The Place of Cd-Rom Technology in Library Development in Nigeria

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ABSTRACT While the computer market in Nigeria has been flourishing and expanding; its applications in library and information services have not contributed much to that expansion. This paper then tries to identify the problems and eventually stressed the importance and relevance of CD-ROM technology to the development of library services in Nigeria. The paper shows that CD-ROM is a more appropriate technology for Nigeria because of the relatively harsh environment. CD-ROM is found to be a more efficient medium of storage for publishing large amount of information. The qualities and significance of CD-ROM over Online industry are stressed and the paper finally recommends the uses of CD-ROM technology for Nigerian library development. The problems to be faced by the use of CD-ROM in Nigerian libraries are also identified. The paper then advises both the government and other relevant agencies like National Universities Commission to be constantly organizing seminars and workshops on CD-ROM applications to Nigerian libraries.

INTRODUCTION

CD-ROM discs are identical in appearance to the audio compact disc, but they contain computer programmes and data bases that can be read-with appropriate equipment on a personal computer. Compact-Disc-Read Only Memory [CD-ROM] is the popular name for a small plastic disc 4.72 inches [120mm] in diameter that can hold approximately 550 million characters of information. It is a compact disc containing a large amount of data, including text and images, which can be viewed by using a computer but can not be altered or erased. As Kurdyla (1988) has pointed out, this last figure is the equivalent of 1500 micro-computer diskettes [floppy discs] or two hundred 1000 page books, or as Zorkoczy (1988) says, more than what 300mm LP discs hold on both sides. The disc contains more than 20,000 tracks about 1.6mm apart within which sound [characters, bits of information] is represented in the form of 'pits' and 'plateaux', (Ojo-Igbinoba, 1993). CD-ROM was commercially introduced in 1983, and can be regarded as a useful, efficient and economic medium for storing and publishing large amount of information. The attractiveness of the CD-ROM technology is that it is simple to use and can even be handled by one untrained in computers as far as large databases are concerned. CD-ROMs are quite different from other computer products, like a book, once you have bought a CD-ROM; it can be used as often and for as long as one wishes with no extra charge

that involved in a power source [and stationary e.g. printing paper, printer ribbon]. When compared Online versus print versus CD-ROM in terms of their costs and benefits, Brindley (1988) rightly observed that it would seem that libraries will gradually migrate from print to CD-ROM. Korwitz (1990) also pointed out that CD-ROMs, text passages, and even photographs could be digitalized and stored on discs. Because of this technological advancement, it became possible to create a workstation linking a personal computer-based computer system with a CD-ROM drive and a laser printer to retrieve full-text information on discs and to provide quality printouts from international databases. CD-ROM can be regarded as a tool that can meet many of library needs when the information is properly designed for efficient access. It has enormous potential in publishing and producing large databases at low cost. The CD-ROM databases are very suitable for a publication where frequent updating is important e.g. dictionaries, directories and pictorial data. It is also very useful for the conservation of library materials and its high density storage capability will shrink shelf space requirements in libraries especially in the area of remote storage and in the preservation of highly used materials (Seaton, 1983). Its advantages over other forms of computer products are due to the fact that all bibliographic databases available in printed and Online are also available on CD-ROM. It can be regarded as an appropriate technology for Nigerian libraries.

The objective of this paper is to stress the importance of CD-ROM facilities in Nigeria and the advantages it has over online facilities. The importance of CD-ROM technology to library application in Nigeria will be emphasized and the problems expected to be faced by its introduction to Nigeria are pointed out. The roles which the government and other agencies are expected to play in the application of CD-ROM to Nigerian library development are also stressed.

