

Challenges for Information Users in the Turbulent Times, Technological Transitions and Changing Work Environment

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ABSTRACT

With the ongoing process of globalization and spurt in knowledge activities, the demand for information has been steadily growing in all the spheres of economy. The information systems and services that provide speed and convenience will survive and thrive as such systems and services will be preferred by users in a growing competitive world. The paper also discusses the impact of ICT on libraries and user communities besides talking about the electronic information services scenario and the challenges facing information users. Continuous developments in ICT have facilitated real-time access to global information, though paradoxically problems related to deluge of information and uninhibited access to information for user communities have also emerged. This paper highlights the Indian scenario and reports two kinds of user studies conducted by the author pertaining to the conventional information usage settings and electronic information environment. These studies depict that information usage in India in both these environments is generally tardy and points out the reasons for the same. The study reflects the fact that information collection also depends on the initiative of users. Presents two cases where information users have put in a herculean effort to collect information and maintain the same in the form of personal information files. The conclusion focuses on the considerable work and effort needed in the country for imparting literacy, computer literacy and information literacy for preparing and powering the masses for the construction of a knowledge based society.

KEYWORDS: Information Communication Technology, electronic information service, knowledge based society, information users, information technology literacy

0. INTRODUCTION

In the contemporary turbulent times and an increasingly complex, competitive and uncertain world, the accumulation and strategic use of cutting edge knowledge becomes the mantra for survival. If capital, land and job were once considered the main generators of wealth and power, to-day according to the World Bank, 64% of the world's wealth comes from knowledge. [1] Creation of knowledge and its application have influenced almost every sector of economy, besides having a deep impact on the lives of millions, bringing about radical changes in the concept of work itself. Knowledge activities have influenced the nature of workflow and work processes, thereby accelerating the speed of work. A generation ago, the average person had a 100,000 hour working life (40 hours x 50 weeks x 50 years). To-day, we can do everything that person did in a tenth of time, a mere 10,000 hours. According to Peter Cochrane, Head of Research for British Telecom Labs, in the next generation people will be able to do that in a 1000 hours [2]. In the past a major motivation for gaining knowledge came in the form of an enlarging self-esteem and wisdom to such a level, which might bring societal recognition of learned men and women. But now the main purpose of gaining knowledge is to make the individual take note of what to do and how to do it in a best possible way. In a changing work profile, human resources become obsolete as speedily as machines and thus require to be upgraded with new knowledge and every kind of competence through continuing education and training. The expertise of an individual is neither static nor lasting in knowledge based societies and such societies value inquisitive learning men and women who constantly track new ideas, keep in touch with the latest developments in their fields of activity and acquire new knowledge and skills in conformity to their work performance requirements. Moreover, collection of relevant information on a continuous basis and its timely and appropriate use forms a part and parcel of an active life of workers of a knowledge-based economy.

Because of the knowledge intensive work activities, the combined information needs of the country are not only growing but also widening. Information seeking is now not merely a concern of researchers, educators, managers, planners and decision makers but people from almost every segment of society need information. As a corollary to the liberalization policy of the government and efforts for increasing exports, there is considerable spurt in demand for business, industrial, economic and financial information. Information activities have also increased in the agricultural sector, which involves 65 percent of the total employment. For instance, the Indian Society of Agricultural Professionals aims to

reach out to at least 100,000 agri-business professionals during the next five years and provide answers to questions like – can olives be grown in India? Or is there a market for grafts from Maharashtra to remote Assam? [3] Block farmer information centers with the Internet facilities are also being set up in selected districts, where farmers can receive information and also share their own observations and ideas. As far as societal information needs are concerned, there are great variations among individuals with regard to context, educational and intellectual level, frequency and volume of information required. Future libraries and information centers will provide individual attention to information users and may concentrate on task based and problem solving information services.

