ROLE OF INFORMATION IN THE TWENTY FIRST CENTURY

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INTRODUCTION

Social commentators and observers of the changes in modern society are continually amazed by mounting evidence of an incredible increase in the information that flows through society [1]. One of the most striking characteristics of a developing society is the sense of information consciousness that permeates throughout the populace of the society. They realise the importance of rapid and smooth access to the information for material and moral advancement. The rapid diffusion of electrical devices of radio, TV, computer is taken as the most impressive evidence along with cable TV, home video recorders and computer terminal of the information explosion which is a characteristic of the 20th century. In this context reprography plays an important role in providing information to the society through its various processes. Every day, there is a huge proliferation of literature gushing out of the press continuously, which poses several problems for every library to organise and preserve the published literature. But the literature needs to be organised rather scientifically.

The published material containing the thoughts of saints, philosophers, poets, scientists and technologists is coming everyday in abundance. The contents of the printed literatures should be organized scientifically in order to make the best use of it. Reprography through microforms comes to solve the problems of storage. In this direction the contribution of electronic machines also can not be belittled.

INFORMATION EXPLOSION

This is an age of information explosion. The driving forces such as the remarkable progress made by science and technology during the last 150 years, the popularisation of political institutions throughout the world and education in all section of the society, the introduction of speedy means of communications like telephone, radio, TV and supersonic jets etc., change in research pattern (i.e. parallel research, team research and relay research), the competition in trade and industry among various nations, Green Revolution in a developing country like India, the epoch making events like Bolshevik Revolution in 1917, the World war I and world war II, the advancement in printing technology and paper making etc. were the sources and impetus for out pouring of information. The 'knowledge explosion' has obvious influence on the research activities in the country.

The information explosion that is taking place is staggering. Information explosion means the proliferation of ideas or creation of new information. To give a rough estimate about the number of documents generated in a year, there were approximately 6 million papers and articles published in the year 1980 alone in various branches of science and technology. Added to this is the famous law of Derak-de-Solla Price that the publications are doubled in every ten years. A situation can well be imagined during the 2000 AD, when there will be approximately 24 million publications and if each paper runs for approximately 10 pages and for each such paper, 10 copies are maintained, there will be more than 2 billion sheets of paper for storage [2]. This huge production publications make information explosion a reality and some experts call it the 'Information Deluge'. It is, therefore, difficult for any agency to maintain most of the literature that is being produced from different parts of the world due to the limitations in funds, storage capacity and the methods of processing and retrieval of documents.

It may be mentioned here that by 2000 AD, in the countries like USA and Japan, the printed documents in libraries, particularly special libraries would be replaced by cassettes, magnetic tapes and other terms of non-print media and the homes
and the offices of the users will be inter-linked with each other through computer terminals.

If the implications of 'information Explosion', are considered, it is seen that there is no 'explosion' in the process. The 'explosion' creates chaos and destruction. Information growth has not caused any chaos or destruction but has revolutionised the techniques of library science by the challenges posed by it. Hence it may not be incorrect to redesignate this phenomenon as 'information Revolution' or 'Second-Generation-Documentation' [3].

WHAT OF INFORMATION?

Information is a message communicated by a communicator to a receiver. Information is also the product of human brain in action. It may be abstract or concrete. When a person begins to think, a variety of images and sensations flash through his mind which make some information to accumulate in the mind and his memory retains these pieces of knowledge. A close analysis of the variety of experiences gained by a person would reveal the relationship of these units with associated ideas. Different persons may derive a different set of experiences over the same units of thought and these experiences on identical units of thought remain isolated and less valuable if the individuals do not share their experiences [4]. The individual subjective knowledge of each person is transformed into objective knowledge by each individual's public expression via speech, writing, etc., or on being shared. Objective knowledge is publicly observable by all and comes very near to the concept of information [5].

CHARACTERISTIC OF INFORMATION

Information basically acts as a trigger to set a human being on an action plane. Information may be compared to kinetic energy which moves things while the recorded knowledge of a human being may be compared to potential energy which provides the reservoir. Obviously, all other things remaining equal (namely, resources, competence, opportunity, knowledge, etc.), it is the information that makes one human being more advance than his counterpart. Though information is a very important resource, it can be treated at par with other resources such as, men, machines, materials and money (the 4 Ms). The principal reasons for this are:

- information provokes one-upmanship;
- information is volatile;
- all information is not public;
- it is difficult to price information products and services;
- management of information is rather complex.

INFORMATION - AN INDISPENSABLE RESOURCE

For socio-economic development, information is an indispensable resource. The supply of correct and precise information in time helps the policy makers in making maximum use of the available resources as also in avoiding duplication of work. Similarly, a research and development programme can be accomplished successfully only if the required information becomes available as and when it is needed. Without proper and complete information, no worthwhile decision can be taken. In fact no progress is possible without the support of information [6].

