Economics of Library Computerization

In talking about the economics of library computerization I will answer the question: What is meant by the economics of library computerization? The economics that I am concerned with is scientific economics, the study of how men in society elect to use limited resources for the production of goods and services. The three fundamental economic questions in any society are: What is to be produced? How is it to be produced? For whom is it to be produced? The same questions apply to librarianship and to library computerization.

The major publication on library economics is Economics of Academic Libraries by William J. Baumol and Matityahu Marcus,1 with which I presume most of you here are familiar. The word academic appears in the title because the authors' data came from academic libraries; however, their findings are valid for public libraries, school libraries, and special libraries. Per unit costs in academic libraries were rising at a rate of about 6.3 percent per year for the two decades following 1950. This increase can be compared to a 0.9 percent per year rise in the wholesale price index. From this comparison it is obvious that libraries are headed for serious trouble. Baumol and Marcus concluded, very rightly, that some profound modification in the manner in which libraries operate is going to have to occur in the relatively near future. A 6.3 percent annual rate of increase means that in twenty-five years, per unit costs of service will increase by 460 percent. This is the kind of increase that
society apparently will not support and, as you know, we are already experiencing diminishing financial support in librarianship. Major changes must occur in what is produced or how it is produced and for whom—possibly in all three. My remarks will be concerned with how computerization can, and does, have a profound impact on these three fundamental questions.

Baumol and Marcus make the interesting point that the cost of computerization had been declining at a rate of 55 percent per year, going in the opposite direction from costs in libraries, and far more precipitously. The reason that costs go up so rapidly in libraries is that libraries are highly labor-intensive. Library salaries are forced up by salary increases in other sectors of the economy, but in the case of libraries these salary increases are not accompanied by increased productivity. This situation is not unique to librarianship; it is also true of education, hospitals, artistic performances, restaurants and many other labor-intensive activities. When Baumol and Marcus analyzed the economic variables within library operations and correlated them, it was abundantly clear that libraries are labor-intensive service institutions, and it is this factor that leads to the disproportionate rate of rise of per unit costs. It is unit costs that must be considered if useful comparisons are to be made.

Another important conclusion made by Baumol and Marcus was that increased costs were not due to inefficiencies in library operation, nor were they caused by mismanagement as is sometimes alleged. Actually, efficiencies in libraries seem to be extraordinarily high. Librarians have been able to achieve something of great significance in that they employ techniques of mass production for products which are all different. Mass production is clearly efficient when large numbers of identical items are produced, but this isn’t the case for individual books coming out of the processing line. Nevertheless, librarians have adapted the technique of mass production to the processing of totally unlike individual products, one of the major advances to have occurred in libraries in the last forty to fifty years.

Even though libraries operate efficiently, studies of libraries show that libraries are in failure. Studies in both academic libraries and public libraries have shown that approximately 50-60 percent of the time, a user does not get the information he wants. This failure rate is too high; it turns people away from libraries, and it has turned me away from libraries; I no longer have the time to experience a 50 percent failure rate. I used to publish a fair amount of material in the history of science and the history of technology, but I no longer do so because it takes too much time to get the data. There are just too many interesting scholarly questions that are easier to answer without spending time using a big library.

A general rule of economics applicable to many commodities is that as a price of a good is raised, the demand for the good declines. We see something of this sort occurring in libraries, where as the cost to users to use libraries
increases, demand by users decreases. Cost to the user is, of course, generally measured in time, and we all know of cases where the user's cost was too great. For example, a professor of political science at Yale University (where I was associated with the library) had a sabbatical to write a book, but was making such slow progress using the huge Yale library that he went to Geneva to the ILO library, where he finished rapidly using a much smaller library which had information more readily available. I have had some experience in writing a book using the Yale library, and it was hard work even twenty years ago.

In an interesting recent paper, Raymond Jackson uses a mathematical model to show that as the use of a library increases, the book stock erodes, and the only way to continue good service is to limit the service of the library. I can give you an interesting example of this kind of observation from my own experience. Nearly forty years ago, when I was at the Harvard College Library, I observed something curious in the figures for the number of borrowers and the amount of total circulation. I did a correlation between the number of registered borrowers (one had to register in those days to be a borrower) and the total circulation over a period of fifteen to twenty years for which figures were available. There was an inverted ratio; that is to say, the fewer people registered to use the library, the greater the total amount of circulation—except for two years. I was so intrigued that there were two years which didn't fit that I went back to the original records of circulation for those two years, did the additions again, and after having corrected the figures, the two years did follow the pattern.

