RYBURN M. ROSS

Assistant Director for Technical and Automated Services
Cornell University Libraries
Ithaca, New York

Cost Analysis of Automation in Technical Services

This paper has several purposes: (1) to determine the relationship of automation costs of technical services in a large research library to the total library resource allocations; (2) to describe Cornell University Libraries' history of automation efforts and the accompanying cost experiences; (3) to review a specific cost analysis for processing monographs in a large technical services group; (4) to review productivity measurement of library staff involved in processing; and (5) to propose some general management planning information techniques to measure the performance of technical services staff.

Adequate cost analysis and true determination of costs in technical services has always been a very elusive matter. Although there have been numerous feasibility studies performed on various processing centers and technical processes, few such studies have been followed by thorough cost studies after new automated library systems were installed. In addition, the techniques for performing such studies have varied so widely that comparisons of studies are rarely valid. Perhaps the best that any library can hope for is that it will continually study its own processes and their costs and base management conclusions on this information without attempting to make comparative studies with other libraries.

In 1967, Paul Fasana made the following points concerning the determination of library automation costs: (1) few factual data exist on this topic; (2) library automation is expensive; (3) considerable conjecture is centered on the anticipated efficiencies and savings once computer-based systems are designed and implemented; (4) cost figures in themselves are

meaningless; and (5) determination of the cost of automated library procedures is needed.[1]

Unfortunately, almost a decade has passed with little progress made in an area of library management so vital to a library's total resource allocation. A greater portion of each large research library's budget, hard hit by annual inflationary forces, is being expended for automation. Initially, the purpose of implementing automated systems was to lower unit costs, particularly in the book processing areas of the library. More recently, library managers have justified the installation of automated library systems by citing such factors as improved service to the library patrons and reduced processing times. Today, less emphasis is placed on cost reductions achieved by using computers to perform clerical tasks in libraries.

Library Resource Allocation

Although there is little hard data on amounts spent by libraries on automation, Brett Butler estimates that "somewhat less than five percent of overall budgets go to automated service costs."[2] He also points out that very few libraries were involved in automation activities ten years ago, but now almost every library is involved in some form of automated activity, "even if they only buy catalog cards which are generated by computerized systems." Butler now estimates that from $125 to $175 million is now spent annually on various automated systems and activities and that within the next eight years, these same expenditures will approach $400-$500 million and comprise 8-15 percent of the libraries' budgets. In the future such extensive expenditures will require detailed cost analyses and careful reallocation of library resources. Such resources are already burdened by tremendous pressures to maintain book collections and install new library programs (e.g., audiovisual centers).

The graph used in Figure 1, "Cornell University Libraries, 1974/75 Expenditures by Program," is an excellent method illustrating the various library expenditures by program. One is immediately aware that libraries are highly labor-intensive organizations with large portions of the budget going to staffing the library, processing materials and collection development. Purchase of books and periodicals and preservation of the collection make up nearly the entire remainder of the budget. Cornell University Libraries has proceeded carefully and deliberately in utilizing automation techniques and current operations and processes absorb only a total of $138,947 or 3.2 percent of the total endowed budget. It is expected that this amount will gradually increase each year until approximately 8-10 percent is expended in this program area. Automation costs should be related to the total operating resources of a library system, and because they compete directly with the requirements for staffing and book expenditures, these programs will by necessity require substantial justification. In comparing the Cornell University Libraries' program expenditures with another large academic research library such as Stanford University Libraries, one is struck by the

similarity of the two libraries' program costs with the exception of automation. Due undoubtedly to the fact that the BALLOTS system is now operational, the percentage of projected cost for automation in the Stanford library in 1975/76 is 9.6 percent of the total budget.[3]