It is mainly the developments in information communication technologies (ICT), which have pushed knowledge in the forefront of development activities, launched the process of gradually transforming societies into knowledge based societies, besides globalizing the world economy. Advances in information communication technologies, however, have brought immense changes in the way we acquire, store, search and disseminate information. It has added voice and pictures to the information content, making it a better learning resource and thus generated more interest in information use. Rapid developments in the ICT have influenced almost every component of libraries and information centers ranging from information acquisition to house keeping operations and providing answers to users queries. It helps to link intra and inter-library activities. The worldwide connections of libraries through computers and communication facilities will largely change the way the libraries share their resources and serve their users. The networked environment eliminated the cost of paper, physical storage of content in paper format and transportation of printed documents. It has set forth the process of digitization of uniquely held collections and delivery of such collections through the Internet. The networking of libraries also initiated the work of standardizing bibliographic format and improving bibliographic utilities. Libraries serving similar subject areas and having common interests can develop their intranets and even evaluate, acquire, organize and index hypermedia resources through joint efforts.

In the present resource constrained environment, libraries are constantly pursuing pathways for cost effective library services. Libraries functioning in a networked environment have the choice to buy the actual information resources required by them or buy access to such resources. Decisions regarding whether to buy and archive the information resources or buy access to them can be easily taken depending on the cost of acquisition and frequency of use of such resources. Libraries having space problems have the choice to procure information resources available on CD-ROMs and DVD-ROMs for compact storage of information and convert their physical space occupied by the card catalogue to few OPAC terminals.

In their pursuit for offering better services to their user communities, libraries have been integrating with library networks and using online databases. However, development of the Internet has not only considerably enhanced the capacity of libraries to better serve their users with comprehensive and timely information, but also completely transformed their functioning, operations and methods of rendering users' services. The Internet is being used both for accessing information and for publicizing the library services by developing library homepages. Some libraries have started offering web-based library and information services and making their databases and OPACs accessible through their websites. They

have started creating and marketing their content. Libraries are now using the people's portals to access expert databases, consultants and advisors to connect their users to the most appropriate human resources to exchange views and thus exploit the resources of tacit knowledge.

Libraries are accessing electronic journals with back files, updated electronics reference works, newsletters and a host of other resources having multimedia features. Some projects were undertaken to study the feasibility of rendering twenty-four hours reference service and efforts are also being made for the provision of integrated reference service. Professional associations like American Library Association (ALA) compile the list of best free reference websites for the benefit of users. As the just in time access to the information has become a necessity, the speed at which the information be made available has come to the central point of focus of the Internet researchers. Efforts are being made to develop a faster, more powerful and dependable Internet-2 which will facilitate faster connectivity and high-speed communication of information. When the project crystallizes, it will have the capacity to transmit the contents of 30 volume *Encyclopedia Britannica* in a single second. And this next generation is going to be at least 1000 times faster than the present one [4].

1. ELECTRONIC INFORMATION SERVICES SCENARIO

The electronic information is getting unbundled and is malleable and thus can be easily repackaged to serve the specific needs of information users. The information technology provides solutions for filtering, indexing, ranking, nesting and windowing of data and information, and hence a wide variety of information products and services can be developed. Beyond the library networks are ongoing immense activities and efforts of electronics information publishers and information providers to develop cutting edge electronic information services, for their survival in a cutthroat competition. The competition is so intense that only the biggest and the best companies offering the value added and most appropriate information services have ultimate chances of survival and new information companies that can meet these requirements may emerge on the information scene. Small information businesses, which offer the most desired content and facilitate users' convenience may also sustain in the developing electronics information services scenario.

The *amazon.com* which appeared a few years back is not only one of the massive effort for bibliographic control of documents, but also a great source for placing instant orders for procurement of documents. It provides reasonable customers service that has twelve million regular users today. The *amazon.com* is valued by market today at US\$ 28 billions [5]. The *ingenta.com* provides access to millions of articles from thousands of journals up to a back period of seventeen years. Delivering over 20 million pages impressions to over 3,50,000 visitors a month Ingenta operates the UK's most visited academic web service, serving the needs of over 70 percent of the country's educational and research institutions [6]. Uncover access is now also available through *ingenta.com*. Gale Group released the InfoTrac one file that provides access to millions of articles of periodicals, magazines, newspapers and newswire services. Fragmented packages of need based services are now appearing in the market e.g. EBSCO's Computer

Science: Consumer edition provides access to full text articles which appear in select important computer science magazines whereas its Computer Science: Technical edition will provide access to computer science periodical articles which are of technical and scholarly nature. Hypermedia is also being organized into a sort of packages, which can be readily used as research resources for solving specific problems. e.g. H.Dawson [7] provides an annotated list of useful Internet information resources for researching on the Middle East Peace process.

