

# NEW TECHNOLOGY AND THE PUBLISHING INDUSTRY

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**ABSTRACT:** Innovations in information technology are taking place at a very great rate. As a result technological and economic changes are being felt in the publishing industry. This paper reviews the changes in the publishing industry since it came into existence and examines the technological and economic impacts resulting from changes in information technology. It also attempts to predict the future of the information system.

## LA TECHNOLOGIE NOUVELLE ET LE MONDE DE L'ÉDITION

### RESUME

Les innovations technologiques se succèdent à un rythme effréné. L'industrie de l'édition n'échappe certes pas à cette évolution et doit faire face à des changements d'ordre technologique et économique. Le présent exposé passe en revue les principaux changements technologiques survenus dans l'industrie de l'édition depuis ses origines et analyse les implications technologiques et économiques qui en résultent. On tente également de prédire l'avenir du monde de l'information.

# NEW TECHNOLOGY AND THE PUBLISHING INDUSTRY

## INTRODUCTION

Innovation is a means of survival for any enterprise. Survival not only requires that an enterprise innovates but also that it adopts appropriate new developments. The publishing industry is no exception to this general rule.

The purpose of this paper is to review the impact, both positive and negative, of new technologies on the publishing industry and also to examine what is likely to happen in the future.

## PRINTING AND PUBLISHING INDUSTRY

Before printing was invented, dissemination of information took place verbally or by means of professional scribes using papyrus, parchment or paper. Dissemination of information was limited to a small group.

The printing of books was first developed sometime between 1430 and 1460. With the invention of printing in the 15th century enormous advances in the dissemination of information took place. In the 19th century mechanical printing gradually replaced the manual printing press and publishing became a full scale industry. The publishing industry involves the interaction of people with different skills: authors, editors, printers, binders, publishers, booksellers, librarians etc.

## GROWTH OF THE PUBLISHING INDUSTRY

The growth of the publishing industry is measured in terms of increase in (1) the number of publishers, (2) the book and periodical production and (3) the size of secondary services.

The number of American publishers increased from 773 in 1956 to 13,900 in 1982, according to a count in Books in Print. The British Books in Print lists 8745 more publishers in 1982 than in 1940.

Book and serial production data for many parts of the world are inconsistent, because criteria for inclusion and exclusion of materials differ. However, I shall attempt to estimate the growth of the publishing industry in terms of increases in the production of books and serials in the last 30 years by reviewing standard book and serial statistics.

TABLE 1 TOTAL USA BOOK PRODUCTION: TITLES PUBLISHED, 1950 - 1980, FOR 10 YEAR INTERVALS

<u>YEAR</u>	<u>1950</u>	<u>1960</u>	<u>1970</u>	<u>1980</u>
Titles published	11,022	15,012	36,071	42,377
Index number	100	136	327	384

TABLE 2

BRITISH BOOK PRODUCTION: TITLES PUBLISHED

55

<u>YEAR</u>	<u>1960</u>	<u>1965</u>	<u>1969</u>	<u>1974</u>	<u>1979</u>
Titles published	23,783	26,358	32,393	32,194	41,940
Index number	100	111	136	135	176

TABLE 3

TOTAL BOOK PRODUCTION IN CANADA: TITLES PUBLISHED

<u>YEAR</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Titles published	4,205	6,710	4,083	6,834	6,735	6,241	7,878	13,970

## NEW TECHNOLOGY AND PUBLISHING

Total book production data (new books and new editions) for the USA from 1950 to 1980, for 10 year intervals, are presented in Table 1. Book production has risen from 11,022 to 42,337, and increase of 284% between 1950 and 1980. British book production (Curwen 1981) increased from 23,783 in 1960 to 41,940 in 1979 (Table 2).

Canada is one of the small producers of book titles in the world. In 1971, the total book production (Table 3) was 4,205. In 1978, the total production rose to 13,190. Canada remains the largest importer of US books (Bowker Annual 1982).