Cornell University Libraries Initial Automation Plans

In 1965 Cornell University Libraries employed a systems analyst to study the application of computers and data processing techniques to various library operations. After several months of study and consultation with experts, a 5-year library automation program was established. This program called for the automation of three basic library processes: (1) monographic acquisitions, (2) serial records control, and (3) circulation and inventory control.[4] All of these procedures require numerous repetitive clerical tasks which appeared well suited to data processing methods and equipment. As part of this initial study, a mathematical model was constructed which plotted the "Systems Costs vs. Time" for the manual systems, improved manual systems and envisioned automated systems (see Figure 2). Every effort was made to incorporate all direct and indirect costs in all three systems, including salary increases to cover the annual inflation factor. In determining the costs for the improved manual systems, sufficient clerical labor was added to the existing staff to maintain all processes on a current basis. However, in this estimate no attempt was made to add the additional labor required to provide the same level of services expected of the automated systems. Figure 2 illustrates that more than five years elapses before costs of development and implementation are recovered.

At the time of the study it was estimated that approximately $250,000 would be needed to develop all three computerized systems. In 1966, the university administration gave the libraries a small grant to begin work on the first system, later to be called the Automated Acquisitions and In-Process Control System. The acquisitions system became operational in January 1968 and is a series of computer programs which handle the majority of routine work for the centralized Acquisitions Department. This department orders and receives monographic material for ten separate college libraries on campus. The system performs approximately sixty-five various operations involved in ordering, receiving, bookkeeping, and generating management information and statistical reports. The receiving system records the in-process status of material, initiates the automatic claiming and cancellation processes, and posts charges to more than 300 accounts. The system provides an on-order and in-process weekly status report in alpha main entry sequence to be used by searchers and the public services departments. Over 32,000 titles are represented in the main status list. "Mini-Master" lists showing the status of acquisitions for each individual college and departmental library are made available through a computer-sort routine. A unique feature of this system is that monographic series titles are accommodated both by author-title entry in

CORNELL UNIVERSITY LIBRARIES
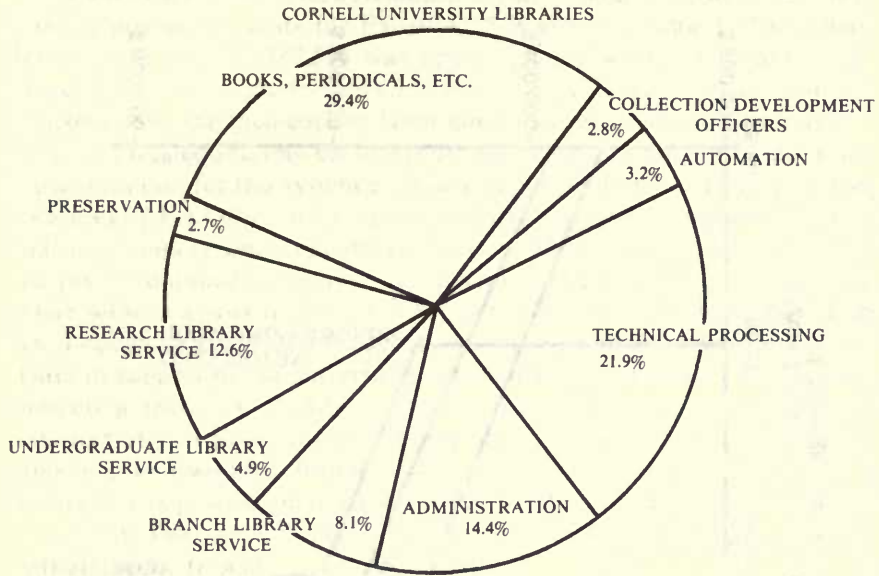
1974/75 Expenditures By Program
(endowed divisions excluding the Law Library)

Books, Periodicals, Etc.	$1,278,076	29.4%
Preservation (Binding)	$ 118,474	2.7%
Research Library Service	$ 547,381	12.6%
Undergraduate Library Service	$ 214,122	4.9%
Branch Libraries Service	$ 350,217	8.1%
Administration (Incl. General Expenses)	$ 627,716	14.4%
Technical Processing	$ 954,433	21.9%
Automation	$ 138,947	3.2%
Collection Development Officers	$ 121,192	2.8%
Total	$4,350,558	100.0%

