able to behave in a courteous, patient and tactful manner. They need to give the user their complete attention.

• The main goal of librarians should be to ensure all members of the institution know what information resources are available to them and how the library staff can facilitate access of them, within the physical walls of the library or elsewhere. As users are accessing more and more bibliographic and full-text databases as well as utilizing the vast resources of the Internet from outside the library, librarians will need to reach out to them to offer the help they need.

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- Librarians can request a publisher to test out the produce on a trial basis to make decisions about the appropriateness of an electronic resource for his library. Trails periods help eliminate the guesswork in selection of electronic resources. The other option is to visit or talk to other librarians about how a particular electronic resource performs in their library.
- Librarians must select material according to their users' requirement. Librarians must possess reasonable knowledge of electronic resources and adequate grind¬ing in the techniques of their evaluation and selection.

#### **1.5.1** Basic Skills needed in Managing a Library

Earlier librarians are just considered as the custodian of books and it is said that for managing a library, no professional competencies are required. It is an old concept that libraries have fixed and hierarchical organisational structure, bureaucratic leadership, controlled and centralised decision making, command and control by the administration, guarded and infrequent communication, etc. Modern libraries require librarians to act like managers with appropriate management techniques and principles. A librarian manages a library like any other manager managing his organisation. Thus the role remains the same. Managing a library also requires basic skills as needed in case of any other commercial or industrial organisation. The necessity of general and managerial skills as core competencies of staff for effective management of libraries, flexible and decentralized organisation, with empowered staff having the spirit of team work, interpersonal communication, shared vision, lifelong learning, etc. are obvious. Keeping these changes in mind it becomes essential for the librarian to have expertise and focus on the following areas of management:

### 1.5.1.1 Change Management

Change Management is a systematic approach to dealing with the transition or transformation of an organization's goals, processes or technologies.

### 1.5.1.2 Entrepreneurship

An entrepreneurship is an individual who creates a new business, bearing most of the risks and enjoying most of the rewards.

# 1.5.1.3 Strategic Planning

Strategic planning is a process in which an organization's leaders define their vision for the future and identify their organization's goals and objectives.

#### 1.5.1.4 User Centered Management

User Centered Management is a collection of processes that focus on putting users at the center of product Management and development



### 1.5.1.5 Management of Technology

Management of Technology (MOT) is a field links "engineering, science, and management disciplines to plan, develop, implement technological capabilities to shape and accomplish the strategic and operational objectives of an organisation."

#### 1.5.1.6 Project Management

This project management system helps your engineering team track every initiative. A single system can manage every aspect of every project your engineering team is executing.

#### **IN-TEXT QUESTIONS**

- 8. Libraries perform as the connector between information producers and information seekers. True / False
- 9. MOT stands for:
  - a) Management of Technology
  - c) Project Management

- b) Library of Technology
- d) User Centered Management
- 10. Change Management is a \_\_\_\_\_approach to dealing with the transition.



# 1.6 SUMMARY

Librarians already share a number of competencies and talents as a successful management consultant. Librarian may strengthen his ability to communicate their value by repositioning themselves as library and information management consultants. By approaching reference work from the perspective of a management consultant, Librarian can better help users to recognize the value of the librarian brings to their quest for information. The librarian's role has transformed in the Age of Google. The Internet cannot and will not replace human interaction. Consumers will continue to seek libraries and the individuals who work within them for reasoned advice on locating quality information both efficiently and effectively. The library and information management consultant must proactively seek clients, rather than focusing almost exclusively on making information available in case it is needed in the future. Because great libraries have much in common with great businesses, there should be no apprehension with repositioning reference librarians as library and information consultants. With strategic competitive planning, along with the disciplined allocation of financial, human, and capital resources, a great library will deliver superior



performance that is reflected by measured outcomes, year after year. By thinking and acting as library and information management consultants, librarians will be better positioned to deliver superior results to the communities they serve.

# 1.7 GLOSSARY

**Change Management**: It is a systematic approach to dealing with the transition or transformation of an organization's goals, processes or technologies.

**Entrepreneurship**: An entrepreneurship is an individual who creates a new business, bearing most of the risks and enjoying most of the rewards.

# 1.8 ANSWERS TO IN-TEXT QUESTIONS

1. Two angles	6. a)
2. True	7. False
3. a)	8. True
4. Spatial	9. a)
5. Automating	10. Systematic

# **1.9 SELF-ASSESSMENT QUESTIONS**

- 1. Discuss the Some of the most common tasks for library management consultants
- 2. Discuss the Role of Librarian in the Management Consultancy.
- 3. Write a brief nate on basic skill needed in managing a library.

