

# LIBRARY APPLICATIONS OF CD-ROM DATABASES WITH A CASE STUDY OF CD-ROM SYSTEM AT ISRO SATELLITE CENTRE LIBRARY

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*Stressing the positive roles played by CD-ROM databases in modernising services of libraries, explains the significance of CD-ROM technology in terms of enormous storage at low cost, ruggedness, use in remote locations and for archival purposes, potential for mass market distribution, efficient replacement of online searching in developing countries and highly versatile and efficient search and retrieval features; Discusses various library applications of CD-ROM databases including national, general and specific applications. Some of the specific applications enumerated are library automation, retrospective conversion, cataloguing, exchange of bibliographic data, current awareness service, retrospective searching, impetus to networking cooperation and resource sharing, developing local databases, expanded services like SDI at no extra cost, reference service, collection development and evaluation and*

*quantitative studies; Lastly, a cost and use analysis of CD-ROM services from a case study of CD-ROM system of ISRO Satellite Centre (ISAC) library is also presented.*

## 1 INTRODUCTION

Revolutionary changes brought forth by new technologies are helping libraries to realise their goals of modernisation. CD-ROM, as one such new technology, excels other media like magnetic storage, paper and microforms in storage, distribution, search and retrieval capabilities. Most of CD-ROM databases (anything received in the form of CD-ROM is customarily called as 'CD-ROM database' have their paper copy and/or magnetic tape counterparts with which librarians are quite familiar. The contents of CD-ROM products include: (i) Abstracts, (ii) Databases, (iii) Full text, (iv) Images, (v) Audio, (vi) Softwares. CD-ROM specialists dislike calling CD-ROM as

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logical extension of other existing media or one of the peripherals of PC. It is inevitable, for librarians, to consider CD-ROM databases as optical versions of print indexes and reference tools and as an alternative to online searching. As a matter of fact, till to date libraries are one of the main consumers of CD-ROM products.

It is not just the storage capacity of CD-ROM is enormous (600 MB) but the cost of storing is very low. As could be seen from Table 1, it is 14000 times cheaper to store in CD-ROM than on paper. Hence, CD-ROM databases save space even much more than microforms. The cost structure of CD-ROM is different from that of floppy or magnetic tape but similar to that of phonograph records or traditional book printing, *ie.*, it has an initial setup charge and a low per-copy cost thereafter (Table 2).

CD-ROM databases can withstand and operate under difficult and harsh conditions like heat, humidity, dust, surface scratches, microwave radiation, magnetic fields and unstable power supply in remote environments. This ruggedness together with easy and cheap duplication from CD master

Table 1: Cost of Storing one MB of Data (In \$)

Online	200
Hard disc	10-20
Floppy	1-2
Paper	7
CD-ROM	0.005

Table 2: Cost Structure of CD-ROM (in \$)

Master making	3000-5000
Duplicating	6-30
Material	2

make them quite effective for archival storage. However, more research into the physical properties of CD-ROM and optical digital discs is needed to demonstrate its durability beyond 10-30 years shelf life to fully replace microforms. Presently, CD-ROM can be made to survive beyond its shelf life by rewriting the information onto a new disc with powerful error detection and correction mechanism.

CD-ROM is the first practical technology for mass market distribution of databases. This is a producer's technology in the sense that it is cheaper to produce in volumes and almost impractical to pirate. There is no limit to the number of discs which can be produced and distributed. Unlimited number of queries can be directed to each disc. Yet the database is relatively secure from accidental erase or damage of contents. As such these Rainbow discs can cause dramatic change in access to and compilation of information. CD-ROM has become almost *de facto* standard for distribution within the publishing industry. CD-ROM databases have substantial impact on libraries particularly those which do not enjoy telecommunication facilities.

CD-ROM databases are an effective alternative to online searching and help to overcome the problems to poor communications. They not only eliminate need for costly and difficult telecommunication links, but also provide great flexibility that CD-ROM workstations are portable and even battery operated. CD-ROM databases help to overcome many problems which plague the centrally located database with electronic connection to far-flung locations. CD-ROM database is a case where the rich can pass on the benefit to the poor. In other words, they are ideal for developing countries with underdeveloped telecommunica-

tion infrastructure. Hence CD-ROM is aptly termed as the technology of the 'information isolated' areas and 'information poor' countries. CD-ROM can provide 'custom-made' technology for less developed and developing countries. However, we are yet to see improvement in the quality of contents of the databases to suit the local needs.