CD-ROM –THE TECHNOLOGY

CD-ROM, a spin-off of audio CD technology, stands for compact disc-read-only memory. The name implies its application. It can be viewed as a generic information delivery medium, or format or a specific title. As it has been pointed out by Ojo-Igbinoba (1993) it is actually a combination of several products and process-data generation, preparation, pre-mastering, mastering and replication-just like in making a book, one gathers the information, composes the text, layout, design, printing and binding. In CD-ROM technology, information is arranged in a specific manner in order to be read by computer and then by the user. This is carried out in CD-ROM pre-mastering process, which is analogous to the composing, designing and layout of a book. Once inserted in to the CD-ROM drive, the text, video images, and so on can be read into RAM for processing or display. However, the data on the disk are fixed – they cannot be altered .This is contrast, of course, to the read/write compatibility of magnetic disks. What makes CD-ROM so inviting is its vast capacity to store data and programmes. The capacity of a single CD-ROM is up to 680MB- about that of 477 diskettes. To put the density of CD-ROM into perspective, the words in every book ever written could be stored on a hypothetical CD-ROM that is 8 feet in diameter (Long, 2001).

CD-ROMs store data in a single track that spirals from the centre to the outside edge. The utrathin track spirals around the disk thousands of times .Data are recorded on the CD-ROM's reflective surface in the form of pits and lands. The pits are tiny reflective bumps that have been burned in with a laser. The lands are flat areas separating the pits. Together they record read-only binary [Is and Os] information that can be interpreted by the computer as text, audio, images, and so on. Once the data have been recorded, a protective coating is applied to the reflective surface [the non-label side of a CD-ROM]. Popular CD-ROM drives are classified simply as 24x, 32x, and 40x.These spin at 24, 32 and 40 times the speed of the original CD standard (Long, 2001). The speed at which a given CD-ROM spins depends on the physical location of the data being read. The data pass over the movable laser detector at the same rate, no matter where the data are read. Therefore, the CD-ROM must spin more quickly when accessing data near the centre.

The introduction of multidisk CD-ROM player/changers enable read access to vast amounts of online data. This device is like a CD audio player/changer in that the desired CD-ROM can be loaded to the CD-ROM disk drive under programmed control. These CD-ROM player/changers sometimes called juke-boxes can hold from 6 to more than 500 CD-ROMs. The larger juke-boxes have multiple drives so that network users can have simultaneous access to different CD-ROM resources. The advantage of CD-ROM over Online is due to the fact that people who are searching CD-ROMs are themselves the end users of the information. CD-ROMs are relatively easy to use; by contrast, the online industry has always been dogged by the unfriendliness of its software. The disadvantage of online industry is that most of its new users have to undertake several days of special training just to be able to get at the information in an online database. Ojo-Igbinoba (1993) pointed out that high connect time charges and unfriendly software have meant that most searches on online systems are, therefore, conducted by intermediaries, trained information professionals who act on behalf of the end users of information. CD-ROM, however, can dispense with the services of intermediaries and place large, easily chargeable databases directly in the hands of the end users. One of the disadvantages of CD-ROM is the fact that one must have a micro computer, and a CD-ROM reader in the location where one wants to use the information on the disc. Presently, this means that the information is not portable, and it can only be used where the CD-ROM player is available. It must be realized that most of the full text articles required for a lot of the CD-ROM searches are not available in-house in Nigerian or African libraries a number of which have up to many years' gap of periodical subscriptions.

The CD-ROM reader itself has limitations and one of these limitations is due to the fact that

only one user at a time can access information on the disc. For instance, if one did have a CD-ROM encoded with the text of three hundred 500 page books, only one person could have access to those books at a time. In printed form, if all 300 books were on shelves, 300 persons could have access to the same information. This can be regarded as a temporary disadvantage. Another disadvantage is the initial high cost of installation which keeps away many institutions from setting up their units.