### **1.10 REFERENCES**

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# **LESSON 4**

# ROLE OF LIBRARY ASSOCIATIONS AND LIS SCHOOLS

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# STRUCTURE

- 1.1 Learning Objectives
- 1.2 Introduction
- 1.3 Library Associations and LIS School
  - 1.3.1 Library and Information Science (LIS) School
  - 1.3.2 National and International Professional Associations
  - 1.3.3 Sub-Section 3

#### 1.4 National and International Associations

- 1.4.1 National Associations
  - Indian Library Association (ILA)
  - Indian Association of Special Libraries and Information Centres (IASLIC)
- 1.4.2 The USA and UK Library Associations
  - American Library Association (ALA)
  - Chartered Institute of Library and Information Professionals(CILIP)
- 1.4.3 International Associations
  - Association of Information Management (ASLIB)
  - International Federation of Library Association and Institution (IFLA)

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- 1.5 Roles and Responsibilities of Library Associations
  1.5.1 Role of Library Associations
  1.5.2 Responsibilities of Library Associations
- 1.6 Summary
- 1.7 Glossary
- 1.8 Answers to In-text Questions
- 1.9 Self-Assessment Questions
- 1.10 References
- 1.11 Suggested Readings

# 1.1 LEARNING OBJECTIVES

Library associations in the foundation on which the structure of the library movement can be erected Information explosion, development and applications of ICTs, changing dynamics of information users, and evolving trends in library and information services have promoted the discussion of continuing education in library and information science. ICTs are increasingly changing the landscape of libraries and challenging the traditional prevailing roles of LIS professionals.

After reading this Unit, you will be able to :

- understand the definitions, aims, and objectives of professional associations and schools of Library and Information Sciences.
- discuss the important role of LIS professional bodies/associations and schools.

# **1.2 INTRODUCTION**

In modern society, library associations are the foundation on which the structure of the library movement can be raised. These play an important role in the promotion of librarianship as a profession vital to an informed and knowledgeable society. Associations and professional bodies are powerful forces representing the tone of voice of the professional community to solve the problems related to welfare, status, working conditions, physical facilities, education and training including research and development activities. The basic



assignment of a library association is to improve, expand and professional knowledge in the library professions, promote and improvement of library services, to promote educational programs and other innovative programs and publications. Although the central purpose of the associations has always been to serve the needs and protect the interests of the community, they struggle to widen the purpose and serve the overall needs of the nation. Library and Information Science (LIS) education in India goes through a turning point and has become a fast-growing subject with a multifaceted strategy.

# 1.3 LIBRARY ASSOCIATIONS AND LIS SCHOOLS

Today it is very important to produce professional, para-professional, skilled library professionals with not only complicated management library policy and planning skills but also proficiency in information and communication technology. LIS education in India rise with a multidisciplinary approach and proved that it is a fast-growing and fast-developing subject and always comes with new and different approaches. It is not only limited to core subjects of library sciences but extended to different other mainstreams, for example, information science, computer science and computer application, research methodology, statistics, management studies, and many more. Professional Associations and LIS Schools are established by and for professionals. Their membership is open to all librarians, library staff members, library and information science teachers, library associations, and even users of libraries (Rai,2017).

#### 1.3.1 Library and Information Science (LIS) Schools

Presently libraries play an important role as a social agency for the growth of modern society. Library and information science is the combination of two terms or subjects a) library science and b) information science. This combination of two subjects was firstly used at the University of Pittsburg in 1964. Then, in 1990 American Library Schools added Information science. After the 1990s library science and information science were developed by many other countries around the globe.

"In India, the Central Library of Banaras Hindu University (BHU) at Varanasi was established in 1917. Before Independence, there were only five universities, such as Andhra, 3 | P a g e



Banaras, Calcutta and Madras offering diploma courses in library science. After independence, some universities, educational institutions and learned societies started their libraries. As a result, the number of LIS schools started to increase.

The University of Delhi was the first university to establish a full-fledged Department of Library Science and started admitting students to the PG Diploma in 1947. In 1995, the diploma was changed to Master in Library Science (M.Lib.Sc). Later between 1956 to 1959, six new LIS departments were established at Aligarh Muslim University, M.S. University of Baroda, Nagpur University, Osmania University, Pune University, and Vikram University. Since the 1960s, the number of LIS departments established has continued to increase" (Rai,2017, Satpthi & Satpathi,2009, pp.68-71).

#### 1.3.2 National and International Professional Associations

Library development is dependent upon professional planning, farsightedness, understanding and involvement. These issues can be managed more effectively by library associations than by individual institutions. Hence, the solidarity of the profession is a prerequisite for working for a common cause and achieving the desired results. "Library associations, if they play their part well, can help in spreading the public library movement in a country and ensure better library service and build up a good image of the profession. They, indeed, assist in the development of libraries and library and information services and also present appropriate proposals to the right quarters. Associations and professional societies are also powerful forces representing the voice of the professional community to solve the problems related to welfare, status, working conditions, physical facilities, education and training including research and development activities. Although the central purpose of the associations has always been to serve the needs and protect the interests of the community, they strive to broaden the purpose and serve the overall needs of the nation"(Goldman,2014,p.ii).