As far as search and retrieval efficiency of CD-ROM database are concerned almost all the features of online searching are available for searching CD-ROM databases. Most of the softwares of CD-ROM databases allow for searching by 20-25 criteria with over a dozen browsable indexes including search techniques like Boolean, truncation, ranging, word proximity, field directed, free text, numerical values, chemical formulae, search qualifiers, set building, etc., together with setup and installation options, re-executing saved searches, both on other CD-ROM discs as well as online databases, thesaurus aid, downloading facility, etc. Futuristic retrieval techniques like feedback and fuzzy logic as well as expert system, in all possibilities, will be available on CD-ROM databases once they are available for online searching. All these facilities and features are available at one's own workstation to carry out search either by end-user or library staff as a mediated search without any tension of telecommunication failure or exorbitant telecommunication cost. One can do it very leisurely having the luxury of trial and error mode of learning. Above all some of the softwares of CD-ROM databases like that of PROQUEST (of INSPEC) help you to customise the database by marking the availability of the primary documents in a given library or group of libraries. Thus libraries holding information virtually upgrade the database to the level of OPAC and union catalogue.

## 2 AREAS OF APPLICATIONS OF CD-ROM.

A big list of real and hypothetical applications of CD-ROM is often touted by technology promoters. Library applications are only part of the gamut of applications of CD-ROM technology. Since almost all that is available on CD-ROM are also available on paper and some of them in microform and/or on magnetic medium, it is desirable to look at the additional benefits of getting information on CD-ROM. CD-ROM databases save space, are easy to carry and use, provide perfect file integrity, help low cost on demand information dissemination and distribution, suit archival function, provide perfect security and protection—all of which were once claimed by microforms.

CD-ROM products generally present more current information than print sources do, but less current than online sources. It so happens (inspite of the fact that the periodicity of print products may be less than the frequency of updating CD-ROM products) for the reasons that print sources are often the by-products of process of electronic database production and mail/transit delays are much more for print products than CD-ROM products. Yet more immediate problems such as copyright restrictions, standardisation and other issues like option for outright purchase as against annual lease need to be settled for wide acceptance and use of CD-ROM databases.

## 3 LIBRARY APPLICATIONS OF CD-ROM DATABASES

Before going to the specific applications of CD-ROM databases in libraries, we may note some of the notional and general applications of CD-ROM databases. Firstly, a CD-ROM workstation with few CD-ROM databases would enhance the image of the

library and serve as an excellent public relations tool, both of which are very important in view of increasing need for marketing library products and services. CD-ROM databases are effective and cost efficient alternatives to costly online services in developing countries. However, advocates of online services hold the view that CD-ROM databases do not supplant online and library services but only supplement them. The reasons put forth include quick access, availability of expertise of intermediary, supply of hard copy, time saving benefits, need for diversity, currency and comprehensiveness, availability of extensive back file for retrospective search, etc. Naturally, Dialog Inc. feels that CD-ROM is a poor replacement for online searching. CD-ROM has not only helped to de-mystify the aura of online searching, but also serves as an aid to learning, teaching and improving keyboard skills, computer literacy and general search confidence among library staff and end-users. CD-ROM technology ideally suits archiving gray literature including standards, patents and newspapers. CD-ROM databases expand horizon of extension services of libraries with many directories and reference tools in audiovisual forms and systems like vehicle navigation system on CD-ROM. CD-ROM databases provide ample scope to expand services to users. With this background let us go into the specific library applications of CD-ROM which can also be thought of as substitution services, value added services and new/innovative services made possible by CD-ROM databases.

### 31 LIBRARY AUTOMATION, RETROSPECTIVE CONVERSION (OF BIBLIOGRAPHIC DATA) AND CATALOGUING

One of the indirect applications of CD-ROM databases (began right in 1985) is

helping library automation. In India library automation efforts have stumbled for quite some time and taken abnormally more time for various reasons. One of the serious difficulties of automation even after proliferation of computers and availability of cheap softwares is enormous time, efforts and manpower needed for capturing accurate data. CD-ROM as a cheap mass storage alternative, today provide many national bibliographies, and catalogues on it to economically down load the required data for library automation and also to carry out quick and authentic cataloguing. In addition, the OPAC of individual as well as groups of libraries became the source for cataloguing and retrospective conversion of data for many libraries. Many commercial establishments offer such OPACs for use by libraries anywhere in the world. Some of the well known systems are presented in Table 3.