CD-ROMs AND LIBRARY APPLICATIONS

Nigeria had a late start in the use of computers, but a start having been made, the growth in use has been quite remarkable. The computer market has continued to flourish in terms of number of vendors entering the market and number of installations and applications. In 1988, the number of IBM compatibles alone sold in the country was put at 460,000 (Levin, 1989). "Scientific and Technological Information (STI)"refers to the information relating to, or generated in such broad fields as pure science, and technology, including agriculture, industry, medical science, and engineering. As pointed out by Ehikhamenor (1993) most library users depended on the libraries of their establishments for their information requirements. Most of the libraries were actually able to provide books and journals to meet those requirements. The need of users to keep abreast with developments in science and technology was also met through subscription to abstracts and indexes in hard copy. There were no operational automated services. In-house bulletins of new materials received were prepared manually for distribution to users. He also observed that most of the libraries have been experiencing much difficulty providing these materials to their users on account of alarming rate of inflation of the prices of books and journals, as well as depreciating value of the Nigerian currency. The abstracting and indexing services which are very much needed by researchers are no longer purchased as their prices have become prohibitive. In the industrialized countries, there is a growing trend not to make databases available in hard copy. As a result of the high cost of hard copy editions, majority of library users are opting for the online services. This trend is adversely affecting the cost of the hard copy editions.

Apart from online services, some of the database producers and vendors are distributing their products on CD-ROM for the benefit of those who, for economic reasons or infrastructural problems, do not use the online services. In addition, information retrieval systems are no longer just offering bibliographic information, more and more are including text. Without any shadow of doubt, full-text databases and advances in multimedia technology are evidences of a new order of information services that a developing country like Nigeria cannot afford to ignore. The use of the Internet and CD-ROM to access information continues to grow. Students are being encouraged to regard computers as tools to be used in all aspects of their studies. In particular, they need to make use of the new multimedia technologies to communicate ideas, describe projects, and order information in their work. This requires them to select the medium best suited to conveying their message, to structure information in a hierarchical manner, and to link together information to produce a multidimetional document. It must be realized that the trend in library automation in Nigeria has not been impressive. While the computer market in Nigeria has been growing rapidly, libraries have not contributed much to that growth. It is probably not right to say that libraries have not been aware of benefits of automation. An earlier survey by Ubogu and Gupta (1987) to access the progress of computerization showed that many libraries believed in the necessity for automation.

One would have expected the five oldest university libraries to take the lead in automation, but only the university of Lagos libraries attempted an automation project based on its own facilities by early 1980s. The project, which was a turn key circulation system, proved unsuccessful. Ehikhamenor further explained that one of the problems that attended early plans for automation was lack of manpower for library and documentation applications. Even by 1988, computer vendors had not made an entry into this area. Previously not many libraries had any staff with knowledge of automation. Many Nigerian University libraries attempted the automation of their libraries but their efforts were usually frustrated at the end. The failure of these attempts was attributed by the libraries concerned to frequent breakdown of the computer and crashing of programmes. In addition to the frequent breakdown and high down-turn of the computer installations were frequent power

failure and inadequate air-conditioning. The situation was often worsened by poor servicing and lack of spare parts. One may rightly think that there was no conceptual design before some of the projects were started. For instance, at the Ahmadu Bello University, work on their computerization effort had gone far before it was realized that there was something wrong about the procedure and the equipment. This sad experience made many libraries to be more cautious about automation. Until recently many of them were not even thinking about it. Several others have carried out some feasibility studies using consultants and automation committees, the resulting decisions and recommendations have since been overtaken by financial crisis and by advances in information technology.

However, some university libraries, including those of the Universities of Ibadan and Ilorin, the Imo State University and the Federal University of Technology, Owerri, had by 1989 acquired at least one micro computer which they intended to use for serials control, data entry for a database, administrative file management, circulation control and for word processing. Many other libraries have since joined the group. Research libraries, which provide STI services exclusively, have all along seemed generally apathetic to automation. There are, however, two major exceptions, namely the libraries of the International Institute for Tropical Agriculture (IITA), Ibadan and the Federal Institute of Industrial Research, Oshodi (FIIRO). The IITA library has developed an integrated database system, serves acquisitions, cataloguing and circulation processes. It was implemented in BASIS on a network of three VAX computers. As pointed out by Ehikhamenor (1993), the IITA library is currently maintaining the most sophisticated in-house bibliographic retrieval system in tropical agriculture. The database can be accessed through over 60 terminals and micro-computers scattered all over the institution. Beside the in-house database, several databases on CD-ROM have been acquired and mounted for searching.