Fig 1.1: National and International Professional Associations

# 1.4 NATIONAL AND INTERNATIONAL ASSOCIATIONS

#### 1.4.1 National Associations

We have historical records of early library associations in India such as the Baroda Library Association (1910), Andhra Desai Library Association (1914), Bengal Library Association (1927) and Madras Library Association (1927). The Indian Library Association was founded in 1933. The post-independence period witnessed an increase in the number of library associations in the country. "At present, many national and state-level library associations. At the national level, we have Indian Library Association. There are also associations devoted to special categories of libraries, subjects, fields and other special interests. For example, the Government of India Library Association, (GILA), Indian Association of Teachers of Library and Information Science (IATLIS), Society for informational Science (SIS), Indian Academic Library Association (IALA), Medical Library Association (MLA),



Society for Advancement of Library and Information Science (SALIS) and Indian Association of Special Libraries and Informational Centres (IASLIC)" (Ranjan & Singh). Some of the state/regional level regional library associations include:

Sl. No	Library Associations	Year	Place
1.	Andhra Desai Library Association (ADLA)	1914	Andhra Pradesh
2.	Maharashtra Library Association ((MLA)	1921	Maharashtra
3.	Bengal Library Association (BLA)	1925	West Bengal
4.	Baroda State Library Association (BSLA)	1926	Gujrat
5.	Madras Library Association(MLA)	1928	Madras
6.	Karnataka Library Association (KLA)	1929	Karnataka
7.	Punjab Library Association(PLA)	1929	Punjab
8.	Indian Library Associations(ILA)	1933	New Delhi
9.	Government of India Library Association (GILA)	1933	Delhi
10	Bombay State Library Association	1935	Bombay
11	Bihar Library Association	1936	Bihar
12	Malabar Library Association	1937	Kerala
13	Assam Library Association	1938	Assam
14	Utkal Library Association	1944	Orissa
15	Travancore Library Association	1945	Travancore
16	Kerala Library Association	1945	Kerala

There are some library associations in India whose contributions to the development of national consciousness are immense and deserve to be remembered by future generations of library professionals. Two associations at the national level are described in the following sections, namely, the Indian Library Association (ILA) and the Indian Association of Special Libraries and Informational Centres (IASLIC).



#### I. Indian Library Association (ILA)

The Indian Library Association (ILA) was founded on September 13, 1933, in Calcutta (now Kolkata). "The first All India Library Conference was attended by intellectuals, educationists, librarians, and eminent citizens of Calcutta. It is the largest professional body in the field of Library and Information Science in the country and also made steady efforts to provide an opportunity for the development of library and information professionals at all levels and all over the country. The headquarters of ILA was shifted to Delhi in August 1964 (https://ilaindia.co.in).

#### a) Objectives of ILA

The main objectives of the ILA are as follows:

- i. "Promotion of library movement and improvement in library services in all its aspectsin India;
- ii. Promotion of library science education and the improvement in the training of libraries in India;
- iii. Promotion of bibliographical study and research in library science;
- iv. Improvement in the status and conditions of services of librarians;
- v. Affiliation of the state and other library associations with the Indian Library Association and cooperation with an international organisation with the same objectives;
- vi. Publication of bulletins, periodicals, books, and so on which will tend to the realization of the objectives of the association;
- vii. Establishment of libraries, documentation and information centres and assistance intheir establishment and working;
- viii. Promotion of appropriate library legislation in India;
  - ix. Providing a common forum to all persons engaged or interested in library and information work by holding conferences and meetings for discussion of professional,technical and organizational issues (Bhatti and Chohan,2012,p.3).

#### b) Major responsibilities are done by ILA

"ILA organised the All India Library Conference every year at different places in the

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country. It also takes some other responsibilities, for example, organization of workshops, seminars, conventions and other activities, which can promote libraries and librarianship in India.

Some of the topics in such activities include:

- o Library Legislation;
- School Children Libraries;
- Library cooperation/ Resource Sharing;
- o Library Personnel; Reading Materials/ Collection Development;
- o Bibliography and Documentation; University Libraries

The Indian Library Association is a member of the International Federation of Library Associations (IFLA) and the Commonwealth Library Association (COMLA). The association hosted the IFLA Conference of 1992 in New Delhi. The Association also drafted Model Public Library Bill and arranged advanced training and internship for Indian librarians with the British Library Association in London" ((https://ilaindia.co.in).