The 12th edition of Ulrich's International Periodical Directory (1967-1968) lists 30,000 titles. In 1969-70 this figure increased to 40,000 and in 1982-83 the directory lists 63,000 periodicals.

With the enormous increase in the primary literature the secondary services have been growing in size. In 1970, Chemical Abstracts expanded to include digests of information of management, financial marketing and production developments in the chemical and related industries. In 1971 (vols. 74+75), 308,976 abstracts were listed in Chemical Abstracts. In 1979 (vols 90+91, 436,887 abstracts were cited, an increase of 41% in eight years. The total number of abstracts cited in CAS to the end of 1979 is 8,068,661 (Chemical Abstracts Service 1980).

The publishing industry has grown so rapidly that it increasingly presents the following problems: (1) space to store books, serials and card catalogs, (2) storing and preserving the pool of available information and (3) accessing the available information through manual searching of the indexes and abstracts.

### MICROPUBLISHING

One alternative to print is microform. The technology for scholarly publishing in microform was available as early as 1928. During World War II, microphotography was used to preserve original manuscripts, archives, rare books and personal papers considered at risk in the United States (Meckler 1982). Scholarly micropublishing began with the publication of dissertations by University Microfilms International, Ann Arbor, in 1938.

There are several hundred microform publishers already operating in the United States. United States federal government documents (e.g. Government Reports listed in NTIS) are being duplicated and disseminated in microform to depository libraries. The Library of Congress, solely for purpose of preservation, has filmed research materials, archives and single cop-

## NEW TECHNOLOGY AND PUBLISHING

ies of works by individuals and scholars from its own holdings. Some publishers offer microforms as alternatives to the printed version by simultaneously making the journals available both in microform and hard copy.

The invention of the Characton cathode-ray tube (CRT) made possible the production of computer output microfilm (COM). In COM output, COM recorders are used in the place of a standard computer printout. COM is most useful when there is a frequent need to reorganize data, such as merging, sorting, interfiling, deleting and updating records.

Libraries, in order to overcome the increasing cost and space of card catalogs with the enormous increase in the total number of publications (books and serials), are taking advantage of this new development. COM products in libraries with machine-readable bibliographic data base include author/title catalogs, subject catalogs, serials lists, in-process lists, circulation lists, storage lists, etc.

COM can be produced from word processing equipment (Gordon 1979). The process involves a few specific steps. The input data are transmitted into a floppy disk in the word processing equipment. Since COM recorders cannot read data from floppy disks, either a tape drive is attached to the word processing system or a data communication adapter is installed on the word processing equipment. The next step involves the translation of the data on the mainframe into a character configuration compatible with COM recorders and the production of microfilm or microfiche from magnetic tape. This new technique reduces the cost of micropublishing and avoids the cumbersome procedure of editing usually adopted in the production of microform from print.

Microform is cheaper to produce than paper copy. It is easy and economic to distribute, and easy to store within a limited space. Academic libraries with storage problems and budgetary constraints are the main buyers of microforms.

From the beginning of 1979, the Geological Society of America began publishing the GSA Bulletin in two parts. Article summaries were published in Part I on paper. The complete articles were published in Part II on microfiche. The microfiche Part II of the bulletin was discontinued as of the December issue of 1981. From the first issue of 1982 the bulletin is again publishing the complete articles on paper. This indicates that microform is not preferred by geologists and may not be suitable for publications which include maps and charts.

At present, typically rather bulky and expensive readers are available

## NEW TECHNOLOGY AND PUBLISHING

to read microform. Microforms are still unpopular with users due to (1) the strain of reading from a screen (2) cumbersome reading equipment (3) fuzzy images and (4) difficulties with the locating information, since the majority of micropublications are not catalogued. Due to the difficulties in reading from microforms there is a demand for printed copies from microform onto paper.

There is a negligible likelihood of microform spreading beyond institutions to the individuals. Microform has not replaced the paper copy and is not expected to in the near future. However, it does offer solutions to some of the problems associated with printed publications such as preservation, storage space and distribution.