From the above, one can see that the importance of library automation and CD-ROM technology in Nigeria libraries can never be over-emphasized. Abstracting and indexing databases which have been the province of online are now also available in CD-ROM. Library catalogues, union catalogues for resource sharing and retrospective conversion and cataloguing systems and others are now on CD-ROM. Full-text information such as encyclopedia and other reference books are now published in CD-ROM. The Library Corporation, Grolier Electronic Publishing, British Library and Whitaker as revealed by Ojo Igbinoba (1993) pioneered the development of CD-ROM applications in libraries. Micro-soft, a micro-computer software company which promotes CD-ROM technology has introduced the Microsoft Bookshelf, a database. Kurdyla (1988) pointed out that this unique product combined ten commonly used reference works on the disc: a dictionary, thesaurus, almanac, postal code directory, quotation dictionary, grammar and so on are stored on a single CD-ROM. Also the disc contains a collection of over 100 forms and letters for use as templates. Kurdyla also revealed that what makes the product even more useful is the fact that it is interactive with the major word processing programmes currently in use with micro-computers. While typing a document, the user can highlight a word and automatically search for it in the thesaurus, dictionary, almanac, or other reference work. The user can then automatically copy the retrieved information into the document being composed. The Microsoft Bookshelf has shown the type of products that will soon inundate the market because of its low cost.

One of the advantages of CD-ROM is its ability to store large quantities of information and some publishers have used them in this way to deliver large numbers of computer programs especially in the area of software and graphics. They can be used to support desktop publishing applications or the development of computer-generated presentation materials for corporate use. Most of these products can be searched by title, keyword, subject heading etc, as may be applicable.

CD-ROM AND ITS IMPORTANCE IN NIGERIA

Information technology is rather a recent phenomenon in Nigeria. In general, the history of the development of telecommunications in Nigeria is characterized by unfulfilled objectives. Achievements have been consistently short of demand for services. CD-ROM has enormous utility in Nigerian libraries. As revealed by Little John (1991) CD-ROM has enormous potential for

African researchers in their efforts to gain access to scholarly data and literature. The discs can hold huge volumes of information and are inexpensive to ship. They do not require special handling, storage space, or the large drives necessary for magnetic media. Hardware requirements are IBM compatibles (and now Apple) personal computers with a memory of 640kb. The system is relatively inexpensive even more so today as disc drives decline in price. Also the cost of making CD-ROM is falling as a result of increase in research efforts. Another reason for the reduced price of CD-ROM is due to the fact that competition among the publishers is increasing. Cost is very important for Nigerian libraries as the decision to or not to buy is a matter of cash. Because of poor telecommunication systems in Nigeria, CD-ROM does not require online telephone connection, and also power outages do not affect the discs or its memory. There is a growing volume of scholarly materials on CD-ROM, primarily bibliographic databases but also abstracts, anthologies containing full-text articles, reference materials, such as encyclopedia and increasingly, complete periodicals (including newspapers). According to Ojo-Igbinoba (1993), there are more than 1000 commercially available CD-ROM products, 38% of them in the Social Sciences and 30% in Science and Technology. CD-ROMs are easier to read than microfiche or file, less difficult to store and probably more durable than fiche or film in difficult environments like in Nigeria in particular and Africa in general.