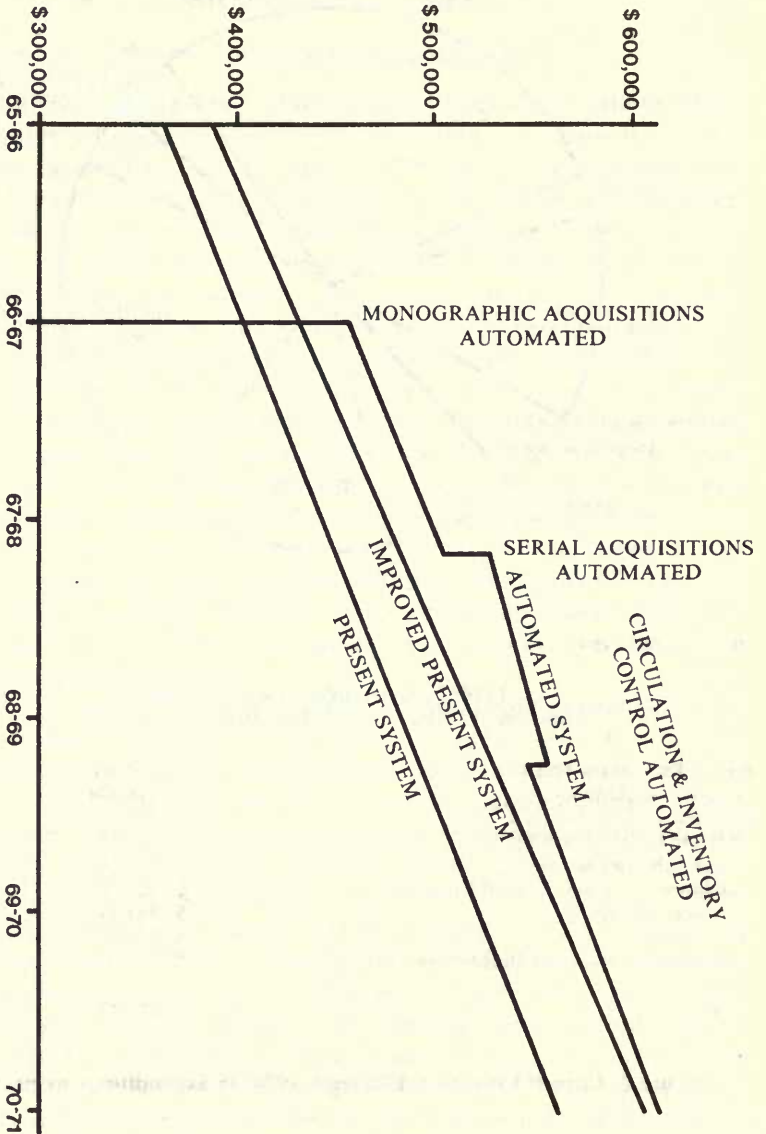**Figure 1. Cornell University Libraries, 1974/75 expenditures by program**

**Figure 2. Systems cost vs. time; Total Cost Less Overhead For:
1 Monographic Acq., 2 Serial Acq., 3 Circulation**

MONOGRAPHIC ACQUISITIONS
AUTOMATED

SERIAL ACQUISITIONS
AUTOMATED

CIRCULATION & INVENTORY
CONTROL AUTOMATED

AUTOMATED SYSTEM

IMPROVED PRESENT SYSTEM

PRESENT SYSTEM

Source: Blakely, Robert. "Projected Automated Costs for 1) Monographic Acquisitions,
2) Serials Acquisition, 3) Circulation and Inventory Control; FY 66-67." October 1975. (Un-
published report.)

the main status list and in quarterly listing by series entry for approximately 10,000 standing orders.

