Chapter-IV

EVOLUTION OF INFORMATION PRODUCTS & MANAGEMENT
4.1. INFORMATION PRODUCTS

In libraries and information centers, the products usually consist of the materials and services provided by them to its users. These products include books, periodicals, literal programmes, bibliographies, annual reports, report archives, Specialty report archives, statistical surveys and compilations and services like CD-ROMs, online / offline information retrieval services, OPAC, E-mail, CAS and SDI.¹

Over a period of time, the product’s life will naturally decline. This characteristic feature of the life cycle of any service or a product makes a need to evaluate regularly the materials and service in libraries to determine their status of use. The success of a product or service depends not only on its quality and design but also on the usability by its users. The focus of this chapter is to evaluate the information products and services offered in the university libraries (Rajyalakshmi and Waghmare, 2004)²

4.2. DEFINITION OF INFORMATION PRODUCT

The term “inform” originally meant, “to give shape to” and information is to shape the users who get it, to make some difference in his outlook or insight.

“Information products” refers to electronically deliverable knowledge based products. The electronic information products are available in the form of CD-ROM, DVD or floppies and also available through Internet and Online databases. The information products contain originally the published information in an electronic form or information

76
originally published in print form and then made available electronically (Rajashekar and Kumbar, 2004).³

“Information, which can be stored, accessed and transmitted through electronic gadgets is called electronic information resources” The term ‘electronic’ is referred to the media in which information is stored and retrieved.

With the development of Information Communication Technologies (ICTs), many of the popular information sources like encyclopedias, dictionaries, bibliographies, multimedia presentations and their back volumes are available much more cheaply in the electronic format. The spread of electronic information resources and electronic publishing on the one hand and the Internet spreading information world - wide on the other have revolutionized the use of electronic information in all spheres of human activity. (Breeding, 1999)⁴

4.3. EVOLUTION OF INFORMATION PRODUCTS

In olden days, the information was stored in manuscripts and kept in Guru Kula Ashram libraries run by the saints. Later print media has come after invention of the printing machine. By means of printing press the information is explored to all over the world. The print media information in the form of books had come in force after invention of paper by Chinese in 13th century. The information products include books and other print material appeared in the 19th century.
According to Ramesh Babu (2004) the world has experienced two revolutions viz. the industrial revolution and the information (technology) revolution in the 20th century due to evolutionary changes in the field of Information technology. Tremendous growth and diversification of knowledge have emerged with multidisciplinary subjects. Information has been identified as one of the vital resources needed for the success in almost every major human endeavor. Collection, organization and dissemination of information system with economy and efficiency depend on the skills and expertise of the librarians. Information is needed in all aspects of society and in all disciplines. Users demand information i.e. timely, accurate, valuable, up to date and quickly available.

Figure: 4.1.

Evolution of Information Storage Media
Explosion of information all over the world necessitate people invent to new methods have to manage the vast information. In fact, people have invented new methods to compress the information in size with huge storage capacity and transmit it at faster. This leads to evolution of new products of information (storage media) as shown in figure 4.1. The need to micro-reproduce was seen as a way to save precious shelving space, to preserve and protect essential information and to process information. Microform, videodisc and CD-ROM technologies are more convenience to the readers and libraries.

Breeding (1999)\(^6\) stated that many an information products have migrated away from CD-ROM to Word Wide Web. This does not mean that the libraries have withdrawn CD-ROMs from their collection sources. Further, CD-ROMs and DVD-ROMs will play a key role in information storage in future.

Libraries are fast becoming bi-focal. They no longer supply books alone and are becoming information centers and supply information instead of books. The format of documents has been changing. The handwritten and print media are replaced by the electronic and optical disc which includes CD-ROMs, Audio, Video, Cassettes, are occupying dominant place in libraries.

The reading habits of users of the University library are also undergoing changes greatly. Multimedia products are making inroads into libraries and information centers. The storage media for information are
fast changing in a fascinating manner from print media to film media; micro-film/micro-fiche media to magnetic media; magnetic media to electronic media; electronic devices to optical media, optical media to Web media, Web media to further (what next?).

- Print media (Papers, metal sheets other hand materials)
- Film media (Magnetic tapes, drums)
- Electronic media (Floppy, hard disks, microchips)
- Optical media (CD-ROM, video disks, CD-WORM, CD-I)
- Web media

4.3.1. Print media

The invention and subsequent rapid development of laser printing has been changed the environment of print media. Information technology for speedier information transfer and dissemination process has been improved with suitable software and word processors which allows the users to produce high quality publication at low costs with a greater accuracy. DTP provides more extensive and sophisticated features than conventional word processing systems enabling the production of documents of good quality.

4.3.2. Radio and audio-cassette

Earlier, radio was used as a mass media for broadcasting news, features and entertainment. With network of radio stations, music and special programme package materials are now produced for a specific
group of people. It has given rise to music industry, records, and audio cassettes. This sound recording becomes a big industry. Recorded lectures and interviews in tapes and cassettes are available in many areas. They are at cheapest cost of information to be used at convenient time.

**4.3.3. Film media**

The latest format to enter into arena is electronic. It is usually used with a computer system or in association with a telecommunication with a telecommunication system. Magnetic tapes in digital computers were used for secondary storage medium purpose. By mid-1960s magnetic disks and magnetic drums also appeared for fast data processing. In 1970 floppy disks also were used.

Motion pictures are mostly used for entertainment purpose. Video cameras capture the important moments on a tape or a film; thereby make them permanent record for future viewing. With TV and pay cable TV, viewers can see them at their places.

**4.3.4. Slides**

Slide tape and multi-image programmes are more useful in education and motivation. The ready made multi-image programmes and materials widely available for users using. Such materials allow users for extend retention.
4.3.5. Microfilm/Micro-form

Micro-form is a generic term identifying visual information originally in paper form which can be reduced photographically. Under this format, films, aperture card, micro opaque, micro-fiche and microfilm are formed. They are tough and durable; are important for preservation of fragile materials. They save the cost of maintenance a lot.