The subject specific organization of hypermedia resources is being undertaken for helping users to conveniently access such comprehensive subject information resources. For instance, *Global Legal Index*; [8] a work undertaken by the Australian Legal Information Institute involves the organization of thousands of legal websites. Butterworth's LEXIS direct is the premier legal information Portfolio on the Net. It carries two billion documents from 28,000 sources which are updated daily and can be accessed by the legal information users from all over the world.

The electronic information scenario is so competitive and fluid that every now and then some developments take place which are required to be tracked by the library professionals. For instance, the web edition of the *Ulrich International Periodical Directory* integrates Journal Citation Reports, which helps to evaluate the importance of journals, and assists in the journals selection process. EBSCO online; Complete Journal Activity Report helps libraries to analyze the user searching behavior and provides periodical usage statistics. A survey [9] of the online information industry commissioned by the Information World Review and DIALOG indicates that about 81 percent of information professionals believed that a time may come when they cancel subscriptions to all the print and electronics journals and buy individual articles as and when they are required. BioMed Central [10] is receiving articles from about 28,000 scientists who have signed the Public library of science Advocacy Group open letter agreeing to boycott periodicals which do not grant free access to research content within six months of publication. The articles available as a result of this effort can be accessed by anyone through the Internet.

There are also problems of change of ownership of information sources which the information users cannot constantly keep track. For instance, *Journal of High Energy Physics*, was published by the International School for Advanced Studies. However, from March, 2002, it is being published by the Institute of Physics Publishing [11]. It is also anticipated that in the near future activities regarding branding of information may spurt up. Some brand names providing information access have already started appearing e.g. AskJeeves, James knowledge, Questa, Librarian's Index to the Internet [12] provides some examples of co-branding of information where some information contents suppliers offer co-branding for libraries.

2. CONVENIENCES AND CHALLENGES FOR INFORMATION USERS IN THE ELECTRONICS ENVIRONMENT

The electronic information environment offers better means for exchange of information and users' satisfaction rate is much higher as compared to traditional methods of information access. It makes no difference whether the information seeker is in the library premises or thousands of miles away. Users can access information as and when they find time, because the networked electronics environment facilitates instant communication and real time access to desired information. Libraries functioning in the networked environment are giving more emphasis to user oriented services rather than following procedure-oriented routines to serve their user communities. Through resource sharing efforts, libraries can more effectively serve the information needs of their users. Users can themselves solve several minor information problems, if they are trained to make adequate use of the web resources.

The information technology enabled information facilities also provide better learning environment. One study on the experience of 30,000 students indicated that just 20 minutes of interactive work a day with a computer over the course of a school year yields an increase in reading skills of a year and a half [13]. The electronic information systems must capacitate the information users for assimilation of information, extend their abilities and enhance their perception power and facilitate the process of information search more convenient and interesting and more importantly configure themselves to the needs and requirements of individual information users. The advances in software development have reached a level where design and development of such information systems will be a reality. Dodd [14] reports that since the brain processes information in a visual way, it is expected that future developments in information handling will be graphical rather than textual.

Developments in ICT have a profound influence on the information seeking habits of information users. About three decades ago reprint exchange was one of the potential methods for exchange of information among researchers. The entry of photocopiers had a considerable impact on the practice of reprint exchange. With the growth of photocopying machines, this method of information exchange has sizably diminished if not completely eliminated. The computer systems of 1960's and 1970's were mainly stand-alone systems used for analytical work. The electronic machines of 1980's and 1990's started large scale integration into networks and set forth a new era of interactive computing and online information seeking. The growth of the Internet and development of the web page ushered a new environment of information seeking and using. In searching the printed resources information search is undertaken in the hierarchical order, but Internet resources are searched in the spatial order. Users read the printed works in linear order, but while using the Internet resources they can quickly jump from one information source to another source of their interests.