These CD-ROM products have greatly helped the users and libraries with excellent search softwares, exhaustive and accurate coverage and improved catalogues. Libraries are benefitted by economising in terms of data capture and entry including retrospective conversion of data, cataloguing and indexing activities, maintaining uniformity in class numbers and descriptors, easy reclassification and change of scheme, 'on-the-fly-processing' in circulation and having the information about holdings of other libraries. At the same instance, users have a more efficient, versatile, accurate, user friendly OPAC which often indicated how to locate them on shelves and availability in other libraries including spoken help, browsing shelf list, closed access racks and branch libraries, auto-help screen and logged record of searches made. A cataloguer or a user can pose vague or incomplete queries to above databases to check

**Table 3: Machine Readable Bibliographic Records on CD-ROM**

Name	No. of Records	Producers
LaserQuest	4 m	G R C
Bibliofile	3 m	Library Corporation
MINIMARC	3.5 b ch	Library Systems & Services
CD MARC Bibliographic	4 m	Library of Congress
CAT CD-450	1.2 m	OCLC
Laser Cat	8.5 m	WLN
Le Pac	Customised	Brodart Automation

full bibliographic details and availability. The Intelligent Catalogue of the Library Corporation applies inference techniques to search and recommend additional items to users. Laser Guide of General Research Corporation, as a unique browsing mode to scan 'closed' stacks and shelves of branch libraries, provides library's floor plans giving users a map and instructions to users to locate books. Le pac from Brodart Automation provides customised PC and CD-ROM containing the library's unique card catalogue. In addition to offering advice, plenty of cross references are automatically presented and access can also be restricted to newest titles. Above all, user can make and save notes as a search is in progress. These CD-ROM catalogues provide accurate and up to date authority lists.

#### 32 EXCHANGE OF BIBLIOGRAPHIC DATA

The potential of CD-ROM databases for exchange of bibliographic data is enormous and such standardised exchange of bibliographic data goes long way in helping libraries. Creation and production of authoritative bibliographic records of a nation and the national bibliography for international exchange, for cooperative systems, for use

in individual libraries, for abstracting and indexing services, for use in online information-retrieval systems, for use in the book trade, *etc.*, has been an issue bothering information professionals for quite sometime.

CD-ROM has been the most exciting and far reaching technological innovation of recent times for the development of standard procedures for transfer of information between computer systems with diverse hardwares and softwares. ISO's Open Systems Interconnection (OSI) protocols exemplify the decisive advance made possible in respect of networking on a global scale. International MARC community has already started work to standardise production of databases of national bibliographies on CD-ROM with a view to allow easy interchange of CD-ROM products from different agencies.

The discs would be accessed, searched and downloaded using the local search language and it would be possible to switch between discs without changing language. There is even a BNB project to see whether records produced according to different cataloguing rules could be placed in one CD-ROM with a quest for economies in

library cataloguing through an increase in the exchange of bibliographic data. They are hopeful of coming out with a retrieval interface if not complete standardisation.

CD-ROM is also considered to be a likely medium for the distribution of national bibliographies. The international MARC Networks Advisory Committee has been aiming to establish a standard for applications software for CD-ROM for use in national bibliographies.

CD-ROM discs are not transfer media and ISO 2709 is essentially a tape standard though it can be used for other transfer media. CD-ROM databases usually exist in another medium before being converted to CD-ROM. Many CD-ROM producers secure data in variety of formats including ISO 2709. Hence, ISO 2709 can be used in the generation of CD-ROM though CD-ROM packages do not themselves usually output ISO 2709 data. However, suppliers of CD-ROM databases can provide an ISO 2709 interface for promoting the downloading of data from the CD-ROM. For commercial reasons many CD-ROM suppliers would not want their data to be incorporated in other information-retrieval systems. As such libraries may have to have their own programmes for processing and importing the data downloaded from CD-ROM databases.

### 33 CAS AND RETROSPECTIVE SEARCHING

Replacement of online searching and subscription to secondary journals by CD-ROM databases with more versatile search softwares is one of the significant applications of CD-ROM bibliographic databases and a logical outgrowth of secondary journals subscribed for last several decades. It is widely held that most of the secondary journals are either under-used or unused by

library customers. These abstracting and indexing journals with their quarterly, semi-annual, yearly and some times even five yearly cumulations and varieties of indexes cost heavily in terms of subscription price, binding charges and storing space. On the other hand, budget crunch faced by most of the libraries is forcing them even to cancel subscription to some of the secondary journals. The arrival of CD-ROM versions of these tools in the market at this juncture with their versatile searching, efficient retrieving and post-search processing facilities is a timely boon to libraries. CD-ROM databases are giving a good break in promoting the use of secondary journals.