H P Luhn developed microfilm in 1961 which is not for high compact storage, but it can photographically record either exact or graphics with a resolution quality equivalent to 600 dpi. The life of microform is about 50 years. Microfilm images are not machine searchable and require serial searching technique which hampers optimum retrieval and access. Even then microfilm will continue to be used in the future for applications requiring compact high quality storage and retrieval of both text and graphics. Following World War 2, the use of microforms as information sources and storage devices is widely used by libraries. Microforms come into two formats- roll or flat. Microfilms are more popular for reproduction of large documents such as newspapers. Duplication from master copy is inexpensive whereas in film rolls, master copy is expensive. Different microforms need different types of readers/equipment to make use of them. The uses of microforms are: 1) they save space, 2) increase access and 3) Preserve fragile items too. Thus, there is saving in collection development and maintenance as also in document delivery costs, for, document duplication and mailing are inexpensive.
4.3.6 Electronic media

Technological developments in printing and communications brought into existence a variety of electronic media making the world a Global village. Another non-paper and print form experimented with in libraries was videodisc. These laser discs of video clips, sound recording, maps, and texts are multimedia presentations of information. Video communication is the latest audio-visual electronic media. By the late 1970s video recording and playing apparatus vigorously marketed. The portable video cameras have changed the meaning, the cost, the production, the speed and the presentation of programmes. The distinction between video recording, television and cinema of late had become blurred. Video provides freedom to viewer to select his programmes as per his needs. These programmes could be music, poetry, songs, lessons or any other privately recorded material. Now the optical media is widely used for compact storage and speedy dissemination of information in text, audio, video form to the needy around the world. The characteristics of electronic documents of information differ greatly from those of paper documents.

- Electronic documents can be used without knowing where it is stored geographically.
- Several people can use online electronic media at the same time.
- Easier to copy and download those in user file.
- Less bulky than the paper documents.
- Very flexible; easier to receive, rearrange, reformat and combine them with other documents.
- Material is highly changeable e.g. stock market price, train/aeroplane schedule, exchange rates of currency, it is easier to update them.
- Reduces the work of manipulation in arranging bibliography which can be arranged alphabetically, or chronologically, subject wise.
- Electronic form is very useful and fast in doing the work of scanning of names/words/phrases in preparing statistical analysis of words.
- Electronic format is very useful in rapid communication of information for getting military and weather information

### 4.3.6.1. E-book

An e-book is an electronic form of a book, usually a parallel publication of a print copy, but occasionally ‘born digital’. Generally, e-books refer to products that appear as single titles, and in terms of subject matter these are usually as fiction or textbooks.

In selected areas, particularly literature, texts have been converted into machine-readable form for research purposes. All classical Greek texts and increasing number of medieval and modern literature texts are already available in electronic form. *(Jonson, 1994, p.71)*

According to *Arms (1999)*, the development of making high quality facsimiles of deteriorating library books. They can be accessed across the Internet and the entire or part of the book can be printed on demand. Technology already exists for copying microfilmed materials into electronic digitized form.
4.3.6.2 Electronic Journals

Any journal that is available over the Internet can be called an ‘electronic journal’. Electronic journals are simply electronic form of a journal.

4.3.7. Shared Catalogues

These are machine-readable catalogues. Automation of catalogue started in 1963. Library of Congress carried out MARC Pilot Project in 1966. MARC format was standardized in 1968 and MARC II operational distribution service started in 1969. These formats have been accepted internationally as International Standard Bibliographic Description [ISBD]. MARC has led to greater standardization of cataloguing records. It is based on Anglo American Catalogue Rules. There are now national MARC formats includes UK MARC, for the United Kingdom and INTERMARC for France.

Shared and multiple institution catalogues contain the information about books and journal holdings of several libraries. These are easier to use and allow user to search a document through every searchable element such as author, title, year of publication, publisher. They promote resource sharing among a group of institutions/ libraries. The Internet which is a linkage of regional supercomputer networks around the world provides any institution/ person that is connected with it. Through this, it is access to records of several library catalogues scattered around different countries and permit readers in one library to search catalogues of remote
institutions, and send their requests for borrowing of literature through their libraries. Hence, they are termed as gateways to other libraries.

4.3.8. OPAC

The Online Public Access Catalogue [OPAC] can be accessed through Internet. The OPAC system is transparent, user friendly, menu driven environment and is easier to use. This is more powerful than the card or microform catalogue. In a way, the National Union Catalogue [US] is available online.

4.3.9. Optical media

A media on which information is recorded, stored and read with the help of laser light, with a view to increase its storage capacity is called optical media also called compact medium. It offers very high recording densities than the magnetic media. Optical storage systems use laser to record information. The characteristics of optical media can be broadly categorized into two groups: (I) Read-only optical disks, and (ii) Read/write optical disks. Read-only optical disks contain pre-recorded information where as the read/write optical disks are blank and permit direct recording of information by the user. Read-only optical disks can be further divided into two groups: (I) based on video disk technology, and (ii) based on compact disk technology.

4.3.9.1. Optical Video Disk System

They contain television images and the recorded signal from the variation in light intensity as the laser strikes pits in the surface of the
videodisk. The organization of optical video Disk system is presented in Fig. 4.2

**Figure. 4.2**

**Organization of Optical Video Disk system**

4.3.9.2 Digital Optical Disks

These hold digital information and employ lasers both in recording and reading. A wide range of digital optical disk is available.

4.3.9.3 Audio Compact Disks

These are high quality alternative to records and cassettes. Compact disks are made to a standard specification (12 cm). The audio information is digitally recorded.