The versatile nature of the digital technology accelerated the growth of the Internet. Everything can be digitized whether it is text, numeric, voice or pictures. The Internet now has huge volumes of information on all the subjects under the sun and thus can serve the needs of users having varied information interests, The amount of scholarly information doubles appropriately every seven years, and the number of web servers almost tripled in one year from 9,950,491 in January 2000 to 27,585,719 in January 2001 [15]. The Internet is spreading in an amoeboid manner because of growing user interest in

the volume of information it carries. In January 1996, 30 million people were using the Internet. At the dawn of the new century, however, more than 400 million people were online. This 1,333 percent change over only five years is a harbinger of how the Internet will continue to alter the way we work.... [16]. The Internet has enhanced people to people online contacts, boosted interdisciplinary work and increased awareness of the existing information resources and thus further accelerated the growth of information.

With the availability of the Internet, growth of cable television and other media, the information seeker has greater number of choices for finding the desired information. However, at the same time the information seeker is also facing the overload of information. The search engine Google has continuously increased its coverage of the web and now claims to index more than 3 billion pages. J.C. Miller has studied the relationship of information overload to various forms of mental illness. He states, Glutting a person with more information than he can process may lead to disturbance [17]. In the developed countries information users have access to channels and resources of information which an average user is not able to use and assimilate. Some of the information users even suffer from Information Fatigue Syndrome where the information overload creates problems in correctly analyzing and leads to lack of confidence in decision making, causes infostress and makes a man stand at cross roads in a dilemma thinking which way to go. On the other hand, many people in the developing countries do not have access to information or lack information technology skills thus are not able to access electronic information resources for making correct decisions and initiating appropriate actions in their work process.

3. INDIAN SITUATION

Users' initiatives for keeping in touch with latest information and motivation to use information depends upon the nature of work at hand, work habits of co-workers particularly the leader and type of work environments. The execution of mental abilities of a user to grasp relationships directly depends upon the availability of relevant information. However, users can perceive, interpret and draw relationships of information within the limits of their own knowledge and education. Moreover, users can have access to information within the limits of available resources, existing communication facilities to access information and on the basis of their own knowledge and experience of information searching methods, tools and information access systems.

A study [18] of resources of scientific and technical libraries indicates that about twenty percent of the scientific and technical libraries in India house eighty percent of the printed information resources. In such a situation, the Internet connectivity for libraries in India should be accorded a top priority for providing access to comprehensive information resources to users. However a large majority of the libraries still do not provide the Internet facilities to their users. Researchers neither get time nor can afford the cost to search the Internet at a cyber café. They do not visit such Internet shops until it is absolutely essential. A large number of libraries are still grappling with the problems of automating their libraries and developing their OPACs and need computer hardware to fully automate their libraries in the

first place before the machines are provided to their users for searching OPACs and surfing the Internet. Should Indian libraries provide machines to automate the library work or spare such machines for the Internet connectivity? In fact in the interest of library users, the libraries are required to do both at the same time. Indian libraries should initiate the process of resource mobilization and even fund raising for developing the necessary infrastructure. To encourage the use of the Internet facilities, adequate number of computers for accessing the Internet should be made available in libraries. Without the Internet connectivity many potential benefits of electronics information resources cannot be made available to information users in India. For instance, the *Journal of High Energy Physics*, published by the Institute of Physics Publishing involves a considerable subscription amount. However, the users from developing countries can have access to this journal through the Internet without paying any subscription cost. According to a NASSCOM survey, there were one million Internet users in India as on June 30, 2000 and this number is likely to increase 23 million by the end of 2003. Keeping in view the population of the country, the number of Internet users is not sufficient and government should have a policy to encourage the use of the Internet, so that more number of people can participate in knowledge-based activities.