### COMPUTERS AND PUBLISHING

The use of computers in publishing, in the early 1960s, marked the second phase of mechanization of the publishing industry. Publishing using computers involved keyboarding of data or reading of keyboarded data by means of an optical character recognition (OCR) device. Word processors are also used to input data into a floppy disk. Speech recognition systems are also being developed for voice input of data (Gates 1980).

Video display terminals (VDTs) and word processing systems are gradually replacing the traditional editing procedures: hard copy mark up and rekeyboarding. Text processing constitutes a major growth area in computer applications to publishing. The output from computer assisted publishing varies from simple computer printouts, to camera ready copy, to COM.

### DATA PUBLISHING

Since the early 1960s, computer typesetting has been applied to produce printed indexes and abstracts: e.g. Chemical Abstracts, Engineering Index, Index Medicus, etc. These computer assisted publications marked a new phenomenon, database publishing. Database publishing is one approach toward making multiple use of the information that is input for the production of printed products (Terrant 1975). It also marked the second phase of the publishing industry: distribution and publishing both in machine readable form and on paper (Lancaster 1982).

### ONLINE INFORMATION RETRIEVAL

Innovations in telecommunications technology have made possible instantaneous transmission and two-way interactive communication. As a result machine readable databases became available for online retrieval of

## NEW TECHNOLOGY AND PUBLISHING

information through vendors like SDC, DIALOG, CAN/OLE, QL, etc. in North America.

### ONLINE AND PRINTED SECONDARY SERVICES

A number of publications on the impact of online searching on subscription to printed publications have appeared in the professional literature. Williams (1981, 1982) indicates that database producers are facing a decline in subscriptions to their hard copy versions. She was unable to conclude whether or not the decline is due to increased use of online counterparts. Barwise (1979) conducted a complete analysis on the interaction between printed products and online databases. He concluded that online retrieval has not yet any perceptible impact on subscription to printed publications. Lancaster and Goldhor (1981) conducted a survey among academic and special libraries to determine the extent to which the libraries have discontinued subscriptions to printed abstracting and indexing services as a result of accessibility of equivalent databases online. They conclude that the decision to discontinue the printed services was only partially influenced by online access in some libraries and not at all influenced by online access in some others.

In order to determine the impact of online services on sales of their print counterparts in Canada, a survey was conducted in the period of November 1980 to January 1981 among academic libraries. A questionnaire asked each library to list the number of cancellation of subscriptions for abstracts and indexes since 1970, and to divide them into two categories: (1) available online and (2) not available online. It also asked whether the first category was cancelled because of its availability online, an increase in cost or other reasons and whether the second category was cancelled due to an increase in cost or other reasons. The response was 80%. The results are presented in Tables 4, 5 and 6. Among the 18 libraries that cancelled subscriptions for indexes and abstracts, only 6 libraries cancelled subscriptions for indexes and abstracts available online. Of the cancellations of 206 subscriptions, only 84 indexes and abstracts, approximately 41%, are available online. Four libraries did not cancel any subscriptions for indexes and abstracts. Some libraries indicated through added comments that they preferred online access to new publications which are also issued as print on paper.

The survey results show that subscriptions for many secondary services in printed form are declining. The major reason for this phenomenon is the increasing cost of subscriptions while the purchasing power of libraries is in decline. Decision to discontinue print services are only partially influenced by online access.



TABLE 4 NUMBER OF ACADEMIC LIBRARIES IN CANADA WHICH CANCELLED ABSTRACTS AND INDEXES SINCE 1970

Classification of libraries based on availability and non-availability of Abstracts and Indexes (A/I)online. No.