4.3.9.4 CD-ROM (Compact Disk-Read Only Memory)

Optical technology has opened up a new method of data storage and retrieval for libraries. CD-ROM technology entered libraries in the form of
multimedia resources such as encyclopedia, information banks like census materials, bibliographic electronic retrieval databases and other information forms. CD-ROM is an acronym that stands for Compact Disc Read Only Memory. It is an optical disc of 120 mm diameter and a hole of 15 mm at the centre with a storage capacity of over 500 megabytes which is roughly equal to 250,000 pages of text or 1500 floppy disc or 50 hard discs. It is a branch in the optical disc family tree. It is the most existing technological development to affect information specialists since the advent of online systems in the early 1970s. CD-ROM was launched in 1984 at the peak of the micro-computer revolution. CD-ROM is optical based medium used for storage of data. CD-ROM technology democratized online searching by eliminating the mediator and passing the cost on to the institution. Full text on CD-ROM also helped to overcome the problem of novice bibliographic users not finding materials because of binding, re-shelving, or non-subscription. Though a mastering process, data are encoded on an optical disc; later the data are read back using a CD-ROM drive. Normally a CD-ROM product consists of the database, which resides on the CD-ROM and software instructs the computer how to access the information. CD-ROM has obvious advantages over other media for data storage and retrieval. It has the following features;

- Large storage capacity
- Computer based information delivery system;
- Read only medium and;
- Mass-produced economically
4.3.9.5. WORM Disks (Write-Once Read Many)

The drawback of CD-ROM was overcome by the innovation of read/write technique of an optical disk. But again the bottle-neck was, the user could write information only once. This technology came to be known as write once read many (WORM). Information once recorded on WORM cannot be erased nor re-recorded.

In the rewritable disks, image systems were limited to mainframes. WORM optical disks are best for high access. They are most cost effective alternative for a growing number of information management environments and often provide the most efficient solution at the lowest cost. WORM disks provide fast turn around increase security over magnetic tape storage and enormous space efficiencies over both tape and paper. Optical discs, optical tapes and optical cards offer higher storage capacities than magnetic ones. CD-ROM format provides speed of publication, access and delivery and is the best suited to databases which are frequently searched.

4.3.10. HYPERTEXT AND HYPERMEDIA

Ted Nelson coined the term “Hypertext” in 1965. Since then, the idea was idle but it has been put to reality recently.

A hypertext system allows authors or groups of scholars to link information together. Using a computer based hypertext system; scholars can quickly follow trails of footnotes, and related materials without loosing
their original context. Thus scholars are not required to search through library stacks to look up reference books and articles.

4.3.11. DVD

DVD is an acronym that stands for Digital Versatile Disk. It has changed the entire environment of information products and huge storage capacity with high quality picture. DVD-ROM, the designated follow-on to CD-ROM currently holds 4.7 GB per disk. It is mostly used for games and entertainment media, but some reference titles have been issued on DVD-ROM. Rewritable products DVD-RAM and DVD+RW are emerging. DVD is a disk-based medium with the same 12-cm. diameters as CD-ROM. The new disks are not read in today’s CD-ROM drives, only in new DVD drives, but these new DVD drives also read CD-ROMs. Like CD, DVD is being sold to the consumer and computer markets.

The consumer version is used to distribute videos and audio recordings. Its main benefits to the consumer are higher image quality than VHS: clearer, more lifelike sound: and the ability to jump quickly from point to point on the video with no delay. A single device can play music and videos. The monetary advantages to film studios are also great: lower replication costs and fewer international versions. DVD holds up to eight dubbed languages sound tracks and 32 subtitle tracks and can play NTSC, PAL, and SECAM formats from a single disk. DVD copy protection also discourages small-scale bootlegging. DVD replaces CD-ROM in all
aspects. DVD-ROMs will still have an important part to play in the future.

**TABLE 4.1**

**READ-ONLY DVD MEDIA**

<table>
<thead>
<tr>
<th>Medium Capacity (GB)</th>
<th>Slides</th>
<th>Layer per side</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVD-ROM (current) 4.7</td>
<td>Single</td>
<td>Single</td>
<td>Read-Only</td>
</tr>
<tr>
<td>(Future) 8.5</td>
<td>Single</td>
<td>Double</td>
<td>Read-Only</td>
</tr>
<tr>
<td>(Future) 9.4 (4.7x2)</td>
<td>Double</td>
<td>Single</td>
<td>Read-Only</td>
</tr>
<tr>
<td>(Future) 17 (8.5x2)</td>
<td>Double</td>
<td>Double</td>
<td>Read-Only</td>
</tr>
</tbody>
</table>

The table 4.1 shows that the storage capacity of different DVDs. DVD storage capacity is much more than (nearly four times) the capacity of CD-ROM, because it stores information in much compact way, i.e. its hole size much smaller than CD-ROMs. As per as the amount of information storage is concerned, it is cheaper than CD-ROM, even the individual disc cost is more. The computer versions of DVD will hold the capacities shown in Table “Read-Only DVD Media”

**4.4. Symbiosis between CD-ROM and Microform**

- The huge storage capacity, compactness and robustness of CD-ROMs suggest that the technology is superior to microforms and magnetic media.
- Microforms are documents storage medium. Searching there is boredom. CD-ROMs are searching medium as well as storage media.
- Getting hard copy from an original microform is awkward and time consuming. Printing from optical disc is fast
- Microforms require their own dedicated hardware; whereas compact discs share most their hardware with numerous other applications.
- Microforms and their equipment are unfriendly to users. There is a great deal of evidence of user resistance to microforms. CD-ROMs are easy to use.
- The microform industry lacked sufficient technical standards. The developing international standards in the case of CD-ROM are hopeful.
- CD-ROMs are inexpensive when compared with costs of books and serials.
- Optical discs will require limited space and many users can use them at a time from different terminals.

4.5. TYPES OF INFORMATION PRODUCTS

Generally information products include all books, journals, reports, reference resources, and newsletters available in printed form. In the Internet context, term refers to “electronically deliverable-based goods” and also “digital goods” or “Knowledge based goods”\textsuperscript{10} Such goods that disseminate the knowledge and then creators can supply it to its users with an easy access mode can be considered an information products. The following are the information products:

4.5.1 Books

- Anthology: collection of selected literary pieces or passages or works of art or music.
- Reference: a work containing useful facts or information.
4.5.2. Periodicals

Publications released on a regular basis that may include news, feature articles, poems, fictional stories, or other types of writing. Many periodicals also include photographs and drawings.