Lack of competitive situations and proper research environments, inadequate information facilities do not encourage spurt in knowledge activities. Even the existing resources of libraries and information centers remain underutilized. Statistics of Inter library loan records, reference queries received, and the number of members making use of libraries at any given time indicates that members do not even make sufficient use of the existing information resources. A study [19] regarding the average number of daily reference queries received by 110 libraries shows that on an average a total number of 1935 queries were being received by all the 110 libraries. Moreover, 50 percent of queries were being received by just 18 percent of the libraries. Lack of culture of information use is sometimes detrimental to further development or extension of information facilities. Take the case of National Aerospace Laboratory, Bangalore that provided access to ESA/IRS databases almost two decades ago, but later discontinued the facility, because usage was not to the level of extent of economic cost involved for connectivity. The AGRIS inputting center at Delhi at the beginning of 1980 initiated SDI services for a number of agricultural scientists, but due to lack of scientists' interest, this service was later on rendered only at the institutional level. The author visited the Internet Lab facility offered to users at the University of Jammu during the months of November and December 2002 to make observations regarding the Internet usage. It was found that during 11 A.M. to 1 P.M. during which this Lab can be used, an average number of 15 users visited the Internet Lab daily. Almost seventy percent of the users use this facility for email. The rest of the users who find information resources using the Internet either search whatever interests them during the process of search or find information related to the immediate task at hand. Cross sections of users in the university library were asked why they are not using the Internet facility offered by the university. Majority of the users responded that they do not know how to search the Internet. However, some users reported that Lab timings do not suit their work schedule. What is worth noting in a university having 273 teachers and 542 registered scholars is that, on an average only 15 users are using daily the limited Internet facility provided by the university. The situation is not different as far as our reading habits are concerned. According to a survey by the Book Council of India, an average Indian reads only 14 pages in a year as compared to 70 pages read by an individual in the U.K. So, even if people buy books to be 'with it' and as a status symbol, they do not really read them [20].

A plethora of Indian studies regarding the information problems, information searching habits, publication outputs, citation analysis of Indian publications, etc had been conducted from time to time. A computer print out of all such studies may run into not in yards but in kilometers of length. The findings of many of such studies neither had ever been used for information systems improvement and amelioration of information resources and services nor as a potential input for library and information policy making. The user studies, if properly conducted through a combination of different methods for data collections and by engaging the users in an interesting conversation regarding their work, their problems and their interests, reveal not only the real information problems, but also a lot more about the research system, research evaluation, quality of research, recognition and reward system, work facilities, work culture, impediments in work etc. Such information can be of immense potential use for improvement of research system that is so important for the generation of new knowledge and ideas.

In 1980's this author conducted a national level survey of publication productivity and information needs, problems and communication patterns of Indian scientists, visited several scientific research institutions across the country and had personal discussions with many scientists. One third of the scientists studied published two third of the total number of papers. Among scientists surveyed, a single scientist published 192 papers whereas 129 scientists taken together had only 190 papers to their credit. The productivity of scientists had a direct bearing on their information use habits. There were scientists who either visit the library almost daily or send their junior colleagues to the library for collection of information. There were also other scientists who had the same designation, but paid very few visits to the institution's library in a year. These trends are continuing and will continue at institutions until corrective measures are initiated at the policy level to achieve total performance level of people working in institutions.

There are thus wide variations in the extent of information used and information searching habits of similar category of users working in the same institution. Several users try to collect relevant information that is accessible through least effort and some of them even rely on the memorized knowledge of a colleague instead of visiting the library for collecting information. The information use is by and large tardy and because of lack of users' concern sometimes information problems may creep in during the process of work. Some scientists have the general conception that information search will be required when the experimental work is over and hence such scientists do not regularly search information to keep in touch with the latest developments in their area of work. A number of citation studies also corroborate this fact when we find quite old literature cited by the researchers. The use of information is not generally as a result of natural flair for knowing the new developments but sometimes governed by other considerations. In a study of in-house use of library documents and seat occupancy, the space technologists were found to visit the library more during the departmental reviews for promotions [21]. A university scholar at Bangalore reported the author that he was not in a hurry to collect information and complete his work because the moment he submits his thesis, he will lose the fellowship he is getting for his Ph. D work. Uncertainly in career paths of scholars thus also influence their information searching habits.