I certainly would not advocate that the only way to improve service in libraries is to limit service per individual user or to limit the number of users. If we are to reverse the rate-of-failure trend, we are going to have to increase availability of information. Now the information may be in the library and inaccessible or it may be that it is not in the library. With some exceptions, as libraries grow larger they become more and more passive in their services. They don't actively serve their users; they don't really participate in their users' programs. There is an increasing need for libraries to offer services actively if they are to pull out of failure. The major general change must be from a passive service to an active service in terms of what is going to be produced, how it is going to be produced, by whom, and what technology is to be used.

To what extent will libraries support information needs and to what extent will publishers fill the need? The people who use libraries also buy books, and in recent years we have had considerable evidence that an increasing amount of information is coming from publishers rather than from libraries. The "for whom" question means that it is necessary to define the community of users, and just saying "all people in the United States" is not enough. There must be a more useful definition. Most of us talk in the terms of "all" and the National Commission on Library and Information Science
talks in terms of "all," but we know very well that not all people are served and not all people even want to use libraries. But how does one define "users" more accurately to make the correct economic moves to answer this extremely important question?

In connection with each of these questions, we must reexamine the objectives of libraries. How are you going to increase the supply? How are you going to make more information available? And, once again, for whom are you going to make it available? For example, it is technically possible to connect a cable television system to a network computer so that anyone with a television set on the cable system could access the catalog in the network computer, but such an arrangement still leaves the question of for whom the service would be provided. Not everybody has a television set on a cable system, and moreover, there are only one hundred communities in the United States with cable television systems capable of supporting two-way communication. Catalog access through cable television is clearly a worthwhile service, but one that can not be provided to all potential users.

It seems to me that Baumol and Marcus are absolutely correct when they say that some profound modification has to be made in library operation—which means that library service cannot be substantially improved by traditional means. In making a profound modification, the technology of choice is obviously an information processing machine: the computer. Computer technology is the only technology available that can greatly enhance productivity of library staff. The computer as a labor-saving device can be thought of as a logical extension of the technique of mass production with interchangeable parts developed in the United States in the second quarter of the nineteenth century. Such production greatly changed the economic aspects of industrialization and also made possible the production of new products. Mass production using interchangeable parts was developed in clock manufacture and in armories in the United States. The original objective of the manufacture of muskets with interchangeable parts was that weapons could be repaired in the field without having a hoard of armorers with forges accompanying an army. It turned out that this technique also had an enormous economic power, although this was not realized until it was employed commercially. A good example of the use of mass production in the commercial sector was the manufacture of the Colt revolver, which could not have been produced as a commercial success without this new technology.

Some of the labor-saving principles that computerization can make are: 
(1) an increase in work done mechanically, (2) computers permit nonhuman sources of power to be substituted for human effort, (3) high volume of output, (4) high operating speed, (5) increased mechanical continuity in operations, and (6) computers permit automatic error detection. Computerization makes it possible for libraries to take advantage of labor-saving principles. These principles alone will increase productivity of staff,
but there has to be a continual increase in productivity of the kind seen since the advent of the computer in agriculture, manufacturing, and in service industries.

The second way in which library productivity can be increased is through economies of scale. Here, although an individual library can certainly utilize labor-saving principles, it is really only by networking that economies of scale can be realized to any large extent. I will talk only about shared cataloging, although sharing of computers, programs, and intellectual contributions can result in economies of scale for other library activities. When the Ohio College Library Center (OCLC) first began to operate in 1971, 68 percent of the cataloging done through the system was done using records that were already in the system; now it is 91 percent. This increasing economy of scale certainly yields an increase in productivity, and it is this type of productivity that is so important. If productivity can increase at the same rate as salaries and wages, then libraries will be behaving as the average of institutions and organizations in the economy as a whole. This goal is the one we must strive to attain.