4.5.2.1. Scholarly journals

Those periodicals with a more narrow audience, such as publications of scholarly magazines, can be termed scholarly journals.

4.5.2.2. Magazines

Periodicals that are aimed at a general audience, such as weekly news roundups or monthly special interest publications, are also called magazines

4.5.2.3. Newspapers

Newspapers are periodicals; the term has come to refer to publications other than dailies. Historically, most periodicals have different from newspapers in their format, publication schedule, and content. Most of the newspapers deal with news of the day and are issued on pulp paper with large, unbound pages. By contrast other type of periodicals focus on more specialized material, they deal with news and tend to do so in the form of summaries or commentaries. These periodicals printed on finer paper than newspapers, with smaller bound pages, and issued at intervals longer than a day [weekly, every two weeks, monthly, quarterly, or even annually]. With growth of the Internet, the meaning of newspaper has been changed. Publishers began to release newspapers and other periodicals on
line. This development blurred the line between the two forms. Because the general format design of online newspapers and periodicals are similar.

4.5.3. Non-print materials

The information acquired through images, audio/video tapes and wireless sets can be called non-print materials. These include;

- Television
- Film/micro-films/micro-cards/Video
- Radio/Audio Tape Pictures
- Maps, Atlases and gramophone records.
- Internet:

4.5.4. Online Databases

The stored information on CD-ROM can be accessed on networks are called online database. CD-ROM can store about 650MB of data and has a life span of about 100 years. They are now available on all subjects. Some of the important CD-ROM databases are;

- AGRIS for agriculture sciences
- BIOSIS for biological sciences
- INSPEC for physics and engineering
- COMPENDEX for engineering
- MATHSIC for mathematics
- GEOREF for earth science
- MEDLARS for biomedicine
- ERIC for education
4.5.5. Websites

World Wide Web also had a huge impact on mainstream periodical publishers. Websites became popular; the largest periodicals began to publish accompanying online version, usually charging nothing for access.

4.5.6. E-mail

It is an Electronic mail. It is unstable information product. As 21st century dawned, another new type of periodical developed as people continued to adapt to new technology- electronic newsletters. These are distributed by e-mail, usually to individuals who voluntarily registered to receive them. For this e-mail software is deigned, which helps to send and receive e-mails. Outlook Express, Eudora are some of the well known e-mail software. This software has additional features to edit the letter, before connecting to Internet. This saves the time of Internet Account.

4.6. CHARACTERISTICS OF INFORMATION PRODUCTS

In order to be useful for decision making and to meet the end users satisfaction, information products needs to have certain characteristics such as:

4.6.1. Accurate information

This refers not only to the question “are all the ‘facts’, true? But, it is even more important when the information is in the form of estimates, opinions, and judgments. Obviously, in these cases one cannot be 100% sure of accuracy, and most think about them, for example, the adequacy or otherwise of the sample in cases or survey information; the dependability
of the person giving the opinion or judgments; how reliable are the statistical methods that might have been used to produce the information.

4.6.2. Up to date information

This might seem obvious for everyday use but, it is something that requires a lot of thought and effort if it is to be achieved in knowledge information systems. If a database is not properly designed, then information can easily get out-of-date.

4.6.3. Timely information

This is one aspect of information modern IT can really make a difference. In the days when library databases were maintained manually, it just might have been impossible for a librarian to obtain a weekly, or even monthly, utilization of resources, or it would have been uneconomical to have them produced manually, so some decisions may have been more guesswork that careful analysis. Now, provide data is entered into the system at appropriate times, and then the librarian as well as users can obtain all sorts or analytical information more or less instantly.

4.6.4. Complete information

Information should be complete and comprehensive based on most current research data available, using sources that carefully examine many aspects of concerns. It should be drawn from sources having a background of knowledge in relevant information and citations should be complete and the sources of information fully identified.
4.7. INFORMATION PRODUCTS AND SERVICES

Electronic information in the new era is changing the duties and services in all fields of library. The use of Internet and the power of search engines have changed the role of libraries and its services radically.

Kuzilwa. Matilda S (2003) discussed the role of libraries in universities and what type of management style can facilitate the effective achievement of that role and some challenges in the management of libraries are identified including resource, fiscal and physical constraint.

The entire information is available on web with customized form. Elsevier Science products and services currently offered on the Web. The usefulness of Hypertext Markup Language [HTML] for World Wide Web authoring in libraries and information centers to enrich the quality of information service rendered to their users was discussed in CALIBER 99.

Thompson Laurie L (2004) described that electronic products and their accompanying licenses have become the norm in most health sciences libraries and consume large amounts of a library’s budget. Careful thought and advance planning will result in products and agreements that will best serve the library and its users.

A library has to recognize the importance of their products and services and it must emphasize the basic needs of customers to be served. The basic products of Library and Information Science are information based products but not the physical form of books, journals, electronic
diskettes. Therefore, library must define their products such as information, knowledge, and ideas are achieved. The products are measured in Library and Information Centers and organizations, on the basis of quality of services, they offered to a targeted community. Following are some of the possible “information products and services” offered by different type of Libraries and Information Center:

- State—art reports;
- Reviews;
- Current Content files;

Distribution well designed informative and printed pamphlets; specially prepared package of information for special groups of users;

- News letters/bulletins/brochures;
- Profiles of specialists;
- Charts, Globes;
- Compilation of need based bibliographies;
- Web services and Home page designing;
- Compilation of Indexes and Abstracts;

In house generated Information products e.g. Local Directories, Profiles, Product; and consolidated and repackages of Information.¹⁴

4.7.1 Internet as a tool for Information Services

Internet is short form of International network and it is also known as Information Super Highway. In other words, internet is the high-speed fiber-optic network of networks that uses TCP/IP protocols to interconnect computer networks around the world, enabling users to communicate via e-
mail, transfer data and program files via FTP, find information on the World Wide Web, and access remote computer systems such as online catalogs and electronic databases easily and effortlessly, using an innovative technique called packet switching.