#### c) Publication of ILA

The Association published several publications:

- ILA Newsletter every month to disseminate current information about the latest trends in the field of Library and Information Science
- Journal of Indian Library Association (JILA)
- Proceedings of the All India Library Conferences since 1978
- o Indian Library Directory
- A Survey of Public Library Services in India
- Year's Work on Indian Librarianship
- o 50 Years of Indian Library Association; 1933-1983 and others.

ILA has also introduced many awards for encouraging excellence in professional practices such as:

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- o ILA-Kaula Best Librarian Award
- o ILA- Vendanaikee Fellowship
- o ILA-C D Sharma Award
- o ILA- AG Verghese Award
- ILA-Dr. K Padma Umapathy and Dr S K Umapathy Fellowship in Library and Information Science.
- o ILA-Dr. L M Padhya Best University Library Award
- ILA-S M Ganguly Award

#### II. Indian Association of Special Libraries and Information Centres (IASLIC)

"The IASLIC was founded on 3<sup>rd</sup> September 1955 at the lecture hall of the Indian Museum, Calcutta on initiatives and inspirations of librarians, documentalists, information scientists, scientists and technologists. It is much recognized by professionals in the field. Keeping in view the importance of inter-communication of facts and ideas among scientists, technologists and research workers, and of the collection of specialized information among them" (http://www.iaslic1955.org.in).

# a) Main objectives of the Indian Association of Special Libraries and Information Centres (IASLIC)

IASLIC formulated the following objectives:

- i. To undertake, support and coordinate research and studies.
- ii. Organize general and special meetings, seminars, workshops and conferences at the regional and national levels.
- iii. Publish journals, monographs, manuals, newsletters, papers, proceedings and reports.
- iv. Conduct short-term training courses.
- v. Work together with other fraternal bodies in promoting the interests of the library and information profession.
- vi. Carry out such other activities which are incidental and conducive to the attainment of its objects.

#### b) Major works are done by IASLIC:



"IASLIC has been organizing seminars and conferences in different parts of the country, which are usually, hosted by university libraries, the department of library and information science, institutions, associations, and other information centres" (Parent, 1988 & Pors, 2006, pp.344)). "Discussions in the seminars and conferences included different areas of current issues on Mechanization of Library Services, Training of Special Librarianship in India, Rendering of Indic Names, Bibliographical Control of Special Libraries, Methods of Scientific Communication, Decentralization of Library and Information Services, Users and Library and Information Services, Education for Librarianship in India, General versus Special Classification Scheme, Bibliometric Studies, Marketing of Library and Information Services in India, Document and Data Processing, Problems and Prospects of Library Associations in India, Indexing and Abstracting Services in India, Translation Services, and others". The Association also provided a program titled, "Training in Special Librarianship and Documentation" from 1964 to 1970. The Association also conducted language courses in German, French, and Russian from 1958 to 1963 for translators for special libraries. "The Association is affiliated with the International Federation of Library Associations and Institutions (IFLA) and the International Federation for Information and Documentation (FID) and plays an important role in the international cooperation of the two federations" (Gosh, 2004). The IASLIC Bulletin, its official organ, has been published quarterly since 1956 and is devoted to the advancement and dissemination of the fundamental and applied knowledge of library and information science in an accessible form to professional colleagues who have a common interest in the field in this country and abroad" (http://www.iaslic1955.org.in).

"The IASLIC Newsletter has been a bimonthly publication of the association since 1966 carrying important information and news about the activities of libraries and information services" (Lamptey and Cortetey,2011,p.15). Other important publications include, Directory of Special and Research Libraries in India, Glossary of Cataloguing Terms in (Indian) regional Languages, Education for Librarianship in India; A Survey, Draft General Code for Interlibrary Loan, Methods of Scientific Communication, IASLIC; Perspective, Performance, and Promise-A Silver Jubilee Commemorative Volume, Indexing Systems, and Library Architecture.

#### c) Publications of IASLIC



- o The IASLIC Bulletin (started in 1956) Quarterly
- o IASLIC Newsletter
- Indian Library Science Abstracts (annual)
- Apart from IASLIC Bulletin and Newsletter, it also publishes books, monographs, directories, conference and seminar proceedings, annual reports, etc.

#### 1.4.2 USA AND UK LIBRARY ASSOCIATIONS

Two library associations, one each in the United States of America and the United Kingdom are described in this section. These associations have a long and distinguished record of activities and service and have been pattern setters for the creation of national associations in many countries. The associations described in this section are the American Library Association and the Chartered Institute of Library and Information Professionals (CILIP, U.K.)