What can the effect of computerization be on objectives? First, it can certainly increase the availability of resources within libraries by greatly enhancing access points to information in a library. Access points are severely limited in card catalogs and in printed book-form catalogs. The first move should be to make information in the library increasingly available.

The second objective is to make resources available outside of the local library, and to do so networking is, of course, required. There have been some very interesting developments in this area, particularly in that smaller libraries are now making their resources available in a way that was impossible before networks were developed. We have never had a precise concept of a national library in the United States, and we certainly don’t mean by a national library what is meant in Spain, for example. With networks the national library will be made up of the nation’s libraries, not any particular library. Individual libraries such as the Library of Congress certainly have unique contributions to make, but we can no longer look at any single library as being the pinnacle or hub of library resources. Clearly, the existence of a distributed national library can only be achieved with a computerized network.

The third objective is to enable libraries to take a more active stance in providing services. It is difficult to see how a more active stance can be achieved in larger libraries without the use of computers. An example of such a new service is selective dissemination of information (SDI), and those of you who are recipients of an SDI service know how extremely helpful such a service can be. The on-line catalog is another example of both a new product and an important new service. It is new because on-line catalogs are entirely different in design from card catalogs or printed book catalogs; they are neither on-line card catalogs nor on-line printed book catalogs. They are, in-
stead, huge numbers of miniature catalogs. The OCLC system at present has somewhat more than 1.5 million of these "minicats" in the system with no catalog, as presented to a user, having more than 32 entries. Complex cataloging rules have been a natural consequence of increasing catalog size, but with a catalog of no more than thirty-two entries, there is no need for the complexity of the Anglo-American Cataloging Rules. Certainly, rules will be needed, but they should not be based on bibliographic principles; rather, rules should be based on users' requirements of catalogs. Recognition and acceptance of the concept of miniature catalogs will lead to one of the most profound modifications that will occur in librarianship, namely, mechanized descriptive cataloging. There does not appear to be any reason why descriptive cataloging could not be done largely in a mechanical way. It will require some human intervention, of course, but when a catalog has no more than thirty-two entries, the entries need not have the requirements for uniqueness and specificity necessary for book-form and card catalogs. Mechanization of descriptive cataloging is only one of the ways in which computerization will affect the economies of libraries, and is also an example of the profound changes that the Baumol and Marcus study revealed as necessary.

What effect will computerization have on the economics of library use? Users are not included in library budgets, and there is a tendency to ignore them from the viewpoint of costs they incur in using a library. Sometimes I wonder just how much computerization is being done to benefit libraries rather than library users. Yet, it should be the users who come first. Their costs are real, and it is a rise in those costs that lead them to discontinue using libraries. Computerization should lower the real cost to users and thereby increase demand for library service. Computerization can certainly bring back to libraries those people for whom the cost of library use has become too great. A study of the Lockheed on-line system in four public libraries in California showed that users of that service were "not the traditional patrons of the public library."7

There will also be new users when remote catalog access, such as that at the Ohio State University Libraries and which Thorson discusses in another paper, becomes available, including some users who won't need to go to the library because they will have access through television connection. One of the sinful things about a card catalog is that there is only one of them and you must go to the library to use it. I can assure you that not having to go to a library is a very important improvement in providing library service. I didn't use the Ohio State University (OSU) library to any extent prior to the adoption of this system because I wasn't prepared to spend a half-day going to and from the library and perhaps having to go to one or two department libraries—only to find that I couldn't get a book. I am prepared to spend the half-minute that it now takes, and the result is that I use two or three times as
many books from the OSU library as I did before, and I buy fewer books. OCLC has done a study of public service terminals on the OCLC system and more than four-fifths of the users in both academic and public libraries preferred to use a terminal rather than a card catalog.

In summary, it is all too clear from economic analysis that libraries have extremely serious problems to be solved. There is no way that society is going to support a 460 percent increase in financial support for an institution experiencing a 50-60 percent failure rate in service. Libraries are as efficient as other labor-intensive service industries, and it is impossible to see how any further increase in the efficiency of an already highly efficient operation can cope with such rocketing increases in costs. It is inevitable that a drastic change must occur in library operations; for the immediate future, the greatest desirable impact will come from computerized, on-line networking, that provides not only labor-saving functions but also effective economies of scale.

REFERENCES


6. Ibid.