Internet is a storehouse of information. It is an outcome of changes in computer and communication technologies. The concept of ‘library without walls’ has almost become a reality. There are dozens of resource locators called as search engines like catalogue in the libraries. These conduct key word search and act as a subject index to the ‘Net’ resources. The rich resources on the Internet are beneficial to all educational endeavours-supporting teaching, research and other academic activities in higher education (Biradar, 2006). The advantage of Internet for information professionals when compared traditional, online databases and CD-ROM databases are a mush user potential, inexpensive and speedy communication with many databases.

4.7.1.1 A Brief History of Internet

The Internet began in 1969 as Arpanet, a project of the U.S. Department of Defense. It now has hundreds of millions of regular users worldwide. In all over the world, 35% of the total population uses Internet (Curtin, D.P).

The U.S. Department of Defence started the experiments on Internet after invention of the computer. In 1957 they started an agency for research in this area, called Advanced Research Projects Agency (ARPA). The common language for information exchange is known as TCP/IP.
(Transmission Control Protocol / Internet Protocol). In 1983 ARPANET recognized TCP / IP and all other network systems connected to the ARPANET used this. All these networks together later became INTERNET. In 1985 the Foundation Net was formed and it became a milestone in the history of Internet. In due course of time, there was phenomenal growth in the use of internet through out the world (Biradar and others).\textsuperscript{17}

4.7.1.2 Components required working Internet

Personal computer, modem and Internet connection is required to use Internet. Node, Router, DNS server, Gateway, TCP/IP, FTP, Telnet, HTTP and IP Address are the key components to work Internet with high speed and control.

4.7.1.3 Searching the Internet for Information

Any one gets information from the Internet through websites. Search engines help to search for information when the website address is not known. They keep a directory of the website. Presently, in the Internet there is no provision to get details of all available websites. Thousands of websites are added daily to the Internet. This makes search engine an Internet tool to access information from the Internet.

Search engines do not store the information. But they keep the details of the websites containing the information and act as a link to the required websites.

4.7.1.4 Browsing

One can visit a website or send an e-mail, using the Internet. Software used for browsing is Internet Explorer, Netscape Navigator, Neoplanet etc. To visit a website one has to load the browsing software and enter the address of the website ones like to visit. The person using Internet must be aware of browsing Software.
4.7.1.4.1 On-Line Browsing and Off-Line Browsing

The search through a website is made with the help of Internet is called on-line browsing.

After using Internet with the help of Internet Explorer, even disconnect Internet, it is possible to search through the pages, which are already open. This is off-line browsing. During browsing, the Internet Explorer “saves” the files, which have already opened. This makes it possible for off-line browsing.\(^\text{18}\)

4.7.1.5 Services available in Internet

Information more than any library is available in Internet. It is the best media to advertise the details of the products and services of business people. Moreover one can send letters and other information all over the world in negligible cost.

4.7.1.5.1 World Wide Web

It is the network of different database servers established throughout the world forming a World Wide Web facility to get information and to communicate with other computers with an Internet connection. In short World Wide Web is the collection of all types of information stored in millions of computers connected to the Internet. It brings information on screen with graphics, texts, sound and animation.

4.7.1.5.2 E-Mail

E-mail is one of the most useful services available in Internet. E-mail provides the facility to transfer the typed information, messages from one computer to another.

4.7.1.5.3 FTP. (File Transfer Protocol)

The facility of transferring files from one computer to another computer with Internet connections is called FTP. The FTP sites, which predate the Web and offer interesting free files to copy (download). Free
files offered cover nearly anything that can be stored on a computer includes software, games, photos, maps, art, music, books, and statistics.

4.7.1.5.4 Telnet

Telnet is a program or command that allows you to connect to remote computers on the Internet using a user name and a password.

Using this facility one can operate a remote computer through one's own computer when both the computers have Internet connections. This is also known as ‘remote login’. It is very useful for pursuing large databases at universities, government agencies, or libraries.

4.7.1.5.5 Internet phone

This facility allows making STD, ISD calls at local rates.

4.7.1.5.6 Web TV / Radio

This is the TV transmission or radio relay through Internet.

4.7.1.5.7 Web Camera

While one talk using Internet, a web camera is used to display the face of the other person in our computer screen. This method of communication is video conference.

4.7.1.5.8 Chat

One can communicate with people from different parts of the world at the same time through this facility.

4.7.1.5.9 Newsgroups

A newsgroup is an electronic bulletin board on which users conduct written discussions about a specific subject.

This facility allows the exchange of ideas, information and knowledge with others or to have a discussion forum through Internet (Williams Brain, K and Sawyer).19

4.7.1.6 Website
Website is a facility to provide information to the world. World Wide Web keeps all websites together. Once a website is created (with the information about a person or about a business) this information can be accessed by all have Internet connections. Moreover all the websites will have a unique address eg. www.malayalamanorama.com.

4.7.1.7 Search Engines

A piece of software which is used to search for information from the Internet is called search engines. By topic, search engines allow you to find specific documents through keyword searches and menu choices. The search engine searches through all the websites and creates an index of the information of the websites. Robot, Web Wanderers and Spiders are some of the search engines. The index created by these search engines will be very huge. There are many search engines in the Internet which differ in their functions. Some search engines will index only the types of websites and some others index the first few lines also which means the mode of functioning of search engines differ. With Netscape Navigator, Internet Explorer or using any other Internet browser, the browser can enter into any search engine. In every search engine, there are different modes to give subjects for search. Open text are other search engines which are commonly used. Media finder and Medical matrix are used to search on particular subjects.

4.7.1.7.1 Definition

According to Bran (2003)\textsuperscript{20} “A search engine enables a user of electronic data resources to quickly locate the specific information desired from within a large volume of mostly unrelated extraneous information.”

4.7.1.8 Internet for University Library Services

Another aspect of Internet is: its use for research workers, the students and teachers of the university.
4.7.1.8.1 for Students

A number of new topics are added in the curriculum of various courses. Such as ERP, TQM Information technology is coining new terms very rapidly. Latest information on these areas can be searched and used for study. A printout can also be taken for personal use/record.