#### I. American Library Association (ALA)

The American Library Association (ALA) has the uniqueness of being the oldest and largest library association in the world. It was founded in 1876 with its headquarters in Chicago. "A group of 103 library activists, at a meeting held in Philadelphia in the fall of 1876 to coincide with the nation's centennial celebrations, resolved on a motion moved by Melvil Dewey, the father of librarianship, to form the American Library Association. ALA, thus born, has been a success story of the dedicated efforts of eminent librarians who steered the association in its formative periods, the ALA grew in strength steadily and became even in the early part of this century the national voice for library interests. Today, with a solid foundation, a wide base of expanding programmes and activities and social impact, ALA plays a dynamic role to foster American library interests with great success" (https://www.ala.org).

#### a) Objectives

ALA is an organisation of librarians and libraries having the following objectives:

- i. "Increase awareness and support for libraries by increasing their visibility in a positive context and by communicating why libraries are both unique and valuable;
- ii. Update the image of libraries, librarians and all library staff for the 21st century, sustaining and strengthening their relevance;


- iii. Bring renewed energy to the promotion of libraries and librarians; and
- iv. Bring library messages to a more diverse audience

It also has the following internal objectives:

- i. "Develop a campaign that represents and is useful to all types of libraries;
- ii. Create turnkey tools, resources and materials that could be utilised by all types of libraries;
- iii. Provide an opportunity to share public relations/marketing/advocacy best practices within the library community;
- iv. Tie together ALA promotions into one unified brand, reinforcing key messages;
- v. Quickly respond to emerging issues such as library funding cuts;
- vi. Develop more cross-collaboration across the association to ensure that new Campaign projects and initiatives are inclusive and effective; work more closely with ALA chapters and affiliates to help them achieve their public awareness objectives
- vii. Promote the contribution of all library staff, including both librarians and support staff;
- viii. Seek increased foundation and sponsor funding to expand Campaign activities;
- ix. Conduct public opinion research to refine and expand Campaign messages on an ongoing basis; and
- Increase coordination with other public relations and marketing efforts, such as READ posters, National Library Week, Library Card Sign-up Month, etc" (https://www.ala.org).

# c) Publications of ALA

The American Library Association develops many resources for the library and information services communities.

- o American Libraries, Book List, Book Links
- ALA Tech Source
- o Library Technology Reports,
- Guide to Reference
- o various newsletters, magazines, and journals.



## II. Chartered Institute of Library and Information Professionals (CILIP)

CILIP (The Chartered Institute of Library and Information Professionals) is the leading professional body of library and information professionals in the U.K. "It came into existence in 2002 with the merger of the erstwhile Library Association(U.K.) and the Institute of Information Science. CILIP provides practical support for members throughout their entire careers, helping them with their academic education, professional qualifications, job hunting and continuing professional development.

#### a) Objectives

The CILIP aims at: activism and enterprise to build its community, a strong voice to advance the profession and modern professionalism to develop the workforce.

Its objectives are to:

- *i.* set, maintain, monitor and promote standards of excellence in the creation, management, exploitation and sharing of information and knowledge resources;
- *ii.* support the principle of equality of access to information, ideas and works of the imagination which it affirms is fundamental to a thriving economy, democracy, culture and civilisation; and
- *iii.* enable its members to achieve and maintain the highest professional standards in all aspects of delivering an information service, both for the professional and the public good.
- *iv.* Anyone working with knowledge, information or library services can join CILIP. It has different categories of membership for people of different experience levels from students to fellows. The Council, set up under the Royal Charter, governs the work of CILIP. Its President and Councillors are elected by the membership in an annual election" (https://www.cilip.org.uk). Council is comprised of 12 Trustees elected directly by the Membership. There is a provision for co-opting up to three members.

#### b) CILIP has special interest groups, namely:

o Academic and Research Libraries Group;

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- o Aerospace and Defence Librarians Group;
- o Affiliated Members of CILIP;
- Branch and Mobile Libraries;
- Career Development Group;
- Cataloguing and Indexing;
- o Colleges of Further and Higher Education;
- o Commercial, Legal and Scientific Information Group;
- Community, Diversity and Equality Group;
- o Education Librarians Group; and
- o Government Information Group.

#### c) Core activities of CILIP

"CILIP organises one-day conferences with expert speakers, demonstrations from suppliers of associated technology and unrivalled networking opportunities. It also organises managed events two and three-day conferences, often with associated exhibitions, organised on behalf of CILIP's Special Interest Groups including the biennial umbrella event. Apart from conferences, CILIP In forums are a series of discussion workshops where one can network with like-minded library and information professionals" (https://www.cilip.org.uk). In forum allows face-to-face sharing and collaboration, complementing the online platform of the CILIP Communities.