Since the progress of every type is linked with the availability of right information at right time, access to it and its timely dissemination are of vital importance. There should be no barriers restricting this free flow of information.

INFORMATION RESOURCE

The information resources consist of

(a) documents, printed and non-printed, audiovisual, graphic, archival and the like;
(b) indexes, abstracts, state-of-the-art reports, numerical data, statistical surveys and tables, etc. and
c) generated and processed data [7].

There has been tremendous revolution in the printing technology and at the same time non-print materials like microfilms, microfische, films, television, gramophone records, videotapes, cassettes etc. and these have been recognised as useful sources of storage and dissemination of the information.

Information is a vital corporate resource of which potential return on investment has not been achieved until now. Information is national intellectual resource - most valuable of all resources - since it can control physical resources of every kind. Both developed and developing nations recognise that scientific and technological information constitute most valuable instrument for economic and social development.
CURRENT TRENDS IN PRODUCTION OF INFORMATION SOURCES

Computers were first introduced to information sources in the early 1960’s for the production of abstracting and indexing journals. Once in machine-readable form, files of bibliographic information were made available for searching, first in batch mode and eventually in interactive mode. Since then, the database services have been considerably enhanced to become the systems as known today [8].

Impressive as the application of computers and electronics to the primary literature is the state of the art of automated search through the secondary literature, the collection of citations, the abstracts and indexes that tell the searcher what information exists and where to find it. Without the help of the indexing and abstracting services the path of direct access to the primary literature in most of the professional fields would be impossible to traverse.

The abstracting and indexing services provided through MARC (Machine Readable Catalogue) project at Lockheed is one of the major commercial information retrieval systems in the United States. The machine search epitomizes the current offerings of high technology to the information world.

IMPACT OF TECHNOLOGY

Since Gutenberg first printed from movable type, technology has been the handmaiden of those institutions devoted to the printed word. Today electronics and communications have so extended the range of words and thoughts, in print and in audio-visual forms, that the very word ‘information’ has become an abstraction whose roots and bounds no one fully comprehends [9].

The impact of technology includes the introduction of

a) Computer
b) Micrographics
c) Telecommunications
d) Audio-visual media

Computer

Outstanding among others, the computer technology has received widespread attention in the last decade. The effective computer based information systems are not only limited to transformation, storage and retrieval functions but also include the mechanism for control of various other components of the information system.

At present the computer device is at the core of both the information revolution and the post-industrial society. Computer acting like a fast giant brain has significant and potential impact on data handling, acquisition, processing, storage, retrieval and dissemination, and their consequent role in aiding decision making, planning, problem solving, etc. and in development - catalysing activities in government, business, industry, research and other sectors. Alongwith the above usefulness, the decreasing cost and the increasing power of the device make it more popular and the main driving force in the new ‘information age’.

Micrographics

Primary to the success of business is productivity. In highly competitive world of today, time means more than money. Inefficient information flow costs a company more than just losing man hours. It increases operating costs, decreases production, and lessens the profit opportunities. ‘Micrographics’ can help in systematically organising the information flow in a business environment and to find the information when ever one wants it.

The paper explosion has created the greatest problem in the information society of today. The 20th century produced a large number of information and data and most of it is on paper. Information need to be compiled, evaluated, retrieved and disseminated for effective use. Magazines, books, product catalogues, trade literature, inventory, customer billing, production and maintenance records, etc. make up for this huge mass of information. Banks, insurance companies, hospitals, personnel and accounts departments, manufacturing firms, R & D organizations, drawing office, libraries and information centres are the places where this problem of ‘Information Management’ is alarming. It is high time that some solution was found to tackle this problem of ‘Information Management’ in a scientific manner. The ‘micrographic system’ plays an important role in preserving the valuable records at the minimum space.

Micrographic technology has been improving steadily over the past decade and the systems can now interface with computers to store and generate information on demand automatically. Today, microforms are used to provide secure, compact, reducible, accessible and economical
records management systems. Microfilm offers tangible solutions to any business which must maintain records economically and retrieve them very fast. The micrographic technology is here and it's shaping the way we handle information today and tomorrow [10].

**Telecommunications**

Telecommunications has grown out of all recognition during the first half of 20th century and has entered very deeply into the lives of the people particularly through the telephone and broadcasting services [11]. Telecommunications cover all types of communication, including television data, teletypewriter, and facsimile.

With the increased concentration of population in large metropolitan regions, more efficient means are being sought to provide the data requirements envisioned in the future. One result could be that with a computer terminal shopping, banking, and other services are carried out at home in a routine. Widespread use of cable TV would provide an alternate, wide-band communications system in each home, parallel with the telephone system. All kinds of data and picture services could be provided via such a system. All the activities, professional, social, shopping, business and educational could be conducted from inside the home. Public service communications of various types - fire, police, education, health, transportation - are commonly carried out separately in urban areas [12].