A summary of the total development costs, production cost history and detailed production costs for FY 1974/75 is given in Table 1. The initial development cost of $87,594 was approximately what the libraries had expected. However, production costs from the initial feasibility estimate of $12,000 above the then-current labor costs increased annually until in FY 1972/73 it totaled $72,760. Each year during the period 1968/69-1972/73 the production cost for this system exceeded its budget despite all efforts by the libraries and the Office of Computer Services to project budgeted amounts and hold costs down. Contributing factors behind this frustrating rise in charges are outlined as follows. The system was developed on an IBM/360 Model 40 with a price quotation of $50 per CPU hour. The following year a larger computer (IBM/360 Model 65) was installed in the central computer center in support of the university's administrative, academic and research computing needs. A priority system for utilizing the computer was also instituted at that time. In order for the libraries' acquisitions system to be processed on a weekly schedule, Priority 8 (the highest priority utilized for administrative production runs) was required. This priority level carried with it a cost of $300 per CPU hour, which is a 600 percent increase over the previous rate.

In subsequent years the cost per hour for computer time increased almost annually and even though the library was able to lower the priority rate to six, production costs continued to increase. Finally, in FY 1973/74 the Office of Computer Services agreed to run portions of this system at a lower priority (five) and budget projections were met. In 1974 the Office of Computer Services installed an IBM/370 Model 168 and, even though this computer ran five times faster than the IBM/360 Model 65, costs remained the same. When the director of the Office of Computer Services was asked why the production costs for the acquisitions system did not decrease, he responded by writing:

Please beware that there are three parameters to consider—charges (costs), service and resources. A true cost saving is one which reduces the use of resources (computing and staff time, supplies, etc.) while maintaining service. A cost saving which reduces charges by use of lower priorities (no saving in computing resources) cannot lead to maintaining services. Your risk, in this case, is possible delays in delivery of output as a tradeoff on the effect on us which is reduced income for the same use of high cost computing resources.

It is obvious that the university's cost increase in hardware and operation software enhancement over this 7-year period did nothing to reduce total library costs; rather they increased dramatically. The lesson to be learned here is that bigger and better computers do not mean lower production costs.

Initial Development Costs

System Design, Programming & Testing	$ 75,000
Supplies (Initial Quantities)	3,658
Equipment Purchased	500
Manual Labor--Change-over & To Run Down Old OOF	8,436
Total Initial Development Costs	$ 87,594

Production Costs History

	Year	Cost	Priority	Computer Cost/Hr.	Computer
Feasibility Estimate	1967/68	$12,000		$ 50	IBM360/40
Initial Production (6 Mo.)	1968/69	$18,036	8	$300	IBM360/65
Full Production	1969/70	$31,000	8	$300	IBM360/65
Full Production	1970/71	$59,098	6	$375	IBM360/65
Full Production	1971/72	$66,075	6	$400	IBM360/65
Full Production	1972/73	$72,760	6	$400	IBM360/65
Full Production	1973/74	$64,941	5&6	$280 & $400	IBM360/65
Full Production	1974/75	$66,077	5&6	$280 & $400	IBM 370/168

Production Costs 1974/75	Cost	% Of Total Cost
Computers		
370/168	$31,663	47.9%
360/20	9,545	14.4%
Total	$41,208	62.4
Forms	14,885	22.5
Keypunch Rental	4,025	6.1
Controller	3,900	5.9
File Rental/Storage	2,059	3.1
Total Production Costs	$66,077	100.0

Table 1.   Automated Acquisitions and In-Process Control System

Progress toward achieving the initial goals of the 5-year plan was considerably slower than what the libraries had programmed. This was due mainly to such factors as the need for extensive and detailed systems analysis, unavailable funds necessary for programmers, lack of trained data processing personnel familiar with library processes, delays in obtaining the necessary computer time for testing purposes, frequent computer configuration and operating system changes, and the necessity at all times of maintaining normal daily operations.

An analysis of production costs (Table 1) for the automated acquisition system indicates that approximately 77.5 percent of the total annual costs for this system is paid out for computer time, keypunch machine rentals, computer controller, computer file rental and storage. This leaves only 22.5 percent of the production costs with which to attempt further reductions. Batch process systems are notorious paper generators and this fact, coupled with increasing paper costs, means that additional savings can be made if a suitable substitute can be found for the paper output. We have concentrated our most recent efforts in this cost area. A substitute was sought in the form of Computer Output Microfilm (COM) for the paper products. A recent cost comparison of the printed lists versus COM output indicates that approximately $7,500 per year can be saved after the initial investment in microfiche readers. The library has decided to go to a COM output for the status list in the next fiscal year, thus taking advantage of the additional saving.