#### d) Publications of CILIP

• CILIP Update monthly magazine (Print and Digital)

## **1.4.3 INTERNATIONAL ASSOCIATIONS**

## I. Association of Information Management (ASLIB)

The ASLIB (Association of Special Libraries and Information Bureaux) was founded in1924 to coordinate the activities of specialist information services in the UK. "It is presently known as Association for Information Management. "Its members are private and public sector companies and organisations throughout the world, concerned with managing



information resources efficiently. Aslib had Special Interest Groups to cater to the needs of particular subjects/ areas" (Moore, 2006). These have evolved into communities of practice. "The expertise helping and advising organisations, from small and medium enterprises to large corporations and governments, on any of their issues and problems, information management great and small" (https://www.aslib.co.uk).

### a) Objectives of ASLIB

The main objectives of ASLIB are to:

- i. stimulate awareness of the benefits of good management of information resources and their value;
- ii. represent and lobby for the interests of the information sector on matters which are of national and international importance varying from copyright and data protection to the role of scientific journals; and
- iii. provide a range of information-related products and services to meet the needs of the information society

### b) Core activities of ASLIB

To fulfil these roles Aslib has developed four main functions within the association. They are a consultancy, publications, training and recruitment. Consultancy activities drawn principally from the network of leading information professionals range from giving answers to specific questions for individuals or small companies, to "major studies for the British Government, and recommending policies and strategies to the People's Republic of China. Managing Information, the association's colour magazine, is the magazine for everyone who uses information. It combines a successful print magazine with a web-based news service, doubling the impact of the publication. The magazine continues to develop its winning combination of high-calibre features, top-level interviews, analysis and practical solutions all packaged in a readable and attractive style" (https://www.aslib.co.uk).

#### c) Publications of ASLIB

- Aslib titles are produced by Emerald and Europa Publications.
- ASLIB Proceedings: New Information Perspectives.
- Journal of Documentation.



- Library Hi Tech News : incorporating Online and CD Notes.
- Performance Measurement and Metrics.
- Program: electronic library & information systems.
- Records Management Journal

### II. International Federation of Library Associations and Institutions (IFLA)

The International Federation of Library Associations and Institutions (IFLA) is the global voice of the library and information profession and also the leading international body representing the interests of library and information services and their users. "It was founded in Edinburgh, Scotland, in 1927 at an international conference, IFLA celebrated its 75th birthday at its conference in Glasgow, Scotland in 2002. IFLA now has more than 1600 Members in approximately 150 countries around the world. IFLA was registered in the Netherlands in 1971. The Royal Library, the National Library of the Netherlands, in The Hague, generously provides the facilities for the headquarters. IFLA has two main categories of voting members: Association Members and Institutional Members. Associations of library and information professionals, library and information services and of educational and research institutes, within the broad field of library and information science, are all welcome as Association Members. Institutional Membership is designed for individual library and information services, and all kinds of organisations in the library and information sector" (https://www.ifla.org/).

## a) Objectives of IFLA

IFLA is an independent, international, non-governmental, not-for-profit organisation. Its aims are:

"To promote the international support, cooperation, exchange of information, education, research, and development within the scope of the library and information services sector in general. In addition, the Foundation seeks to protect, preserve, and document written and printed cultural heritage and all that is in connection with these purposes" (Lamptey & Cortetey, 2011, p. 17).

In practising these aims IFLA holds close to the following core values:



- "the endorsement of the principles of freedom of access to information. ideas and works of imagination and freedom of expression embodied in Article 19 of the Universal Declaration of Human Rights.
- ii. the belief that people, communities and organisations need universal and equitable access to information, ideas and works of imagination for their social, educational, cultural, democratic and economic well-being
- iii. the conviction that delivery of high-quality library and information services helps guarantee that access
- and the commitment to enable all members of the Federation to engage in and benefit from, its activities without regard to citizenship, disability, ethnic origin, gender, geographical location, language, political philosophy, race or religion" (https://www.ifla.org/).

### b) Core Activities of IFLA

IFLA General Conference and Council has held in August or early September in a different city each year. "More than three thousand delegates meet to exchange experience, debate professional issues, see the latest products of the information industry, conduct the business of IFLA and experience something of the culture of the host country. Issues common to library and information services around the world are the concern of the IFLA Core Activities. Directed by the Professional Committee, the objectives and projects of the Core Activities relate to the Federation's Programme and the priorities of the Divisions and Sections. One, ALP (Action for Development through Libraries Programme) has a very wide scope, concentrating on a broad range of concerns specific to the developing world. The others cover current, internationally important issues: Preservation and Conservation (PAC), IFLA- CDNL Alliance for Bibliographic Standards (ICABS) and IFLA UNIMARC. The Core Activities are each managed by a Director, who reports to the Executive and Professional Committees. Profession and Related Agencies with generous initial funding from the Danish government, the City of Copenhagen, and the Danish library community, IFLA's office for Free Access to Information and Freedom of Expression (FAIFE) were established in Copenhagen in 1998. It has a steering committee made up of professionals from around the globe. FAIFE reports to the Executive Committee. Also reporting to the Executive Committee is the Committee on Copyright and other Legal Matters (CLM). A

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range of professional meetings, seminars and workshops are held around the world by professional groups and core Activities" (https://www.ifla.org/).