**Audio-Visual Media**

This type of communication includes illustrations, charts, pictures, maps, slides, film strips, video-tapes, and a variety of microforms. The audio-visual materials could be effectively deployed along with the oral communication in order to enhance the effectiveness of the communications. The audio-visual not only provides the required information but also it gives fun and entertainment.

The commendable developments in the fields of computer and telecommunication technology including satellite communication, photo-composition, printing and micrographics, have the major impact on huge mass of information resources [13].

Newspaper libraries which till recent times were facing the problem of storage of a huge number of newspapers, are now able to store them on compact reels. The papers of the whole year can be recorded on only five to six reels and can be made available to the reader through the microfilm reader.

According to Lancaster, in the year 2000 AD, "every scientist will have an on-line terminal in his office. Perhaps he will also have one in his home. The terminal will likely to have some form of video display to receive information and some form of key-board to transmit information. The video display might consist of a CRT device, a plasma panel, or some other display mechanism yet to be invented. The key-board may be only one of several communication devices available with the terminal. Some form of communication may be achieved by light pen, by finger touch, or other mechanism". In addition, a portable terminal may be available to be carried home and around when travelling. Portable one would be a lightweight typewriter device. The scientist will use his terminal in a routine manner to input, transmit and receive information. Perhaps this may not be true for India in a very near future. However, we might reach this stage a little later.

The keynote address delivered by Dr. Daniel Bell in Boston meeting published under the title "Welcome to post-industrial Society" has emphasised the impact of technology on information science on three different stages upto the present time, i.e. pre-industrial stage, industrial stage and the post-industrial stage of society.

In the pre-industrial stage as defined by Dr. Bell, the information was based on the natural sources obtained by the human being directly from the nature. These resources were exploited by mankind for day-to-day use by manual labour, power of wind and water.

In the Industrial Society this was replaced by machine oriented technology by means of gas, electricity, etc.

Finally, considering the post-Industrial Society as "Information Society", the results were properly utilised by the people in all spheres of their life [14]. It will also be possible to make available the contents of the books in a number of libraries on computer readable media. A compact disc can store as many as 50 books or as much data as 11000 floppidiscs can accommodate. The application of fibre technology to the present system of communication will revolutionise telecommunication system.

Conferences and conventions may be organised on television which does not require the physical
The information revolution of today is indisputably caused by the unprecedented advances in information technology comprising computers, telecommunications, micrographics, and reprographics. The advancement in technology has made the accessibility to world information and knowledge possible from any part of the globe.

Until the advent of automation, the most significant previous technological innovation in libraries was the introduction of photo-copiers. Ralph Parker installed, in 1936, a punched card system for circulation control at the University of Texas. The application of automation achieved the economic goal of increasing productivity rather than use of computers to effect economies. Since early 1960, in USA, computer application for library operation has been considered for processing information which resulted in achieving more information production. The introduction of third generation and fourth generation computer systems, increased speed and memory size along with a shift unit record concepts to files stored on disk for ‘on-line’ access. Thus the results of computer processing became available to people using the system in a matter of seconds rather than in hours or days.

Realizing the need to access information available at any corner of the world and to face the challenges posed by the ‘information age’ in the 21st century, most of the institutions in India are also getting themselves equipped with the modern technology.

In India, the facsimile transmission is there through which information can be communicated over the telephone wire employing arrowband facsimile technique. Facsimile transreceivers were also developed under Technology Development Council Project (TDCP) in 1981. On 16th March 1984, the Post and Telegraph Department in India has come out with an indigenous system on the lines of teletext which will provide a variety of information from film programmes, reviews, music information about theater, food prices, farm prices, recipes, science news, financial news, special information on education, etc. New methods of information storage and retrieval are discovered. The conventional books and news papers are being replaced by microfilms and microfiches. Albeit it has not become very popular in developing countries like India, it has made quite a headway in the west. One may be surprised to know that compared to paper, microfilms and microfiches are cheaper and easier to handle and distribute. The greatest benefit of course is saving of space. The microforms come to rescue in this matter as the microforms take 70 to 90% less space than books. Thus microfilms take up only small space. It is estimated that a library of 60,000 volumes can be easily stored in a single drawer of a filing cabinet. Due to the growth in literature, we will be coerced to store the thought contents of these documents in microforms. It would not be exaggeration to say that microfilms are forerunner of paperless publishing in near future. There is every possibility that at the end of 20th century the libraries may become almost paperless (if not fully).

