

Prospects and Problems of Microforms in Libraries

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Describes how microforms have become inevitable recording media. Defines microform, explains popular types of microforms, concepts and terminologies relating to micrographics. Examines the positive roles of microforms. Enumerates opportunities and threats posed by microforms. Provides a representative list of sources for selection of microform literature. Emphasises systems approach in designing a 'micrographics unit' for a library.

0 INTRODUCTION

An attempt to quantify information explosion revealed that scientific information available at the time of Thomas Edison (1847-1931) could be represented in a bar chart with a 4" high bar and the growth from the end of second world war (1939-45) to 1967 presented on the same scale led to a bar as high as 70 story building.¹¹ Do we really have enough media to record, duplicate and distribute these tremendous information output? Of the three media, viz., paper, electronic storage and microfilm, the electronic storage is prohibitively costly and paper has become dearer in almost all countries. Taking for granted that enough paper is available, it would be a Herculean task for any library to acquire, organise and retrieve all relevant information in paper medium alone. This is how inevitably microforms have come to stay with us. More and more libraries around us are acquiring microforms to overcome their budget cuts and inflation, to avoid unlimited extension of library stacks, to maximise acquisition of relevant information with their inelastic budgets, to cut delays in acquiring information and to avail of ease in handling and

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storage. Surprisingly, the aggressive selling strategies of trade have also contributed considerably to promoting microforms. This is in spite of the fact that users always, and almost everywhere, resisted use of microforms.

Nowadays many manuals of equipments and R & D reports are available only in microforms. This does not mean that microforms are bought in libraries unwillingly and without advantages. In fact, microforms are modern, efficient and powerful communication and information-handling tools affording enough opportunities and threats to librarian. They have vital role to play in providing information services if actively adopted as a 'system' giving due consideration for user reactions and supporting facilities. A library can either convert its existing collection to microform through its own microfilming facility or through job worker or acquire microforms from outside agencies and micropublishers.

1 WHAT IS MICROFORM?

Microform is one which carry almost permanently reduced images of printed or written matter in such a way that the reduced images are no longer legible to read with naked eye. Microforms are compact, uniform, light weight, versatile, clean and inexpensive information storing and handling media.¹¹ Microform is a generic term for any form, either film or paper, which contains microimages.

2 SOME POPULAR TYPES OF MICROFORMS

21 MINIATURISED PRINTING

Miniaturised printing is most primitive type of microform wherein images are printed at about 5× reduction ratio.² Normally miniaturised printing is adopted for publishing reference works such as dictionaries and encyclopaedias and a magnifying lens will be provided with the copy.

22 MICRO OPAQUE CARDS

Micro opaque cards are flat rectangular opaque material on which one or more images are recorded. Reading of opaque card is based on light reflection principle. The size of microcards vary from 3" × 5" to 6" × 9". R & D reports were regularly brought out in this form. Even though

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opaque cards have the advantage of recording images on both sides, they are now almost ceased, giving way to newer forms.

23 MICROFILM

Open reel film is one of the earliest microforms extensively used for archival purpose. The width of a film could be 16 mm, 35 mm, 70 mm, or 105 mm, and length normally around 100 feet. In addition to spool or open reel, microfilms are also available in cartridges and cassettes. Newspapers, back volumes of periodicals and books are available in microfilm. Microfilm offer only sequential and hence comparatively slow access to information.

24 MICROFILM JACKETS OR UNITISED MICROFILM

Microfilm jackets are transparent plastic carriers with single or multiple sleeves or pockets made to hold microfilm in flat strips.¹⁰ Jackets could be 3" × 5" or 4" × 6" or 5" × 8" and microfilm strips could be 16 mm or 35 mm. Periodical articles and other shorter documents are normally produced in this form. Microfilm jackets have greatest advantage of acting as master for producing microfiches and allowing for easy updating. Of late microfilm jackets are available in the form of continuous stationary mounted on sprocketed computer stationary.