No. of libraries that cancelled only A/I available online	6
No. of libraries that cancelled A/I both available and not available online	5
No. of libraries that cancelled only A/I not available online	<u>7</u>
TOTAL	18

TABLE 5 NUMBER OF ABSTRACTS AND INDEXES CANCELLED BY ACADEMIC LIBRARIES IN CANADA SINCE 1970

	<u>No.</u>	<u>%</u>
No. of A/I cancelled available online	84	40.7
No. of A/I cancelled not available online	<u>122</u>	<u>59.3</u>
TOTAL	206	100

TABLE 6 REASONS FOR CANCELLATION OF SUBSCRIPTIONS FOR 84 A/I AVAILABLE ONLINE

Solely influenced by availability online	2
Partially influenced by availability online	19
Not influenced by availability online	<u>63</u>
TOTAL	84

## NEW TECHNOLOGY AND PUBLISHING

### EXCLUSIVE CONTRACTS FOR DATABASES

At least 90% of database producers' revenue still comes from printed products (Barwise 1979). With a decline in subscriptions to their hard copy versions, database producers are looking to the future where the bulk of their income will come from online sales. So a new approach is being tested by some database producers such as Chemical Abstracts Service (NFAIS Newsletter 1982a) and Institute for Scientific Information (Institute for Scientific Information 1982) to mount their databases on their own computer and do their own billing. These database producers have not yet withdrawn all their databases from the commercial search services. This indicates a possible trend in the future with database producers declaring exclusive access to their databases via their own search network.

### PRESENT PUBLISHING SYSTEM

Conventional methods of preparing text, which include the author's first draft, editing by referees and the final text, is still in practice. However, there is a trend to use more and more of compatible text editing systems by authors, referees and publishers. The output is still in the conventional print journal or report. The printed materials are physically transported to locations where they become accessible to users. To enable a user to become aware of the publication catalogs, indexes and abstracts of the primary publication are included in the secondary publications. These are available both in printed forms and online.

### SATELLITE TELECOMMUNICATIONS

Present day electronic transmission using terrestrial data circuits are designed for interactive traffic between a large number of terminals and a relatively small number of host computers. Satellite communications, which have much greater bandwidth than terrestrial circuits and multi-destination possibilities for transmission, are offering a whole spectrum of services, such as electronic mail, video-teleconferencing, high-speed facsimile transmission, text processing and distributed data processing, all relevant to electronic publishing (Page 1979).

### ELECTRONIC PUBLISHING

Electronic publishing implies the substitution of electronically generated information (pages of text and graphics), that is usually displayed on a cathode-ray tube (a television set or inexpensive screen), for information published as print on paper. A strong emphasis is being given to electronic alternatives to paper-based publishing of primary literature.

## NEW TECHNOLOGY AND PUBLISHING

### NEED FOR ELECTRONIC PUBLISHING

The use of scientific and technical information tends to be highly skewed: many journal articles are infrequently used and a small proportion of articles accounts for most of the use of a journal. In conventional publishing all articles are processed in the same way. In an electronic system, it is possible to handle each article differently. Copies of single articles on demand can be sent over a long distance at a relatively low cost (King 1978a).

The increasing use of photocopiers started undermining the economic viability of journal publication. With an electronic journal, it is possible to count every use of an article, so it is possible to charge a fee for each time an article is printed out at a terminal.

The electronic journal can decrease delays in publication, normally experienced with the traditional journal, as it has no publication deadlines (Lerner 1980).

### INCREASING INTEREST IN ELECTRONIC PUBLISHING

The strong emphasis on electronic publishing is evident from an increase in the interest shown by commercial publishers to publish primary journals using electronic alternatives. Elsevier has decided to conduct an experiment with electronic publishing. They are including 11 of their top selling biomedical journals in a primary database, to which, in a joint venture with BRS, they have planned to provide online access. This experimental work will be limited to a number of university and industrial libraries in the United States (NFAIS newsletter 1982c). ADONIS is a computerized system formed by six international publishers. The system is scheduled to begin operation in 1984. It is designed to supply users with a copy of an article from more than 1500 scientific, technical and medical journals that will be stored in computer readable form, within the present interlibrary network (NFAIS newsletter 1982c). Several similar ventures could be cited in the popular and trade press as well as some of the well known newsletters.