4.7.1.8.2 For Research worker

To conduct literature search on his topic of interest or of writing a paper by a Teacher /Scientist in the university/R&D Organization.

4.7.1.8.3 for Teachers

For teaching a subject, information is available in form of Frequently Asked Questions (FAQ) wherein short answers to Questions in the Question Bank of a subject are available. Updates are also available using different search enquiries.

4.7.2 Database - Definition

A data base is an arrangement of data that makes it easy to locate specific pieces of information. A phone book is a good example of a database.

4.7.2.1 Data Base Terminology
It is often convenient to arrange this sort of data in tabular form. A computer display the data both ways as forms showing one record at a time, with one form for each person, or as a table or a table showing many records at a time, with a column for the name, a column for the address, and so on. So the data for each person can be listed on one line. When the data is arranged as a table, each column represent a field, each line represents a record and the table as a whole represents the file.

Databases strive to achieve comprehensiveness in coverage, mainly in term of a wide variety of printed publications in major languages of the world. Databases such as SIRS, Inc. provided, in full text form, carefully selected articles on social controversies from general interest and scholarly journals. The full text was helpful to smaller libraries that could not grow in space and maintain deep periodical collections.

4.7.2.2 Types of data bases

Databases can be classified according to their coverage

- Databases of international coverage
- Databases of national coverage

4.7.2.3 To set up an online databases host

Such host can be used through local terminals attached to the computer on which the database is mounted or through remote terminals.
linked to the host computer system by appropriate tele-communication lines. To set up an online host for 6 major databases CA-SEARCH, BIOSIS, INSPEC, COMPENDEX, MATHSCI, and GEOREF will require a computer facility with suitable hardware and software that can handle 40 to 50 GB data for stand by. Software for online access will need to handle use validation, search cost calculation, billing.

4.7.2.4 Selective Dissemination of Information [SDI]

It is also a bibliographical database which regularly alerts scholars for their current research activities world wide. It is for online searching through telecommunication links, for retrospective searching. These services could be provided in batch or online mode.

4.7.2.5 Electronic Databases

Electronic databases are the most important and highly used electronic media among the LIS professionals for information retrieval purposes.

4.7.2.5.1 Types of Electronic Databases

They are of two types: Off-line systems and online systems. In off-line systems, the information is stored in mainly CD-ROMs where as in on-line systems the information is stored in the main frame to be distributed and made available at the local computers through networks like the Internet.

4.7.2.6 Database management system in University Library

Effectiveness and efficiency are becoming more important for university libraries due to the decrease in financial resources and the transition to a market economy. The university library of the future as an integrated information center, working as the center of the university network, supporting learning, research and teaching, with emphasis shifted
to the user and the quality of services (Rajashekar and Kumbar, 1997).21

Siddiqui, M. A. (1995) stated that a database management system developed in the Reference and Information Services of the King Fahd University of Petroleum and Minerals Library, Dhahran, Saudi Arabia, using an IBM PC AT. The objective of creating the system was to gather, manage, sort and manipulate, efficiently and quickly, online search statistics. In addition, it reduces time spent on record keeping and maintaining statistical and financial data of online searches (Jonson, 2001).22

4.7.3 CD-ROM, Paper media and online - offline: A Comparison

The increase of supply of online databases never replaces the conventional printed books. But it was felt that the days of printed material were over. Later when CD-ROM came similar ideas about both printed and on-line media were pronounced. With the advent of Internet especially the hypertext based World Wide Web; great expectation arose foretelling the future belonged to that new media alone. The main type of media on which information available is: Printed information media, Electronic information media, online accessible databases, CD-ROM database and World Wild Web.

The commercial online service providers are facing a time to improve the competitiveness of the online services with CD-ROM and Internet; they have developed more efficient search tools which could attract users. Online service providers are not able to compete with the high speed and efficient search mechanisms of CD-ROM and low cost Internet databases.

4.7.4 CD-ROM vs. Paper Media

Paper form is the least expensive media but on the other hand the cost of CD-ROM is declining secondly, the full text applications of
CD-ROM. Even now in the Health Science there are so many publications which are available on CD-ROM only.

4.7.5 Online vs. CD-ROM Databases

It is obvious that the charges for online databases are unaffordable for libraries in the developing countries and also telecommunication facilities in the developing countries are very expensive. CD-Rom databases can be a substitute for online search because it provides easiness to massive amount of well indexed information without telephone links and relatively very low cost. An increasing amount of data is now in CD-ROM format and it is important that the intermediaries should make maximum use of it.

CD-ROM media has increased in the market in the late 1990’s. With the great multimedia growth for the network; CD-ROM will be medium for archives (dictionaries, encyclopedias, newspapers, periodicals etc.) and even as a back up for electronic documents on the WWW. CD-ROM will continue to perform as an effective portable medium of information that can be distributed at low and that will continue to be widely accessible on a wide variety of computer hardware.

4.8. INFORMATION PRODUCTS AND SERVICES OFFERED BY DIFFERENT TYPE OF LIBRARIES

Library and information centers are such an organization where product is measured on the basis of quality of library services offered to a target community. The following products/services offered by library and information centers are

- Physical information products/services (Books, Journals, and Bibliographies)
- Electronic information protectiveness (Diskettes, CD-ROM)
Online information product/service (LAN, OPACs, Internet)

Online and Offline services made the library staff to be more responsible in finding the right information to their readers. They need to keep themselves abreast of the developments in the field (Breeding, 1999).

University Library services are the supreme activity to attract the attention of the user community. The commitment of the university library is to promote the higher education under congenial conditions. Hence it is essential on the part of technical people to evaluate and access the usability of the resources and the cost of the manpower in managing library activity.

Libraries and Information Centers are offering the Knowledge products and the services. These are varying from library to library. The aim of University libraries has always to fulfill the research objectives and ambitions of student’s scholars and staff. There is a shift from traditional library services to digital library services in order to satisfy growing and varied needs of clientele. Digital libraries cater to the information needs of researchers in specific fields of specialization.

Table 4.2 shows the different types of Libraries and Information Center rendering the knowledge products and services. 