25 MICROFICHE

Microfiche is a sheet of microfilm containing multiple microimages in a grid pattern.¹⁰ It usually contains a title which can be read without magnifying aid. Microfiches are available in various sizes such as 3" × 5", 4" × 6", 8½" × 11½", etc., with different reduction ratios. The most common size of microfiche is A6 (i.e., 4" × 6") and common reduction ratios are 24x, 42x, 48x, and 60x. The number of image frames vary from 60 to 200 depending on the size and reduction ratio. For example, a 24x microfiche of A6 size will have 98 frames. A6 size microfiche can be made by cutting 105 mm microfilm roll at every 6". Normally, reports, individual issues and papers of periodicals, conference papers, books, and monographs are available in microfiche. Microfiche allows for random access to information and it is extremely cheap to duplicate a microfiche. For

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instance, a 98-frame microfiche costs just 10 cents to duplicate. As such microfiche is becoming an extremely popular medium among microforms.

26 ULTRAMICROFICHE OR PCMI (PHOTO CHROMIC MICRO IMAGES)

Ultramicrofiche is a microfiche with high reduction ratio, i.e., reduction ratio exceeding 90x. Ultramicrofiches are recorded via two-stage reduction with sophisticated techniques and stringent environmental control. It will have reduction ratio upto 150x and number of image frames upto 3200 on a sheet. Ultramicrofiches are yet to become popular due to sophistication involved. National Cash Register Company has marketed some ultramicrofiches. "Books in English" of BNB is brought out in ultramicrofiche.²

27 APERTURE CARDS

Aperture cards are standard Hollerith cards or edge-notched cards with a die-cut rectangular hole or aperture for the purpose of holding one or more frames of flat microfilm. Aperture cards lend to easy indexing and mechanisation. They are best suited for engineering drawings and patents. The aperture size is normally 35 × 48 mm which can hold one 35 mm or two 16 mm frames. However, an 'eight up' version of aperture card can hold eight A4/quarto size frames at 24x reduction in 35 mm film.³ In recent days not only aperture cards are made to hold two or more rows or columns of 16 mm or 35 mm film strips but also aperture cards of standard microfiche (6" × 4") size are brought out with different size apertures.

28 COM

Computer Output Microfilm (COM) is a microfilm containing data produced by a recorder (COM device) from computer generated electrical signals. In this process digital data stored on magnetic tape is directly converted by computer into human readable language on microfilm. COM is very promising, exciting and it eliminates the concept of original paper copy of the document. However, it is limited to computerised data.¹¹

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3 CERTAIN TERMS AND CONCEPTS

31 OPAQUE AND TRANSLUCENT

A microform could be opaque or translucent. All microforms which do not allow light to pass through are opaque. A translucent microform does partially allow light to pass through. Except micro-opaque card and miniaturised printing all other microforms explained above are translucent. While translucents are read on readers by refraction process, micro-opaque card readers adopt reflection process. Opaque forms have an advantage of recording information on both sides.

32 BASE AND EMULSION

Translucent microforms usually have an acetate, triacetate or polyester transparent base on which is uniformly coated a thin layer ($= 0.0005''$) of light sensitive chemical called photographic emulsion. Normally, film itself is called either silver-halide or diazo or vesicular/kalvar depending on emulsion layer coated on base. Table 1 indicates certain qualities, advantages and disadvantages of these types of films.

33 POLARITY

Microforms can be either positive or negative. A positive or dark line image is one which has black prints on a light background and the negative or clearline image has background with prints as clear light piercing transparent area. Both positive as well as negative films have certain advantages. Important advantages are given in Table 2.

In practice negative films have become more popular than positive mainly due to cheap diazo reproduction of negative film from a master negative.

34 REDUCTION AND ENLARGEMENT RATIOS

Reduction is a measure of the number of times a given dimension of an object is reduced when photographed.⁹ It is expressed as 24x or "24 to 1." This means that the original image was reduced to an image 1/24th as high and 1/24th as wide. Since the reduction is two-dimensional, the

Table 1
Comparative Assessment of Different Films (Emulsions)

	Silver halide	Vesicular/Kalvar	Diazo
1. Cost	Most expensive	Midway	Cheap
2. Application	Used for original negative preparation	Used for duplicate copies	Used for duplicate copies
3. Process	Complex and wet	Fairly easy	Easy
4. Light sensitivity	Sensitive to white light	Sensitive to ultraviolet light	Sensitive to ultraviolet light
5. Archival quality	Indefinite	Midway	Comparatively limited (affected by continuous exposure to light)
6. Resistance to wear and tear	Moderate	Midway	Good
7. Polarity on copying	Reverses	Reverses (as well as non-reversible)	Non reversible

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Table 2
Merits of Positive and Negative Films

<i>Positive Film</i>	<i>Negative Film</i>
1. Psychological acquaintance of users	Conceals or masks dirt, scratches, dust, etc, on film
2. Lower level of illumination is required	There will be lesser eye strain
3. Image will be more sharp and suitable in high ambient illumination	Slight defects in screen are tolerated
4. There will be more contrast in the image	Acts as original for cheap diazo duplication
5. Total illustrations will be clear	Some reader printers are available only for negative films

film image occupies only 1/576th ($1/24 \times 24$ th) as much space as did the original image.¹¹ There are various ranges of reduction ratios designed to accommodate different size originals and different number of frames.