Then came a question whether libraries should cancel subscription to paper copy versions of secondary journals or can they justify subscription to both CD-ROM and paper copy versions. In the west, there has been a lot of for and against arguments on cancelling subscription to printed indexes. Some of the reasons in favour of not to cancel print indexes are : (i) Licence agreements of some CD-ROM databases stipulate that all CD discs must be returned once subscription is cancelled resulting in non availability of back files. (ii) Most of the CD discs cover only few recent years. (iii) Some CD-ROM databases differ in their contents from their print versions. (iv) Retrieval capabilities of not all the CD-ROM databases are satisfactory. (v) Frequency of updates of most of the CD-ROM databases are much longer than that of print indexes. (vi) Unless a multi-disc technology or CD-Net is installed only one person can search a CD-ROM database at a time. (vii) CD-ROM databases cost more than their printed versions. Most of publishers allow substantial discount for CD-ROM databases only when print indexes are also subscribed.

(viii) CD-ROM databases have a shelf life of at least ten years and which is likely to be less than shelf life of good quality paper. Not all the above reasons put forth in favour of continued subscription to print indexes are valid in the Indian context. It is necessary to have a case by case examination keeping in view the price and the requirements of users. Ideal in our environment is to subscribe to either CD-ROM or print version with arrangement to depend on cooperating libraries for the other.

Apart from the versatile search features mentioned earlier, some of these softwares of CD-ROM databases allow customer accounting and security, search aids like thesaurus, several indexes including numerical and chemical indexes, automatic spelling variations as well as singular-plural versions, change disc options in single disc workstation, instantaneous display of library holdings information and many other features found in a typical online search facility.

The obvious question is whether a library which has established a CD-ROM workstation with subscription to required CD-ROM databases should continue to have online search facility. Comparing and contrasting online with CD-ROM is outside the scope of this presentation. It is very obvious that CD-ROM databases will have a fixed annual cost for unlimited use (as against cost varying with usage in case of online searches), very low distribution cost (as against high telecommunication cost of online searching), more flexibility in searching alternatives and added features through appropriate software, unrestricted and unlimited access, data stored locally and located at convenient place, no additional cost for downloading data, possible

addition of graphic data to supplement text, efficient use of user time, etc.

Another innovative application of CD-ROM database is providing regularly (as and when updates are received) the contents (with abstracts) of costly and/or less relevant journals as well as those cancelled for various reasons including budgetary constraints after searching by journal name.

#### 34 IMPETUS TO NETWORKING, COOPERATION AND RESOURCE SHARING

Like library automation, the related areas of networking of libraries as well as cooperation and resource sharing among libraries have been indirectly promoted by CD-ROM databases. Apart from the CD-NET and other networking option of CD-ROM installations, the following resource sharing options are available through CD-ROM databases. First of all, some of the PACs discussed earlier have a provision to indicate the names of the libraries holding a given document and provide an inter-library loan option. For example, LePac of Brodart-Automation with electronic mail coupled with complete data-base on CD-ROM can allow each member to search and execute inter-library loan option. The operator stores loan requests and responses on a hard disc and sends them to the ILL Director for transmission at night to each participating library. The system receives responses and new requests and stores them in the mail queue. If a response does not arrive after a predetermined length of time, the ILL Director sends the request on to the next library in queue. The ILL Director collects and maintains records of ILL and calling activity, errors, and exceptional conditions on the hard disc. It can store up to 50,000 requests, acknowledgements and related messages as well as track continuous statistics on up to 500 ILL option workstations. It

has been reported that use of such CD-ROM PACs has substantially increased ILL transactions and circulation.

Secondly, project like ADONIS, a joint effort by ten commercial publishers with trial documents delivery service that supplies biomedical journals on CD-ROM on a weekly basis to 12 major document supply centres in Europe, USA, Mexico, Australia and Japan is yet another area where full-text CD-ROM databases played significant role in providing service to libraries and their end-users. Thirdly, CD-ROM services of one library in a group of cooperating libraries can be more effectively and efficiently shared with other member libraries through FAX and E-Mail. Fourthly, national bibliographies on CD-ROM prove invaluable for library cooperation and inter library lending. Projects of British Library and Bibliotheque National are likely to yield rich dividends to libraries of the respective countries. Providing contents of costly or less relevant or cancelled journals to end users mentioned earlier as a CAS can be extended to co-operating libraries.

#### 35 DEVELOPING LOCAL DATABASES

CD-ROM databases with provision to download selected records and process and upload to other databases give ample scope for small libraries to develop their own local databases. As most of the databases follow standards formats and there are softwares which can easily process and import data from CD-ROM databases, the task of developing specialised databases is made simple, cheap and easy.