Thousands of years ago, people recognised the necessity of keeping records of their daily activities. The carving of paintings and graphic figures on the walls of caves evolved, over the centuries, into a more complex form of languages and written alphabets. Paper was invented and the art of writing and record keeping came to be defined. As more and more records on paper developed, complex storage methods were devised to house these records. But they took more and more room, and finally, people began to run out of space. Something was needed to be done, and in 1800s an English photographer, John Benjamin, experimented and developed the process of microphotography, which is today known as ‘micrographic’. In the 1800s, a Frenchman, Rene Dagron, realised the possibilities of this new process for record keeping and is credited with being the first to use micrographics on a commercial scale.

Micrography is an important branch of reprography. According to Gerrysts “during the siege of Paris in the France-Prussian War of 1870, microreproduction had been used to put messages into microforms which could be conveyed out of the besieged city by carrier-pigeon” [20]. But the regular use of microphotography as an aid to documentation started in 1906 [21]. The computer output of microfilm is greatly influencing the information system. This technique of photochromics enables the record of information in a grainless way. Holography and laser recording are also beginning to play a great role in micrographics. The rapid growth of microforms is due to
the serious space problem created in the libraries by information deluge. Certain technological developments in the field of micrographics have led to the library scientists to control all the situations. Although no serious effort has been made to provide a professional forum to establish closer liaison between the users and dealers of micrographics systems, still during the last few years, the evolution of micrographics and its applications has been quite significant in India. With the objective of encouraging the use of micrographic technology in this country, the Micrographic Congress of India (MCI) was founded on 20th February 1982. MCI aims at developing closer links between manufacturers/suppliers of micrographic equipment and systems in this country [22]. In this regard, it may be mentioned that Resource Centre on the micrographics should be built in India comprising informative literature to improve the information flow among the members of MCI.

CURRENT SCENE (Paperless Society)

In this age of science, electronic computers provide information which subsequently helps to reduce the bulk of the printed material. Thus, the computers also have significant contribution in making the libraries and the society paperless in future. The developing countries have also reached a stage where technology particularly the communication technology threatens the very existence of traditional libraries. In a forecast of telecommunications in the 2000 AD. Martino visualises that "rather than visiting a library any individual might be able to search the library files electronically and receive a printout of specific information or a facsimile copy of a desired document". They are heading towards a paperless society as stated in recent article by Allen Kent. At the first sight, one may think that the introduction of computer system will make the services of the library personnel completely redundant. But this is not the case; because, technically qualified personnel will be essential to provide access to databases and data banks. These technically qualified personnel are essential to work in the exploitation of the resources of libraries. So far as the situation of the libraries in the electronic world is concerned, the libraries still have the important role to play to collect, catalogue and index materials of local interest. It seems likely that librarians and other types of information personnel will have a vital role to perform in a paperless system. The information personnel who are familiar with the resources available in machine-readable form and with vocabularies, query languages, indexing techniques and search strategies will still be needed to exploit these resources most efficiently and effectively. In the electronic world, the libraries still may have a role to play in giving training to the scientists and others in the use of machine-readable resources. In fact, training would become a major activity of the librarian by 2000 AD. The BBC announcement of recent past visualised that the house computers would be sold by the well known broadcasting organization as seen by computer experts and this again leads to the emerging of a paperless society. Further, it is seen that such a society would be ushered in with computer selling as cheap as TV sets. Infact computer has started replacing all documentation work including letter writing, cheque writing, etc. Electronic mail is another development which is rapidly getting popular with the Indian scientists. It is estimated that as much as 60% of the postal mail could be eliminated if electronic mail was introduced.

WIRE CITY

The Hi-Ovis TV system in cooperation in Columbus in the USA is nearest to the future 'wire city' concept of the 21st century where most people need only to remain at home and yet perform many productive functions and shop at the super market or order any service or select any programme they want to see on the TV screen. Two-way TV integrated with telecommunications would provide data access of the magnitude now beyond imagination. This would make telecommunication an integral part of life. Even the future newspaper would be fed on this 'wire system' working with one more wonder invention: 'the fibre-optics' [23]. Prof. P. N. Kaula has opined that it would be more correct to term the future as 'Balance Media Society' but not 'Paperless' [24].

CONCLUSION

21st century will be the age of creativity. The paperless society is round the corner, whether we like it or not. There is sure indication that the conventional paper-based documents would vanish from everyday life. The substitutes for paper, viz. The microforms, are not popular yet, because of the inconvenience one has to suffer while using a microform reader. With the advent of pocket-held video units, one would, hopefully, be more comfortable. The Japanese have already introduced wrist-watch TVs and therefore, a paperless situation is not far way. Now it is the time for various responsible organizations to study its
various technical implications in order to meet the challenges of the paperless society towards the end of 20th century.

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