Enlargement is the reverse of reduction and it is reproduction larger than the original or the intermediate.

35 DENSITY

Density refers to the amount of light which is stopped or allowed to pass through the film. For a negative film, background density is measured in the black background areas of the film and line density is measured in the clear area.¹¹

36 RESOLUTION

Resolving power is a photographic term and it refers to the degree to which a lens, optical system or film emulsion is able to define the details

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of an image, expressed as the number of lines per millimeter, discernible in an image.⁹

37 GENERATION

Generation is a measure of the remoteness of a particular copy from the original material. The first negative copy made from original is called first generation negative microfilm (i.e., 1N). Copies made from 1N are either second generation positive microfilm (i.e., 2P) or second generation negative microfilm (i.e., 5N) and so on.⁹

4 ROLE OF MICROFORMS

41 MICROFORMS AS ECONOMICAL MEDIA

The first and most important role of microform is reduction in library expenditure for acquiring same amount of information. Cost reduction is direct in purchase price of microform as well as in indirect costs such as postage, handling, storage, retrieval, etc. The price reduction of microform version of a document varies from 10 to 95% depending on format and reduction ratio of microform and the market demand for the same document in microform. This role of microform is considered to be a very important role in these days of budget cuts, inflation, high postal charges and soaring printing and paper costs.

An illustration from the experience at our library will make this crystal clear. R & D reports are crucial for information services in the areas of Aeronautics, Space Sciences and Satellite technology. It was in 1978 when we planned to develop reports collection in our library, we did a small survey to find out the number of reports of our interest coming out from various organisations throughout the world. We broadly defined the subjects of interest of the organisation and by matching it against intake of NTIS, the largest reports handling agency of the world, we find that about 12,000 reports of our interest are produced every year throughout the world. Taking an average cost of a hard copy report as \$ 17 (inclusive of handling and postage charges) we were needing more than Rs. 17 lakhs per year to acquire all these reports. We tried to define our profile more stringently, yet we could not reduce the amount required considerably. At this juncture, we decided to obtain microfiche copies of all these reports

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on a standing order basis from NTIS to suit our small budget. The same reports in microfiche copies costed us about Rs. 1.4 lakhs for 1979-80 at an average cost of \$ 1.40 per report and Rs. 1.7 lakhs for 1980-81 at an average cost of \$ 1.70. This led to a tremendous saving of over 90% on purchase price without sacrificing any relevant information. Further, all these reports were received by air freight, free of air freight and handling charges and much earlier than NTIS announces them in their secondary periodical.

The economy of microforms is very high and in this context experts opine that duplication of microform is becoming so cheap that it would be possible to give microform copies of documents to readers at a throw-away price in near future (if copyright restrictions are overcome) instead of issuing a paper copy for a short period.

However, microforms do require additional expenditure on maintenance, reading, enlarging and printing equipments.

42 MICROFORMS AS SPACE SAVING DEVICES

Microforms require 90 to 98% less space than that required by corresponding hard copies.²¹ However, actual saving might be little less depending on type and reduction ratio of microform, extent of supporting equipment facilities needed, etc.

Space is precious in many libraries and it costs us to maintain each sq ft. Libraries in metropolitan cities have already started microfilming their less used documents to conserve valuable space. Obviously, converting existing collection to microform and maintaining both hard copies and microforms actually need additional space.

About 24,000 microfiche reports are stored in our library in a metal cabinet occupying 7.5 sq'ft area and the entire collection with reading and printing facilities is housed in less than 200 sq ft plinth area. Experts, say that it is possible to store 1,75,000 titles of books/reports on 300' microfilm reel of 5" diameter. Even in a library where space is easily and liberally available compact storage in manageable size is very much desired.