#### 36 EXPANDED SERVICES TO USER

Keeping CD-ROM databases as bases, libraries can develop many interesting and useful services to their customers. Specialised current awareness bulletins like

recent conferences held with list of papers, theses submitted to various universities, institution or individual (author) oriented information, etc, can be easily generated and disseminated. One typical example apart from production of CAS and anticipatory bibliographies is SDI service. Hitherto, SDI is a service rendered by only few libraries which had adequate facilities and manpower. CD-ROM databases have made it as simple as developing a profile in the form of a search query and storing the query in the PC for execution with every update of CD-ROM database received.

#### 37 REFERENCE SERVICE

Quite a good number of reference tools are now available in CD-ROM form with sophisticated search and retrieval softwares and multimedia information. The development of these full text databases is slower than bibliographic databases due to complexity of full text retrieval software (*i.e.*, searching unstructured language out of context), need for efficient retrieval design from CAV-based CD-ROM discs (recording on concentric sectors as against continuous spiral recording in CLV) and inability to handle graphics efficiently on CD-ROM. Many CD-ROM reference tools combine more than one (at times as many as ten) printed tools in one database. Search logic such as Boolean, keyword, proximity, etc. with option to store queries, save searches, download hits on to discs for processing with word processing softwares, highlight words for looking up corresponding dictionary part, consulting 'path to article', placing 'book marks' to review, etc are available in the CD-ROM reference tools.

Like secondary journals, many reference tools are costly, often under-used, bulky to store and involve lot of time and



efforts to search by end-users as well as library staff. Further, unlike bibliographic databases, most of the reference tools on CD-ROM are available for outright purchase. Reference tools on CD-ROM relieve users and library staff from arduous task of moving from rack to rack carrying heavy volumes and scratching their heads for complicated arrangements in printed volumes.

The original of Oxford English Dictionary (from Tri-Star Publishing), the Guinness disc of records 1990. The New Grolier's Academic American Encyclopedia, The McGraw-Hill Concise Encyclopedia of Science and Technology and the McGraw-Hill Dictionary of Scientific and Technical Terms (both in one), International Encyclopedia of Education (Pergamon Infoline), Bookshelf (from Microsoft and includes 10 reference tools), The CIA World of Factbook (information on 249 countries and territories), Newsbank's file of 700,000 news clippings, parts-master (NSA's database of over 12 million parts and products procured by the US Government) 47 volume National Directory of the US Postal service for Address Verification System from Information Design etc., are some reference tools available on CD-ROM. Instruction and service manuals, product catalogues, telephone directories, maps, charts, navigational systems, forms and regulations information, satellite imagery and other reference tools are also expected to be available on CD-ROM in the near future.

It may be noted that specialised application of CD-ROM enable integrated reference products with customised packaging of data, value added by including images, sound, etc., with textual data and specialised single-applications systems. For example, Datatek offers Data Times, a

customised CD-ROM databases (full text) of their newspapers clipping service and the Merriam Webster Dictionary is a visual dictionary with audio pronunciation for each work. The multimedia Encyclopedia contains that text as well as audio of historic speeches; stills of actual events set to music; symphonies heard while reading about the symphony and seeing sheet music; colour images which can be enlarged for closer analysis; motion sequences of migratory paths, animal and chemical behaviour; multiple language explanations of the same visual image; annotated text, etc. Hence reference tools on CD-ROM are much more than traditional printed books and provide service much higher in value and can be used with least interference by the reference librarian. Other full text databases include combined facsimile images of all IEEE journals with ASCII index from UMI and military specifications and standards from IHS.

CD-ROM has enormous potential to become an integral part of reference services in libraries. Because of ease of use and affordability, West has already made heavy use of this technology both for reference service and collection development. Time is not far away that reference librarians will spend more time at computer terminal than at reference desk. Further, with placement of CD-ROM systems, reference desks will become busier than before not only for reference service but also to assist and train users in use of CD-ROM and for bibliographic instructions. In fact, CD-ROM itself is a good medium for learning, teaching and bibliographic instruction.

#### 38 BIBLIOGRAPHIC INSTRUCTIONS TO USERS

Bibliographic instruction as part of user education aims at instructing or training

users to make optimal use of information resources and save time in their literature search within specific subject disciplines. They are normally longer courses, vary in content according to subject and type of users and meant for research and project workers, decision makers, planners, managers, etc to help search for information and to maintain personal information system. It may be noted that instructions and training about CD-ROM systems is needed as part of user education in addition to using CD-ROM as an aid for bibliographic instruction. Some of the new technologies are pretty easy to use, but very few can be efficiently used without training. The aim of the whole programme is to make end-user searching as easy and as comfortable as possible, minimise waiting time at the work stations and avoid resorting to time consuming trial and error mode. Users are the best judges about the value or utility and suitability of information retrieved and hence the quality of information retrieved will often depend on the 'stamina' of the searcher. However, many end users are very busy to get involved during the search and may have little time to spend on information retrieval. Further, the two stages which go hand-in hand are finding information and processing what has been found. The need for end-user involvement is more critical for processing information than finding it and it is here that training them in many ways of post search processing of information, integrating it with other information he already has and efficiently managing his personal information system become crucial.