Using IT, learners can absorb more information and take less time to do so. Projects investigating the use of IT in learning demonstrate increased motivation in children and adults alike. In some cases, it can mean success for people who previously always failed. Learners may be more productive, challenge themselves more, and have more confidence. Levey (1990) pointed out that fully-text compact discs might also prove more secured than print copy, for it is impossible to mutilate them by cutting out pages in order to take home a needed article or chapter. This will definitely safeguard the periodical collection which is often vulnerable to such sharp practices in Nigeria. Since 1991, Nigerian libraries have started buying CD-ROMs, and many of the Nigerian university libraries have obtained their computers with CD-ROMs through the World Bank loan to 21 Federal Universities. It was also found that libraries with computers have already purchased the most expensive components of CD-ROM. Many Nigerian libraries have difficulty with the installation of their CD-ROM drives. Once they are installed however, and bugs ironed out, very good services can be obtained. Compact Disc-Read Only Memory is a very suitable technology for Nigeria. It is rugged and portable, shipping and postage costs are relatively inexpensive. It is easier to store and less difficult to read than microform and more durable. As a storage medium, its capacity far surpasses any other e.g. it is 1000 times the capacity of one floppy disc. This capacity will shrink storage space which is already a problem in many Nigerian libraries. When compared with online, CD-ROM is cheaper to install and operate. It is simple to use and does not require the training of online and as such can be handled by one untrained in computers. It can be used in cataloguing systems or in place of national union catalogue. For example, OCLC (Online Computer Library Centre) has developed a CD-ROM based cataloguing system.

It does not require telephone communication. Blackout or power cuts which are very frequent in Nigeria do not affect the disc or its memory. Its link to existing computers (IBM or Apple) is a big plus over paper and microform reference materials. Besides, costs are constantly falling and we are approaching an era in which CD-ROM will be easily affordable by Nigerian libraries from their budgets. From the above, one can see that CD-ROM has a great potential in Nigeria for all bibliographic databases available on Online are also available on CD-ROM and can be searched interactively like online. Users of CD-ROM can browse and experiment and perhaps find rich and unexpected correlation in the information (Ojo-Igbinoba, 1993).

As technology improves, educational capabilities increase correspondingly. The emergence of inexpensive computer and mass storage media, including optical videodisc, has given instructional technologists better tools with which to work. Compact discs [the CD-ROM and CD-I] are used to store large amounts of data such as encyclopedia or films. At new interactive delivery stations with computers and CD-ROM, CD-1, or videodiscs, a student who is interested in a particular topic can first scan on electronic encyclopedia, then view a film on the subject or look at related topics at the touch of a button. These learning stations combine the advantages of reference materials, still pictures, films,

television, and computer-aided instruction. With even newer technologies now being developed, such learning stations will eventually be common place in homes for both entertainment and educational purposes.

PROBLEMS OF CD-ROM APPLICATION IN NIGERIA

We have seen that CD-ROM has computer access. This additional layer of technology and barrier between the information and the reader presents advantages and disadvantages. However CD-ROM suffers from the fact that one must have a micro-computer and a CD-ROM reader in the location where one wants to use the information on the disc. As at now, this means that the information is not portable, i.e. it can be used only where the CD-ROM player is available. Although it is possible to connect more than one CD-ROM reader to a single work station or micro-computer, the process of connecting more than one micro-computer or workstation to one CD-ROM is currently imperfect. Thus only one user at a time can access information on the disc. In addition CD-ROM requires start up capital beyond the reach of most Nigerian libraries. Also, many Nigerian libraries have difficulty with the installation of their CD-ROM drives. Some of this difficulty could involve having incompatible drive, wrong extension card or using a micro-computer with low memory of say, 512kb whereas 640kb is needed. Another difficulty is the lack of in-country expertise with CD-ROM, which is still a relatively new technology in Nigeria. Any breakdown of installation may require long distance advice which is frequently a less than satisfactory solution. Technical assistance will be required from abroad for sometime to come. This is so because libraries are not technically equipped. Such technical or specialized training is hardly available at home and there is little fund available to travel abroad on short courses and also Nigerian librarians do not have written acquisition policy for selecting CD-ROM.