43 MICROFORMS AS FASTER CARRIERS OF INFORMATION

Time is an important factor in providing information service. Where a

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document has to be procured from abroad, we normally wait upto four months to receive them by surface mail or else pay 50 to 100% extra to receive paper copies by airmail. Microforms offer best solution to the situation. Most of the suppliers mail microforms by airmail without additional handling and postage charges and the information is available within a month. Moreover, inland purchases through mail and interlibrary transactions become not only cheap but also fast through microforms.

44 MICROFORMS AS FILE INTEGRATING AGENTS

Any file should be complete and in proper sequence to have 'integrity'.¹¹ The purpose of file is to provide all the information in its proper place, all the time, and microform does that extremely well. User can view a microform, duplicate it or take a paper copy. However, the original goes back to its place in the file to be ready for next use.

In addition, file integrity coupled with compact storage eliminates all problems connected with multivolume paper copies. An excellent example is NTIS Retrospective Index in microfiche. No paper copy cumulative index can be as compact and as comprehensive as NTIS Retrospective Index (Author, Title and Report/Accession Number) which covers bibliographical details of 7 lakh R & D reports taken into NTIS collection during 1964 through 1978 in 1375 microfiche of 48x reduction each with 270 frames. This index greatly facilitates literature searching for 15 years period at a stretch.

45 MICROFORMS FACILITATE EASY MECHANISATION AND AUTOMATION

The simplest form of mechanisation involved is storing microforms in an electrically operated rotary files and retrieving relevant items mechanically. Several semiautomatic and fully automatic retrieval Systems are also available in foreign markets. Aperture cards with their punched or edge-notched coding lend themselves easily to mechanisation. In addition, various microform indexing techniques help handling and retrieval of relevant part of the microform quickly and efficiently. Modern microform readers and reader-printers possess such capabilities in varying degrees.

Mini and micro-computers entailing limited storage space and reasonable cost in combination with compact data storage through microforms can offer a better information retrieval system known as 'On line access/

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of line retrieval'. In this system, it is envisaged that documents are stored in microform and index data are entered into computer. This is expected to save a lot of time and comes very close to a real time system. Alternatively, bibliographical data along with data regarding location of microform may be computerised, so that document back up service becomes faster at no extra cost.

It has already been noted that a microfiche can be generated directly from a computer terminal. This is expected to give great impetus to micropublishers. Once cost of storing information in computer is considerably reduced, automatic information retrieval system becomes cheap and easy through COM. Further, COM can virtually bring decentralisation of information by quickly providing document to the ultimate user wherever he is. The following estimates of experts about computers and COM should clear any doubt in our minds about this 'difficult-to-believe' phenomenon. It is said that computers are able to transfer digital data on microform at a rate of 1 lakh characters per second. COM device is considered to be 10 to 20 times faster than a line printer, 6 times less expensive than paper printout and 1/4th the expense of an online system.

46 MICROFORMS AS LOW COST ON DEMAND INFORMATION DISSEMINATION AND DISTRIBUTION AGENTS

Since microforms can be easily, quickly, and inexpensively duplicated, information can be disseminated and distributed more effectively at less cost. As noted earlier a 98-page microfiche report can be instantaneously duplicated by diazo process for about 10 cents.

Microforms are ideally suited for production, storage and distribution of internal reports of an R&D organisation. When a report is brought out only a limited number of hard copies may be made for immediate distribution and a master negative fiche can be very easily and securely stored and duplicated as and when needed for distribution at future dates on exchange or *gratis* basis.

Microforms have helped publishers to bring short-run editions of books and monographs. This is how lot of publishers including Pergamon Press and UMI are able to provide many out-of-print books in microform even when the demand is limited.

Further, there are a number of devices which transfer image from

microform to printing plate by projecting microform image directly on offset master.¹¹ This device coupled with COM device can give excellent and fast reproduction of copies and updating of any material.

47 MICROFORMS HAVE ARCHIVAL VALUE AND ARE BEST SUITED FOR SECURITY OF INFORMATION AND PROTECTION OF RECORDS

Microforms properly processed and developed will have several hundred years of life. Since information on microform is difficult to alter or falsify, individual pages of document are locked in one microform and a duplicate can be easily created to keep in a secured location, microforms reduce the risk of mutilation and loss and increase the security of information.¹¹

48 OTHER APPLICATIONS OF MICROFORMS

- (i) Microforms help keeping library catalogues at multiple points and easy updating of catalogues, thus avoiding lengthy catalogue cabinets which, at times, do not allow for simultaneous consultation by more than one person.
- (ii) Microforms are easy to store, handle and retrieve.
- (iii) Microfilm technology itself can be adapted to charging systems in libraries.
- (iv) Microforms have ecological value by helping to control paper pollution and paper cost. It also promotes recycling of paper by converting paper copies into microforms.¹¹

So far we have seen positive roles played by microforms in a library. In years to come, no library can escape acquiring microform for providing effective and efficient information services.