Well organised personal information system facilitates and stimulates better and more intensive utilisation of accumulated information that in turn stimulates creative thinking and that leads to improved style of

intellectual work of user. In other words, personal information system prevents information once gained from being lost, intensifies the use of available information resources, improves organisation of knowledge, provides opportunity for creative use of information, allows for linking of facts and ideas and helps to discover hitherto unseen relations, associations and conclusions.

Many studies and surveys have revealed that CD-ROM databases are more effective and less costly than the alternative methods for both learning and teaching bibliographic instructions and there is a dire need for end-user training to enable them to access needed information privately and independently. The need for training may be expressed by end users or felt by the library staff by observing signs of novice users like sitting in front of the work station with lots of beeps, moving from index to index and long periods of inactivity. A short introductory training together with manual (containing basic commands, description of databases, etc), flip charts, quick reference guides, other instructional materials and personal assistance at work station would enable end users to use the system more fruitfully. It is interesting that with a little modification to hardware and user interface, attempts are being made to enable even disabled persons to learn to use CD-ROM system independently.

#### 39 COLLECTION DEVELOPMENT AND EVALUATION

Collection development, management and evaluation are the central and most crucial functions of a librarian. CD-ROM databases have extensive applications in all the phases of collection development and evaluation including selection of documents, checking and enriching bibliographical details, pre-order searching, avoiding dupli-

cate acquisition, direct import of data and even incorporating an automated acquisition system with facilities to print purchase order, order cards, catalogue cards, etc. For example, Bowker's Books in Print Plus consolidated seven printed publications of Bowker on one disc with 1.8 million records of more than 31,000 publishers with 18 search criteria, 10 browsable indexes, 11 output formats, facility to download, print purchase order and card catalogues. Books in print with Book Reviews plus in addition to above facilities provides 1,23,000 book reviews with over 30,000 new reviews added each year to make book selection more meaningful. Bowker has many other CD-ROM products for collection development and evaluation. The Library Corporation's Any-Book which contains 1.5 million bibliographic records with names and addresses of 22,000 publishers incorporates an automated acquisition system with provision to produce purchase orders and maintain all acquisition records including monitoring the status of orders, fund accounting, and ability to identify misspelled words and to suggest possibilities for selection. It can also transfer the ISBN to a special file for use with the Bibliofile Catalogue Production System. The DelMar Group has created the Bookseller's Assistant for bookstore customers to look up books and Laser search in an in-store book identification and ordering system available from Ingram Book Company.

A prototype of Librarian's Inquiry Terminal (which is a library-based version of SMART catalogue of Delmar intended to help increase in sales in book stores), developed by Baker and Taylor and the Delmar Group, conceptualises a database combined with catalogue of books available, librarian's knowledge and review capabilities to

give suggestions for books to buy and read, generate list of suggested titles based on books already read and enjoyed by users and users profiles. Here the intelligent interface is integrated with a CD-ROM PAC. The system uses touch screens and artificial intelligence techniques. After locating an item it shows the dust jacket, the table of contents and first page and provides information on the author as well as a review of the book. When it becomes available this will be an highly imaginative tool for acquisitions librarian for both collection development and collection evaluation.

Even bibliographic databases like INSPEC provide provision to search for new books published. There are other databases like NTIS for technical reports and Dissertation Abstracts on Disc for theses which can also be used for collection development in the respective areas.

Ulrich's plus from Bowker contains citations to over 1,15,000 periodicals and 55,500 annuals and irregulars with 75 data elements for each records and details of 65,000 publishers in 187 countries. It allows 28 search criteria, provides 11 browsable indexes and 7 display formats. This selection tool can be used to reconstruct incomplete titles, plan new collection development strategies, de-selection of titles, generate and download lists of journals by subject, publishers, country, etc. In addition, EBSCO CD-ROM (The Serials Directory) with over 113,000 serials publications including annuals and irregular series as well as Faxon Co's Library of Congress MARC-S Serials file on CD-ROM with over 2,25,000 records are being made available for collection development and evaluation relating to serials.