### c) Publications of IFLA

The results of the programmes developed by IFLA's professional groups are recorded and disseminated in the publications.

- IFLA Journal (Quarterly)
- o IFLA Metadata Newsletter
- The biennial Council Report (records IFLA's achievements)
- o The IFLA Professional Reports series
- Proceedings of the IFLA/UNESCO pre-conference seminar on public libraries and Guidelines for easy-to-read materials.

#### d) Awards for Excellence

IFLA offers the following awards and fellowships/ prizes:

- o Dr Shawky Salem Conference Grant
- The MargreetWijnstroom Fund for Regional Library Development
- o Jay Jordon IFLA/OCLC Early Career Development Fellowship
- o IFLA International Marketing Award
- Guest van Wesemael Literary Prize.

#### e) IFLANET

The website IFLANET has rapidly become a prime source of information not only about IFLA but also on a broad spectrum of library and information issues. It is hosted by the Institut de l'Information Scientifiqueet Technique (INIST), France.

# 1.5 ROLE AND RESPONSIBILITIES OF LIBRARY ASSOCIATIONS

#### **1.5.1 Role of Library Associations**

Professional issues that have far and wide-reaching concerns cannot be handled by an individual or a single institution. Collective action by an interested group is necessary. 18 | P a g e



Professional associations serve as a forum for collaborative and coordinated efforts of individuals and groups. Library development is dependent upon professional planning, farsightedness, understanding and involvement. These issues can be managed more effectively by library associations than by individual institutions. Hence, the solidarity of the profession is a prerequisite for working for a common cause and achieving the desired results. The strength and effectiveness of professional associations reflect this solidarity. Library associations, if they play their part well, can help in spreading the public library movement in a country and ensure better library service and build up a good image of the profession. They, indeed, assist in the development of libraries and library and information services and also present appropriate proposals to the right quarters. "Associations and professional societies are also powerful forces representing the voice of the professional community to solve the problems related to welfare, status, working conditions, physical facilities, education and training including research and development activities" (Dasgupta & Sapathi,2006, Biswas & Dutta,2017, Gosh,2004, Sapathi & Satpathi,2009). Although the central purpose of the associations has always been to serve the needs and protect the interests of the community, they strive to broaden the purpose and serve the overall needs of the nation. "Associations gain significance as society advances in science and technology, complexity and scale and hence their study is becoming part of a study of social change. In the contemporary situation, due to rapid social change, associations are important as a means of organising people to achieve new ends. They are also of great significance to the professionals in that they reveal cultural values and goals that the members themselves alone are unable to formulate. Another important aspect of rapid social change is the way new forms of organisations create new roles and relationships" (Sapathi & Sapathi, 2009, p. 272).

Library associations are established with the following aims and objectives:

- i. To herald the library movement in a country to spread knowledge and information and ultimately contribute to human resource development;
- ii. To work for the enactment of public library legislation, drafting of the bills along progressive lines and based on sound principles; to make the people library conscious so that they demand the right of access to public library services
- iii. To mobilise social pressure for the healthy development of library services;



- iv. To strive for the evolution of an integrated national library and information system based on a national policy, and bring to the attention of the authorities the deficiencies, defects, and so on in the existing library infrastructure;
- v. To provide a common forum for library professionals to exchange information, ideas, experience and expertise, and work for the betterment of salaries, grades, service conditions, status, and so on of library professionals;
- vi. To hold the image of the library profession high in society, and promote cooperation among libraries and library professionals;
- vii. "To share resources and avoid duplication of efforts; and
- viii. To contribute towards manpower development for library and information work by organising education and training programmes, and promoting research, incentives, awards and rewards, and so on.

### 1.5.2 Responsibilities of Library Associations

Library associations undertake many important programmes and activities which vary from association to association. These associations interact with concerned governments from time to time, using every conceivable opportunity for the sound development of a library system in the country. These tasks are done by advising, representing and helping in drafting legislation, formulation of policy statements, guidelines, and so on. Library associations undertake various activities and programmes, such as:

#### I. Conferences

Organising conferences, seminars, lectures, and so on to offer opportunities for library professionals to meet, discuss, and exchange information, ideas, experiences and expertise. Association also helps in providing an opportunity to establish a network of fellow librarians.

# II. Library Publicity and Advocacy

Organising library week, exhibitions, book fairs, competitions, etc. for promoting library consciousness and reading and learning habits among citizens. Library associations also play a vital role in the greater visibility of libraries and librarians.