Once the COM system is implemented, it is doubtful that anything more will be done to enhance this rather obsolete acquisitions system. A search is already underway for a substitute which will provide lower production costs, be more flexible in operating, require less in-house maintenance and provide better and more timely products. There are several alternatives to be considered: (1) service from a network such as OCLC; (2) purchase of a commercially available package such as the Baker and Taylor BATAB System; (3) purchase of a turnkey minicomputer system complete with software; or (4) purchase of a minicomputer and acquisition of a necessary transferrable operating system from another university, such as the University of Minnesota Biomedical Library or the University of Chicago. These latter systems are complete library data management systems and encompass many additional library processes.

Network Evolvement

In 1970 the university administration decided that due to fiscal constraint some retrenchment in all academic departments was mandatory. A 3-year program was announced, and it was obvious that additional money to develop in-house library systems would not be forthcoming.

Fortunately, at about the same time, the Ohio College Library Center (OCLC) announced that it would accept additional libraries outside of Ohio as members for access to the on-line Cataloging Support Module if they were members of a consortium. The Cornell University Libraries in conjunction with the other four largest university libraries in central and western New York had formed such a consortium in 1967 called the Five Associated University Libraries (FAUL). The board of directors of this organization recognized the immediate utility of the OCLC Cataloging Support Module,

and in two meetings (October 1970 and January 1971) the board approved joining OCLC in a common venture. A feasibility study had been prepared for the board's consideration within this 3-month period by the FAUL Technical Services Committee. The feasibility study[5] indicated that there would be substantial savings in the cataloging processes for all five libraries in utilizing the OCLC on-line cataloging system. Table 2 shows the estimated current manual costs versus the expected future costs for the FAUL libraries.

In addition to contributing to the FAUL feasibility study, the Cornell University Libraries performed additional cost studies[6] in July 1972 (Table 2) prior to the installation of the OCLC Model 100 terminals in October 1973, and again in January 1975[7] in order to try to determine exact cataloging and processing times and costs after installation of the terminals (see Table 3). The long period from July 1972 to January 1975, together with the differing techniques and cost elements, makes comparison of these three studies difficult and nearly meaningless.

Processing Costs, Staff Productivity and Cost Savings

The analysis of processing costs for social science monographs shown in Table 3 is the result of one of the most comprehensive time and cost studies ever completed for a large central technical services operation. An attempt was made to cover all direct and indirect labor costs including benefits, overhead, major supply items and a compensation factor for work efficiency for all staff members included in the study. Also included is a prorated unit cost for both the Automated Acquisitions and In-Process Control System and the OCLC Cataloging Support System. The total cost of $9.86 for processing each monographic title developed in this study is very realistic.

In reviewing this summary analysis, one is immediately aware that the prorated unit costs for the automated systems now absorb approximately thirty percent of all costs and it is in these areas where reductions must be made to further shrink the total processing costs. It would be extremely difficult to reduce the direct labor costs (28.4 percent) and the overhead and fringe benefits (19.2 percent) because these two cost elements continue to rise with the cost of living; the compensating factor for work efficiency (23.4 percent) remains somewhat stable in any work force.