Most of the CD-ROM databases provide

comprehensive checklist for evaluation of collection. In CD MARC Bibliographic, while scrolling through the LC shelf list, one can compare library's holdings against those of LC. CD-ROM search statistics can also be used to assess the weak and strong areas of the library's collection so that remedial measures can be taken.

Software like ONDISC and PROQUEST (V 4.30) provide extensive facility to monitor and record usage of CD-ROM databases. Apart from knowing how long a workstation or a database or a disc is used, average usage per day, total Boolean search done and total number of topics searched, one can also know the extent of use of a CD-ROM database by a given user or user department, the number of records viewed and downloaded for each journal title, etc. The possibility of generating journal usage report in an alphabetical order in systems like that of PROQUEST enable one to build a library specific rank list of journals for collection evaluation.

#### 310 QUANTITATIVE STUDIES

Citation indexes and their byproducts have been the major sources for bibliometric and quantitative studies in libraries. By providing citation index like Science Citation Index (SCI) on CD-ROM the work of such quantitative analysis has been made extremely simple and easy. Many libraries in developing countries cannot justify having such tool either in paper or on CD-ROM for bibliometric studies. However, limited quantitative studies can be carried out as an incidental use of CD-ROM bibliographic databases used for other purposes. Productivity of institutions, countries, journals, etc, can be easily elicited from these databases. For example, INSPEC provides 24 browsable indexes, most of lan-

guages, year of publication, journal name, corporate source, publisher and place of publication provide useful year-wise analysis of data. Table 4 gives data regarding year of publication of documents covered in INSPEC for last four years extracted in just 10 minutes. Unlike, citation indexes, usage of other CD-ROM databases for quantitative studies is limited because structure and content of the database as well as their softwares are not designed for the purpose and hence there is no flexibility in manipulating these databases for extensive quantitative studies. Yet the library specific ranking list of journals mentioned earlier is a more refined tool for a given library than the 'Journal Citation Report'.

#### 4 ANALYSIS OF USE AND COST OF CD-ROM DATABASES: A CASE STUDY OF ISAC LIBRARY SYSTEM

Cost is often the ultimate factor for changing from print medium or online version to CD-ROM databases. Online searching involves charges on usage basis in terms of connect hours, number of records printed or downloaded and telecommunication time plus a fixed annual password fee. On the other hand, printed indexes and tools have only one time price for purchase. CD-ROM databases are either one time purchase or annual subscription for a fixed price with replacement/additional monthly or quarterly updates. Some of the subscriptions are on lease with conditions of using at one workstation within the same organisation and returning all the discs once subscription is cancelled.

At present, most of the CD-ROM databases are priced slightly higher than their paper copy counterparts and substantially lower than the prices of the same databases on magnetic tape. These prices of CD-ROM

*Table 4: Analysis by Year of Publication of Documents Covered in INSPEC*

Year of Pub	INSPEC database			
	1990	1991	1992	1993
1981	1	0	0	0
1982	7	0	0	0
1983	11	0	0	0
1984	4	0	0	0
1985	106	9	0	0
1986	504	27	0	0
1987	1594	186	13	0
1988	11670	3017	163	0
1989	127372	12082	1536	102
1990	117827	126757	13831	1285
1991	22	118067	123573	9570
1992	1	1	152038	88029
1993	0	0	120	151930
1994	0	0	0	193

databases are likely to drastically come down as volumes of sales go up for obvious reasons explained earlier. It is also anticipated that in future the prices of paper copy counterparts of CD-ROM databases might also increase and ultimately paper copies might even vanish giving way to electronic medium. Thus CD-ROM is likely to become more economical medium than even microforms and print formats in the near future.

It is meaningless to think of economics of subscribing to CD-ROM databases without cancelling the corresponding print copy subscriptions and quite often cost per record is cheaper on CD-ROM than in print version.

Apart from many non-library applications and non-economic considerations like

convenience and completeness, CD-ROM databases offer lower costs in saving space, quick access and cheaper prices particularly on per record basis.