## III. Service Conditions



Taking up with the management at all levels, through appropriate means, the issues relating to improvement of salary grades, service conditions and status of library professionals and also help in the recruitment of library personnel.

## IV. Education

LIS associations conduct training courses that are necessary to supplement university education in library and information science as well as continuing education programmes for working professionals. Associations also function as accrediting bodies to maintain standards in library and information science education. They also institute awards and rewards to recognise the outstanding performance of the professionals and library systems.

## V. Publications

Library associations publish professional literature like professional journals and newsletters as well as ad-hoc publications such as proceedings, directories, catalogues, bibliographies, course manuals, textbooks, reference books and others.

## VI. Standards, Services and Research

Library associations are involved in:

- Formulating standards, guidelines, codes and manuals concerning practices, procedures, techniques, tools and equipment, is a step towards fostering cooperation among libraries.
- Undertaking bibliographical projects on their own and through outside contracts.
- Contribution of advisory and consultancy services.
- Undertaking research surveys of library facilities and services, user demands, learning and reading habits, book production etc. to identify strengths and weaknesses to take necessary steps to improve the system.

## VII. Ethics

Library associations formulate codes of ethics for library professionals to set high values in conduct and service.

## VIII. Cooperation

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They establish cooperation with international and national associations of other countries having similar objectives" (Biswas & Datta,p.7). They maintain a connection with the book and publishing trade for attending to mutual problems in library acquisitions.

# 1.7 ROLE AND RESPONSIBILITIES OF LIS SCHOOLS

Libraries are an essential social organization for the development of academic society; the importance of their role is being increasingly realized. To fulfil the expectations, libraries must be developed along proper lines. "The essential role of the library is to encourage students, teachers, researchers and faculty members for reading and create an educational environment. The library invites all who enter its house for reading and it is the best path for changing our blind beliefs" (Rai,2017,p.69, Lacy & Copeland,2013p.136).

LIS in the Indian educational system, creating new interdisciplinary courses and teaching new methods of providing information services. At present, the following LIS courses are available in India and all over the globe:

- Certificate course in Library and Information Sciences
- Diploma in Library and Information Sciences
- o Diploma Courses in Health Sciences Librarianship
- Diploma in Digital Library and Data Management
- o Diploma in Information Technology
- o Diploma Archives and Documentation Management
- Bachelor of Library and Information Science
- Masters of Library and Information Science
- o Post Graduate Diploma in Library Automation and Networking
- o Doctor of Philosophy in Library and Information Sciences
- o D.Lit.in Library and Information Sciences

In this modern era of information LIS, professionals think globally and act locally and admire other opinions and suggestions. provide easy access to information to users available in various electronic forms and formats.



# 1.8 SUMMARY

Library Associations are learned bodies which foster a spirit of public service among their members, promote library services, protect the interests of their members and build up the image of the library profession.

ILA, The main aim of IASLIC, ASLIB and other library associations is to conduct conferences, seminars and short-term training courses almost every year and try to cover the new trends in their conferences. These associations do not just give their comment on problems, but also try to take proper action to solve the problem. As such, the development of the nation through library services is neglected in some states, and its services are beyond the reach of the rural poor. Library associations encourage library professionals for joining associations and build relationships with other professional bodies. They also establish proper communication and understanding among all library associations and work for a common objective for the betterment of libraries and librarianship. Library associations must be serious to save the honour of professionals. They should solve the job-related problems of library professionals.

## 1.8 GLOSSARY

Collaboration: It is a working practice whereby individuals work together for a common purpose to achieve benefit.
<b>Consultancy:</b> Expert advice that somebody is paid to provide on a particular subject.
<b>Objectives:</b> Some specific, goals, and aims to be achieved for a purpose.
Official Organ: A journal, newsletter or other publication representing a special group.
<b>Profession:</b> The body of a person engaged in an occupation, requiring extensive education in a branch of science, arts and so on.
<b>Programme:</b> A coordinated group of think to be done or performed.
Standard: It is a type of Model, Guide or pattern for guidance.



# 1.9 SELF-ASSESSMENT QUESTIONS

- 1. Mention the core aims and objectives of the Library Associations and LIS Schools.
- State the core activities of Library Associations and LIS Schools on the National And International Levels.
- 3. Write down the main objectives, and core activities of the Indian Library Association (ILA). Name the publications of ILA.
- 4. State the main objectives and core activities of IASLIC.
- List the main objectives and core activities of the Indian Library Association (ALA).
  Name the main publications of ALA.
- 6. State the main objectives and core activities of CILIP. List the educational activities of CILIP.
- 7. List the main objectives and areas of training offered by ASLIB.
- 8. Write down some specific activities and publications of IFLA.
- 9. State the role of LIS Schools and courses offered in LIS.

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