CONCLUSION AND RECOMMENDATIONS

We have seen that lack of infrastructure such as the lack of constant supply of electricity, poor telecommunication facilities, lack of spare parts for maintenance and repairs of machinery and lack of technical or specialized training at home cannot seriously affect the acquisition and operation of CD-ROM technology in Nigeria once the foreign exchange or cash component is overcome. The presence of these problems weigh significantly in favor of CD-ROM preferences in Nigeria as against online. In Nigeria today, there is a growing appreciation for, and acquisition of some word processors (especially in the universities) – with printers, computer systems to which a CD-ROM drive could easily be integrated. Such public awareness has already provided a fertile ground and the basic skills for CD-ROM acceptance and use. The growing evidence has been encouraged by governmental and non-governmental organizations. In October 1990, a team of consultants from the University of London, the British Council and Overseas Development Agency (ODA) visited Nigeria. They conducted workshop for University Librarians, heads of acquisition and relevant staff of the National Universities Commission (NUC). The main aim of the workshop was to ensure familiarity with CD-ROM and its application to administration, bibliographic and non-bibliographic activities of the libraries. CD-ROM is being used for electronic publishing and for making available expansive and large databases to libraries and information centres in far away and remote places. With the growing acceptance of CD-ROM, researchers in Nigeria could obtain world's periodical articles in any desired field of research within a short period of publication. It must be realized that Nigeria has lagged behind in the use of CD-ROMs and micro-computers because of factors such as high costs, poor telecommunication facilities and even lack of proper knowledge and expertise about these technologies. The impact of micro-computer and the electronic transmission of information will certainly grow dramatically in the years to come. CD-ROM can be a potential short-term medium to bridge the information gap in Nigeria. For Nigerian Librarian, CD-ROM provides an opportunity to own computer capability without the problems of Online Computer Services.

In Nigerian University Libraries, there is need for them to actively encourage users (students) to avail themselves of CD-ROM services. They should endeavour to produce brochures for their clientele that will describe the CD-ROM products located in their libraries and their ability to research. Both the government and relevant agencies like National Universities Commission should organize seminars and workshops on

annual basis to ensure familiarity with CD-ROM and its applications to administration, bibliographic and non-bibliographic activities of the libraries.

It must be emphasized that the manufacture of a CD-ROM is much less expensive than the manufacture of a book or journal, and once software has been developed it can sometimes be reused for other electronic products, so the high initial costs of electronic publication can eventually be offset. Consumer reference products such as encyclopedias and to some extent dictionaries, atlases, and other reference works make up a large part of the CD-ROM market and some may in time be accessible over the World Wide Web. These products are more marketable in electronic format than other types of book because they benefit more from the kind of automated searching and incorporation of multimedia elements (such as video and animation) that software allows. Educational publishing which has serious impact on libraries has also benefited from CD-ROM delivery for some of its products, as multimedia content is both attractive to students and can help them to understand complex concepts. Electronic publishing, the distribution of information and entertainment in digital format, usually include software that allows users to interact with text and images. This, along with more widespread availability of CD-ROM drives and intense interest in the potential of the Internet has turned electronic publishing into a mass-market industry after years of being limited to specialist information. The use of the Internet and CD-ROM to access information in Nigeria is now growing tremendously. People and students especially in higher institutions are being encouraged to regard computers including CD-ROM as tools to be used in all aspects of their studies.

In particular, they need to make use of the new multimedia technologies to communicate ideas, describe projects, and order information in their work. This requires them to select the medium best suited to conveying their message, to structure information in a hierarchical manner, and to link together information to produce a multidimensional document. Students should be using the Internet both to access materials, people, and resources, and to display their own Web pages created by teachers and students. These developments are not only giving learners'

access to vast libraries and multimedia resources, but give access to tutors and natural phenomena throughout the world. As far as library and educational development is concerned in Nigeria and other developing countries, computers with the use of CD-ROMs are essential tools in almost every field of research and applied technology. Database services and computer networks make available a great variety of information sources especially research library and information science. All these benefits are becoming more pronounced especially after the introduction and use of microcomputers. More recently, the introduction of microcomputer, microprocessors and computer combinations like CD-ROMs have made possible the development of library facilities especially in Nigerian universities and research institutions.

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