To have a closer look, the cost analysis of five CD-ROM databases acquired and being used at ISRO Satellite Centre (ISAC) library is examined. Table 5 presents a comparison of cost of subscription or purchase per year of five CD-ROM databases and their print counter parts. INSPEC, COMPENDIX and NTIS are bibliographic databases and BIP Plus and BOOKSHELF are reference tools. In case of INSPEC, CD-ROM database has become 26% cheaper than print version due to special concessional offer. In case of COMPENDEX and NTIS, the CD-ROM subscription cost 27% and 64% higher than

Table 3: Comparison of Cost of CD-ROM Databases with Print Version

Sl. No.	Name of Database	Period covered (back file)	Freq. of up-dates	Pur-chase or Lease	No. Discs	No. of Records in thousands	Price (1993)		% in crease for CD-ROM	Cost per Record (in cents)			
							CD-ROM	Print (per yr)					
1	INSPEC	1990-93	Q	P	4	875	250	\$3500	P. 3100 (\$4712)	--26	3	19	
		[94]					280	\$3785	P. 3300	(\$ 4950)]			
2	COMPENDEX	1992-93	Q	L	2	300	200	\$ 3450	\$2710	27	7	14	
3	NTIS	1985-93	Q	L	.2	321	60	\$2350	\$1435	64	6	24	
		[94]					80	\$2350	\$1435				
4	BIP PLUS	1993	M	L	1	1800	-	P. 820 (\$ 1246)	\$ 1450	--14	-	-	
5	BOOKSHELF	1992		P	1			\$295	\$200	48	-	-	

the print indexes respectively. At this juncture it may be noted that print subscription does not cover back file whereas CD-ROM subscription cover back file ranging from one to three years. Hence the cost per record (taking into account the number of records in back file, which is logical for first year's subscription) on CD-ROM is invariably cheaper than print indexes. As could be seen from the Table the cost per record on CD-ROM is cheaper by more than six times in case of INSPEC, four times in case of NTIS and two times in case of COMPENDIX than the cost per record in the respective print indexes.

As mentioned earlier, BIP Plus covers contents of seven printed tools and BOOKSHELF covers contents of ten reference books. BIP Plus is cheaper by 14% than cost of those seven printed tools put together and BOOKSHELF is costlier than its printed versions put together by 48%. The above analysis of subscription cost of CD-ROM databases is likely to change when a library tries to renew them year after year as there is no additional back file available to library at the time of renewal (see 1994 renewal price of INSPEC and NTIS in the Table).

Above all, it is the intensity of use of databases which determine whether the price paid is worth and the cost is recovered. One may even attempt to find out how cost and use breakeven keeping alternatives like online search and printed indexes in view.

The above three bibliographic databases have been acquired at ISAC library and a CD-ROM workstation installed in mid 1993. The system is kept open for about 5 hours a day and 5 days a week. Soon, there was sudden spurt in literature search requests and total fall in use of online and print indexes of these data-bases. The first

three months with least training imparted resulted in over 120 on-demand specific subject searches executed and more than 4600 records downloaded and provided to users apart from use of these databases by library staff for other purposes. Similar searches on online mode earlier used to cost the library Rs 500 to Rs 1000 per search. A one-day training in use of CD-ROM databases was conducted for representatives from various divisions and groups in the Centre. At the end of one year, more than 14,200 hit records retrieved, downloaded and used in response to over 800 on demand queries of users.

In addition, CD-ROM databases are used for providing regular SDI service and for developing local databases. Two such databases developed so far are on 'Control engineering' and 'Communication engineering' each cover over 5000 records downloaded from last 4 years literature from two different sets of 19 core journals. They are ready for use on LAN with an enduser interface having easy menu mode search by author, keyword, journal title and article title. Further NTIS and BIP Plus are intensively used by acquisitions staff for documents selection, pre-order checking for bibliographical details, price, etc as well as to download and import relevant records to acquisition module of library application software.

## 5 CONCLUSION

There are many surveys conducted in the West about use and acceptance of CD-ROM databases by the end users and the results are overwhelmingly favourable to CD-ROM databases. Most of the surveys found high degree of user satisfaction and their preference to search with CD-ROM rather than print indexes. However, need for

some training or assistance to users was felt by the majority. At the same time, use of inappropriate databases, lack of knowledge and awareness about the availability, applications and use of CD-ROMs were also reported in these surveys. In one survey 97% of the users thought that CD-ROM were easy to use (Welsh, 1989) and in another 70% of librarian encountered students using inappropriate databases (Dyson and Carey, 1993). The interesting thing is that users have great trust and reliance on computerised sources like CD-ROM (Dyson and Carey, 1993).

With the trend like reduced prices of hardwares and CD-ROM databases, innovative linkages between new and old databases online/disc hybrid systems, common search software and command protocols, increased competition, LAN for multi-user access and processing, enhanced software interfaces and workstations which can handle more than one optical natural language, artificial intelligence and knowledge based system features, multimedia technology, standardisation, etc., must make CD-ROM a better alternative in terms of affordable cost and ease of use and not a luxury but an essential new resource in libraries of developing countries.

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