5 CONSTRAINTS OF MICROFORMS

Having seen the opportunities thrown by microforms, let us now briefly note the threats posed by microforms :

- (i) The biggest hurdle in adopting and promoting microforms is user resistance. It is more of psychological than physical inconvenience. 'Proper planning of 'micrographics system', conducive user-aid facility, environment and user orientation can reduce such resistance.

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- (ii) Non-availability of indigenous user equipments, inspection, cleaning, storing and other maintenance equipments.
- (iii) Library has very little control over quality, formats, types and reduction ratio of microforms, when microforms are bought from outside agencies.
- (iv) Standardisation and compatibility problems are also posed when microforms are procured from different agencies.
- (v) Library has to incur additional expenditure in maintaining environmental conditions such as temperature and humidity.
- (vi) Microforms are inevitably damaged during reproduction. It is more so if the original negative is very old.
- (vii) Fire risk continues to exist. In fact microforms are more susceptible to fire than hard copies.
- (viii) The microform technology is dynamic and it becomes difficult for smaller libraries to change their system, especially supporting user equipment facility with fast changing technology. In addition, there is a danger of over-sophistication.

6 SOURCES FOR SELECTION OF MICROFORM LITERATURE

There are plenty of sources for procuring microforms. In the U.S.A. alone there are more than 100 micro-publishers. Most of them provide informative catalogues. In addition, several agencies publish microform selection tools. There are more than one million R & D reports, most of the theses and dissertations from the U.S.A. and U.K., conference papers of professional organisations such as AIAA, IEEE, SAE, etc. over 12,000 periodical titles, 30,000 books and monographs, most of the standards and patents, which are available in microforms. A selected list of sources is given below:

- (i) Guide to microforms in print and Subject guide to microforms in print, (The Microcard Corporation, Cumulative annual listing of microforms).
- (ii) Micropublishers Trade List Annual (Microform Review).
- (iii) Serials in Microforms (UMI, covers over 12,000 titles).
- (iv) Dissertation Abstracts International (UMI).
- (v) Secondary periodicals such as STAR, GRAI, etc, which cover R & D reports.

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- (vi) Individual micropublishers' catalogues, e.g., PP (Microforms Annual), AP, AIP, IEEE, ACS, IEE, Interscience, Elsevier, Springer Verlag, etc.
- (vii) Announcements in Micrographics journals, e.g. :
 - IMC Journal;
 - Journal of Micrographics (NMA);
 - Microdoc (MAGB);
 - Microform Patents;
 - Microform Review;
 - Micrographics Today (NMA);
 - Reprographics Quarterly (NRCD).

CONCLUSION

One of the important aspects in developing micrographics in a library is to consider it as a system. It is very necessary to identify its relation with other systems such as reprographics, automation, etc. Before proceeding further, one should ascertain the nature of existing collection and facilities within the library and also at various Departments, if any. The most crucial aspects involved relate to deciding on formats, types, reduction ratios and sources of procurement.

This presentation has not covered all aspects of micrographics system. Areas such as microfilm technology, organisation, maintenance, quality control and inspection of microforms, selection of user equipments, relation of micrographics with other systems of the library, preventive measures regarding work hazards in micrographics, design of furniture for micrographics, layout for micrographics unit, copyright problems relating to micrographics, etc., are not covered.

Before concluding, it may be desirable to say a few words about the situation in India. We do not have any micropublishers in the country. However, there are agencies and organisations which can produce microforms from hard copies. Most of them cover only traditional formats such as films, jackets and rarely fiches. Our acquisitions of microforms are mostly from suppliers abroad. Very few libraries are going for converting existing collection to microform.

In the areas of user equipments, except few readers, nothing else, not

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even good quality storing and maintenance equipments are locally available. We are yet to develop indigenous equipments to promote use of microforms.

To conclude, microforms are versatile, economic, and efficient information handling media without which no library of present day can hope to be comprehensive and expeditious in serving its readers.

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