In the present knowledge based century, where we witness information deluge, we find that at several institutions information users still face the problems of scarcity of relevant information because of economic barriers, non availability of adequate information technology infrastructure and users lack of awareness of most relevant information resources. Information access is also affected by bureaucratic procedures and government level decisions and factors, which are beyond the control of information users. For instance, the Internet access remained suspended in the state of Jammu and Kashmir for quite some time in the year 2002. The Punjab State government ordered to close its schools, colleges and universities for a week upto August 4, 2002 to save electricity so that the electric power supply thus saved is made available to farmers to irrigate their fields. The major hurdle in information facilities development come on the way when the top management is not able to realize the value and potential of information and the real information requirements of various categories of users are not taken care while undertaking resource planning. Because of diversity of cultures, linguistics regions, the users too have their own beliefs, opinions, perceptions and habits of information use. The information use habits vary with age group and also with area, cultures, information level and IT skill level of users. A 20 years old undergraduate student has different information requirements than a 50 years old research. A professor in a university processes more information in a year than a person in remote hilly village processes throughout his life.

The information access ultimately depends upon the efforts and initiatives of individual information users. There are users who maintain their personal information files and make serious efforts to collect every bit of information that matches their interests. A manager at semi conductor complex limited at SAS Mohali maintains information files in areas as diverse as vastu, alternative medicine, palmistry, reiki, art of living and many more areas and is interested to disseminate this knowledge for the public by developing his website. For 42 year old A.V. Narayanaswami, a coffee planter in Wayanad, it has been a labour of love to his vocation as a farmer and as a Keralite concerned about the woes of the state's farm sector. His huge data collection currently runs into over 1.5 lakhs web pages in more than 300 modules. The database covers the state's farm potential, new norms of production, packaging and marketing [22].

4. CONCLUSIONS AND SUGGESTIONS

In the changing work culture which is run by the clock and governed by the calendar, the users will prefer the information systems and services which offer access to global information resources and provide just in time information. Presently the technology exists to provide state of the art information services to users but issues such as economic costs for infrastructure development, non-availability of uninterrupted supply of power, insufficient training of staff handling such systems and lack training of users to make use of such technologies hamper the process of development of modern information access systems in India. The ICT has powered the information systems and services providers, but at the same time created a chaotic situation in the arena of electronic information publishing and distribution. New wonderful companies like *amazon.com* emerged and many existing companies are restructuring to stay competitive. Every now and then new changes and offers for better facilities are reported by the information world.

In the wake of such developments information literacy and information technology literacy is essential for every individual dealing with information and using the information. The country has the triple challenge of providing literacy, computer literacy and information literacy to masses so that people are able to know the opportunities and work for their own and country's social and economic development. To facilitate this, massive and continuous effort is required to train people from all sectors of economy in latest work technologies and work performance requirements irrespective of their status and qualifications acquired. The recent World Bank Report entitled *Constructing Knowledge Societies; New Challenges for Tertiary Education* records that "Life long learning spurs economic life, reduces poverty, and encourages open and cohesive societies". A massive challenge for a country like India is encouraging and motivating the people to learn.

In a consumer driven society, feedback from information users helps to modify and improve the information system. It helps the information providers to learn what the user does not know and need to know, remove inhibitors for fostering and facilitating information access and initiate action to solve users information problems. However, many of the results of users studies are neither used for system improvement nor for information policy adjustments at the higher levels. Still more important an issue of attention is the user studies which are being conducted through mailing questionnaires without investigator and user contacts or through electronically mailed questionnaires. Some of such studies may not depict the completely correct pictures of users information problems because a typical users' study involves, fifty percent study and analysis of data provided by the user and fifty percent perceived information and common sense.

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