23

24
## TABLE 4.2

**DIFFERENT TYPES OF LIBRARIES AND INFORMATION CENTER RENDERING THE KNOWLEDGE PRODUCTS AND SERVICES**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Academic Libraries</th>
<th>Special Libraries</th>
<th>Public Libraries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Document copy supply</td>
<td>Indexing and abstracting services</td>
<td>Bibliographical services</td>
</tr>
<tr>
<td>2</td>
<td>Bibliographical services</td>
<td>Translation service</td>
<td>Exhibitions</td>
</tr>
<tr>
<td>3</td>
<td>Literature search</td>
<td>SDI</td>
<td>Organizing Colloquia</td>
</tr>
<tr>
<td>4</td>
<td>Photocopy service</td>
<td>Current content</td>
<td>Continuing Education Programme</td>
</tr>
<tr>
<td>5</td>
<td>Online services</td>
<td>CD-Rom Databases</td>
<td>Adult Education Programme</td>
</tr>
<tr>
<td>6</td>
<td>CD-ROM database</td>
<td>Information Consolidation</td>
<td>Organizing Cultural Programme</td>
</tr>
<tr>
<td>7</td>
<td>Reference service</td>
<td>Information repackaging</td>
<td>Newspaper Clippings</td>
</tr>
<tr>
<td>8</td>
<td>Interlibrary loan</td>
<td>Reprography service</td>
<td>Slide shows</td>
</tr>
<tr>
<td>9</td>
<td>Current Awareness Service</td>
<td>Document Delivery Service</td>
<td>Children film shows</td>
</tr>
<tr>
<td>10</td>
<td>Referral service</td>
<td>Virtual Information Centre Service</td>
<td>CD-ROM Database searching</td>
</tr>
<tr>
<td>11</td>
<td>Technical inquiries</td>
<td>Electronic Library Service</td>
<td>Community Service</td>
</tr>
<tr>
<td>12</td>
<td>OPAC</td>
<td>Document Exchange Service</td>
<td>Document Supply Service from Microfilm</td>
</tr>
<tr>
<td>13</td>
<td>Internet Service</td>
<td>Knowledge Management</td>
<td>Lectures by Philosopher and Philanthropists</td>
</tr>
</tbody>
</table>

### 4.9. INFORMATION PRODUCTS AND MANAGEMENT

The reason is obvious. Every organization has objectives or goals. A system or tool which can utilize its resources effectively and fully to achieve its pre-determined objectives is called Management. In fact, it was there at all the times in different forms in different organizations.\(^{25}\)
Information products and services are time sensitive and intangible. They must be used fast and be targeted to the end users, particularly for quick assimilation. Therefore, products and services have to be promoted continuously through advertisement. To promote such Information Products and services, there is a great in need of management. With the advent of full text information products and services in electronic form, feedback from end users through analysis of log files could become a powerful management tool both for librarians and publishers too.  

Enormous changes have been happening in every field in world so also in information product management in library. Information product management requires librarians to deal with information not just as a set of objects or artifacts such as data or files, but also a process that extend from information identification [sensing] collection and organization through its processing, maintenance and use. The basic idea underlying this process is that information product has a ‘life cycle’ from creation through use in decision making and subsequent disposal that librarians need to capitalize on their information potential value. Management of the information product life cycle requires librarians to appropriately plan budget to evaluate and use information products expeditiously and exhaustively.

4.9.1. Information life cycle

The following figure 4.3 shows the six phases of the information life cycle as the base of information management practices model. The purpose of the life cycle is to improve the ways. Information is used for decision
making by users each phase is dependent on the last. Sensing information from outside on market shifts, users needs and new technology changes influences information collected by establishing information needs. Collecting new information needs not only prevents information overload, it also determines how a librarian organizes, indexes and classifies information and links databases to promote access and use by it users. Organizing information properly enables librarians to process information for different decisional contexts.\textsuperscript{27}

**Information Life Cycle**

| Sensing | Collecting | Organizing |

4.3. Figure shows the process of information

This process of the information life cycle is a continuous valuation of information at each phase of the life cycle. At sensing phase people use cognitive judgments about information resources whether potentially collectable information will satisfy a new or unanswered problem or decision benefits received from the collecting of new information phase, whether the decisional benefits received from the collecting of new information are worth the associated cost of its collection. At the recognizing phase whether appropriate data structures standards and routing can be established to help ensure information can be used process decision. At the processing stage, the information collected and organized
satisfies analytical and decision needs. At the maintenance phase, whether information should continue to be stored and updated in anticipation of future use.

The concept, marketing is usually applicable to the as to Library and information centers to disseminate its services to satisfy user’s needs through predetermined coordinated plan and activities.

Library and information centers are such an organization where product is measured on the basis of quality of library services offered to a targeted community. The following are the product/services offered by library and information center;

- Physical information products/services (Books, Journals, and Bibliographies)
- Electronic information protectiveness (Diskettes, CD-ROM)
- Online information product/service (LAN, OPACs, Internet)

Internet, majority of the users of the University Libraries are aware of the developments in Internet, Most of them can browse through the various search engines to find their required information. This has made the library staff to be more responsible in finding the right information to their readers. They need to keep themselves abreast of the developments in the field. Library service is the supreme activity to attract the attention of the user community. The commitment of the university library is to promote the higher education and it is essential on the part of
technical people to evaluate and assess the usability of the library resources and the cost of the manpower in managing Library activity.²⁸

The present electronic era is influencing the corporate culture and the methods of working of the personnel including the librarians and the managers of information centers in India and abroad. The librarians and the managers of information centers are also actively engaged to re-orient their efforts and implement information technology in their respective institutions depending upon the availability of resources at their disposal. Automation of library can influence on the functions of library. Impact of electronic information, the concept of a library being only a storehouse of books has now changed. Consequently in an academic organization, a university library is not considered a center for the creation and recreation of information products and services. Its research activities contribute significantly for achieving academic excellence in a university. This fact has brought a major shift to the responsibilities of the libraries to engage to house the collection. Further it provides routine services to the end users and generates financial resources for their respective institutions. The library moves from collection management to content management. In the traditional sense the collection management is to manage the information in their physical form at document level. Librarians are now focusing on capturing, organizing manipulating and accessing information more effectively by implementing information technology as an intermediary between the products and users of information resources.
4.9.2 Preservation and Life-cycle Management of Electronic Information Products

Preservation is the activity of keeping something safe from harm or danger. Preservation is the indisputable means of assuring the availability and access to knowledge for present and future times. Preservation criteria for electronic information are more complex and less straightforward than for paper publications though some basic considerations will remain the same in both electronic and print media. Issues that might be considered in the long-term preservation and life cycle management of digital information products includes:

- **Legal restrictions**: Include national security, privacy, and various intellectual property rights, similar to the paper paradigm. A prominent difference may arise with regard to sorting out intellectual property rights in hybrid digital information products, which might integrate dozens or even hundred of sources.