### FUTURE OF ELECTRONIC PUBLISHING

While experiments with electronic publishing are being carried out, the death of printed literature and advent of paperless information systems have already been predicted (Lancaster 1978, Evans 1979).

In order to predict the future of electronic publishing a number of issues have to be taken into consideration. In the first place, from a technological viewpoint electronic publishing of primary literature is a

## NEW TECHNOLOGY AND PUBLISHING

practical proposition. Now, the second issue to consider is whether the literature, and the terminal which is needed to retrieve it, can be produced at a price which will make the customer prefer the electronic alternatives. The third and crucial question is whether the reading public will seriously consider switching to the electronic alternatives on a scale necessary to make the new technology sufficiently attractive for the publishers to make large investments (Curwen 1981). The whole question of copyright, privacy and transborder data flow restrictions must be considered carefully. Some groups of authors may have access to the new technology while other groups may not be able to afford it. Then a gap may be created between the haves and have-nots. Developing countries, especially technologically less advanced ones, will have little or no dissemination of information from the developed countries.

John Senders (1977, 1980) carried out a trial in electronic publishing in late 1970s. In 1980, he concluded that the high cost of electronic publishing will be reduced with technological developments, but there is still a problem of an author's unwillingness to publish material in an electronic journal with a limited readership. With an electronic journal, revenue for a particular article will come after its publication provided, of course, it is requested. So the publishers will be looking for publication material that will bring in revenue.

In order to determine if a preference exists for electronic publications or print on paper, an informal survey was conducted in Vancouver, among the faculty members of the University of British Columbia, professionals in industry, and school teachers. A questionnaire asked whether (1) electronic publishing will be preferred to print on paper, (2) electronic publishing will be preferred, if a cheap and portable screen to read is available, (3) electronic publishing will be preferred for browsing and a print on paper for reading the full text and (4) only print on paper will be preferred. The results are presented in Table 7. Among the 71 who responded (60% response) 52% preferred electronic publishing for browsing and a print on paper for reading the full text; 38% preferred only print on paper. Many respondents put down the following reasons for not preferring the electronic publishing: (1) eye strain as a result of reading from the screen, (2) difficult to read and assimilate the information from the graphics on screen and (3) printed literature is convenient to read in any physical position and aesthetically satisfying.

Besides acceptance by users and the availability of technological opportunities, informed awareness of trends in the market place shall be taken into consideration in deciding the future of electronic publishing. There is a growing demand in schools by teachers for critically important instructional activity delivered through electronic media, to support their teaching. The college and university book market is fragmented due to the

TABLE 7 PREFERENCE FOR ELECTRONIC PUBLICATIONS  
OR PRINT ON PAPER

	<u>No.</u>	<u>%</u>
No. preferring electronic publishing	3	5
No. preferring electronic publishing, if a cheap and portable screen to read is available	3	5
No. preferring electronic publishing for browsing and a print on paper for reading the full text	37	52
No. preferring print on paper only	<u>29</u>	<u>38</u>
TOTAL	71	100

## NEW TECHNOLOGY AND PUBLISHING

variety of disciplines, requiring a number of software systems. The high cost of these software systems will be a barrier to the growth of electronic publishing in the college market (Miller 1980). Electronic newspapers will not be an economically viable proposition unless subsidised by governments or industrial organizations. Systems analysis of scientific and technical communication, in the United States, by the National Science Foundation has demonstrated that many scientific and technical journal articles can be economically incorporated into a comprehensive electronic alternative system. (King 1978b).

### CONCLUSION

The publishing industry has passed through a number of changes as a result of technological innovations. However, until the introduction of electronic publishing to the primary literature the survival of the print industry has not been in question. There is general agreement that the new technology will displace print on paper for many forms of information. However, there is some disagreement about the prospects for the future operation of the information system. Its future is seen not merely as an alternative between print on paper and electronic publishing, but an incorporation of many media such as paper, microform, electronic, including high quality video, and other means of information transfer, integrated into a home information system.

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