- **Cost**: The cost arises in evaluating and managing the digital information, as well from the technological infrastructure.

- **Documentation/metadata**: Documentation also referred as metadata, is especially important for scientific data and other mysterious information products that require some auxiliary explanation to facilitate their use. Digital data that are so lacking in documentation that even an expert in the same discipline is unable to understand them are obvious candidates for the trash bin, unless their originator
can be found and persuaded to make them intelligible. The physical separation of explanatory documentation from the data themselves should be avoided.

- **Quality control/quality assurance:** It is another retention criterion that needs to be considered in whether to preserve an information product. One method appropriate for both paper and digital information is peer review. In contrast to paper products, however, electronic information may become corrupted due to technical deterioration or anomaly, or through the intentional or accidental introduction of errors as a result of use. Making quality control for electronic in format is difficult and some time problems such as viruses are not readily apparent and may lie dormant until some future point.

- **Provenance/authority/authentication:** Provenance and authentication have parallel importance for both paper and digital forms, but pose more problems in the electronic context. As in the case of quality control, the original and authentic version may be difficult to ascertain, and fraudulent or illegal modifications can be made that are difficult or impossible to detect.

- **Other context-specific issues:** Issues that might be considered in purging or deeper archiving of documents include:
  
  - Physical condition
  - Cost
• Use history, and again

• Other context- issues

The implementation procedures for retaining and purging documents are also likely to differ from the paper model. Digital information products are more voluminous, varied, and complex than their paper counterparts, and therefore require a broader range of expertise for their proper evaluation and become more labor intensive and costly to screen. 29

4.10 CHALLENGES IN DIGITAL PRESERVATION

Digital preservation raises challenges of a fundamentally different nature, which are added to the problem of preserving traditional format materials. In the preservation of digital materials, the real issue is technological obsolescence. Technological obsolescence in the pre-digital era had merely to worry about climatic control and the de-acidification of books, but the preservation digital information will require digital libraries to constantly come up with new technical solutions

While considering digital materials, there are three types of ‘preservation’ methods:

4.10.1 Preservation of storage medium

Tapes, hard drive and floppy disc have a very short life span when considered in terms of obsolescence. Though the data on them can be refreshed, refreshing is only effective as long as the media are still current.
The media used to store digital materials become obsolete in anywhere from 2 to 5 years before they are replaced by better technology. Over the long term, materials stored on older media could be lost because there will no longer be the hardware or software to read them. Thus, libraries will have to keep moving digital information from one storage medium to another.

4.10.2 Preservation of Access to Content

This form of preservation involves preserving access to the content of documents, regardless of their format. However, while files can be moved from one physical storage medium to another, what happens when the formats containing the information become obsolete? One solution is data migration – that is, translating data from one format to another to preserve the user’s ability to retrieve and display the information content. However, data migration, besides being costly, also lacks any approved standards, and distortion or information loss is inevitable every time data is migrated from one format to another.

4.10.3 Preservation of Fixed-media Materials through Digital Technology

This involves the use of digital technology as a replacement for current preservation methods, such as microforms. Again, there are, as yet, no common standards for using digital medium as a preservation medium. It is also unclear whether digital media are as yet up to the task of long-
term preservation. Digital preservation standards are needed to consistently store and share materials preserved digitally.

4.10.4 Challenges of Preserving and managing Digital information

Preserving electronic documents or digital objects, stems from the nature of the objects themselves. Unlike non-digital formats includes books, magazines, manuscripts, microfilms or digital objects are accessible only by using combination of computer hardware and software. This hardware and software can become obsolete with new technology. Therefore, ensuring ongoing access requires synchronization with technology changes and moving digital objects from obsolete to current file formats, storage media, operating systems and so on. A number of other technical, social and legal issues add to the difficulty of the task. Some of these:

- The rapidly increasing number of digital objects and proliferation of document standards and formats;
- The increasing complexity of digital objects [incorporating text, images, audio, video in various formats] and their increasing software dependence [Storage in database];
- The lock of planning to incorporate preservation needs in systems and lack of availability of off-the-self products supporting preservation needs.
- The lack of consideration of long –term access requirements when creating digital products;
• The absence of widely accepted standards which will assure seamless access.

• Copyright/intellectual property rights that may interfere with the ability to preserve digital objects through systematic copying.

• Unstable storage media [diskettes] whose life span is limited and its data recovery are uncertain.

• A lack of technical expertise in preservation standards and techniques.

• An emphasis on the creation and/or acquisition of digital material in an era of Diminishing resources, rather than ongoing preservation and access to existing electronic holdings.\textsuperscript{30}
REFERENCES


7. INDIA. Caliber 99; *Proceedings* of the Sixth National Convention (Ahmedabad) for Automation of Libraries in Education and Research. 18-20.


10. INDIA. Caliber 99; Proceedings of the Sixth National Convention(Ahmedabad) for Automation of Libraries in Education and Research. 18-20; February.


12. CALIBER 99; *Proceedings* of the Sixth National Convention (Ahmedabad) for Automation of Libraries in Education and Research. 18-20; February.


17. Biradar, op.cit. p. 278.

18. ibid., p.282.


20. ibid., p.72.