A unique feature of the Bayunus study[8] was the calculation of a compensating factor for work efficiency and the inclusion of this indirect labor cost into the total processing cost figure. The direct labor costs were computed by using productive hours. This was obtained by passing a sample lot of titles through the various work stations in the technical services and by the staff recording "time-worked" notations for the entire lot. A work efficiency factor of .8248 requires that a Productive Time Ratio (PTR) for all staff members be computed. PTR is defined as the fraction of each productive

Feasibility Cost Estimates--FAUL Libraries (1971)

	Current Cost	Future Cost
Library No. 1	$ 7.51	$ 4.87
Library No. 2	12.98	5.10
Cornell	8.14	5.33
Library No. 4	6.03	5.03
Library No. 5	9.43	5.11

Cost/Title Summary (July, 1972)

	Unit Orders	Blanket Orders
Acquisitions	$ .723	$ .953
Cataloging	1.062	1.728
Card Production	.825	.890
Total Labor Costs	$2.610	$3.571
Overhead (20%)	.522	.714
Equipment (Card Production)	.116	.116
Total Cost/Title	$3.248	$4.401

Table 2. OCLC Cataloging Module Costs

salaried hour. At Cornell a full-time staff member is compensated for 2,028 hours each year. An average of 490 hours of the 2,028 is unavailable for productive labor because of annual leave, personal leave, sick leave, national holidays, and coffee breaks. This leaves 1,538 hours available for productive labor:

$$2,028 \text{ hrs.} - 490 \text{ hrs.} = 1,538 \text{ hrs.}$$

As a result of this study it was learned that the average worker was engaged in productive effort 72.3 percent of the 1,538 available hours:

$$PTR = \frac{\text{Productive Hours}}{\text{Salaried Hours}} = \frac{72.3\% \times 1,538 \text{ hrs.}}{2,028 \text{ hrs.}} = 54.8\%$$

The compensating factor for work efficiency represents the number of nonproductive hours for each productive hour. For every 1,000 hours, 548 will be productive:

$$1,000 \text{ hrs.} \times PTR = 1,000 \text{ hrs.} \times .548 = 548 \text{ hrs.}$$

Conversely, for every 1,000 hours, 452 will be nonproductive:

$$1,000 \text{ hrs.} - 548 \text{ hrs.} = 452 \text{ hrs.}$$

I. Direct Labor

  A. Measured Labor
Shipping Room	$0.0202	
Automated Systems Control Group	0.0892	
Acquisitions Department	0.9639	
Catalog Department	1.6563	
Marking & Plating Section	0.0719	
	$2.8015	28.41%

  B. Compensating Factor for Work Efficiency

Measured Labor	Compensating Factor		
$2.8015	X 0.8248 =	$2.3107	23.43%

        Total — Direct Labor $5.1122

II. Overhead (21%) and Fringe Benefits (16%)

Direct Labor	Overhead & Fringes		
$5.1122 X 0.37 =		$1.8915	19.18%

Sub-Total—Direct Labor, Overhead &
Fringe Benefits $7.0037

III. Materials and Equipment

Acquisitions Dept.		
(Xerox Rental, Xerox Paper, Forms)	$0.0208	
Automated Systems Control Group		
(3-IBM 129's, 1-IBM 059)	0.0751	
Marking & Plating Section		
(Labels and Bookplates)	0.0140	
Total—Materials and Equipment	$0.1099	01.11%

IV. Acquisitions and In-Process Control System

  (computer services) $1.3027   13.21%

V. Cataloging Support System

  (OCLC) $1.4439   14.64%

TOTAL COST OF PROCESSING A MONOGRAPH
(EXCLUDING BINDING) $9.8602

Table 3. Summary of Processing Costs for Social Sciences Monographs

Source: Bayanus, Owais. *A Cost Analysis of the Automated Systems Control Group; The Acquisitions Department and the Catalog Department of the Central Technical Services; Cornell University Libraries.* Jan. 1975. (ED 102 996)

The compensating factor can be computed as follows:

$$\text{Compensating Factor} = \frac{1 - PTR}{PTR} = \frac{1 - .548}{.548} = \frac{.452}{.548} = .08248$$

Industry has performed a number of studies on the efficiency of employees in high-volume repetitive office work and has determined that the work is done at 50-60 percent efficiency.[9] The Productive Time Ratio of 54.8 percent found in this study for a large technical services staff concurs with other such studies.

In a paper delivered at the cataloging workshop[10] held in Toronto in June 1975, Elaine Walker, Cornell's Catalog Librarian, estimated that the Catalog and Catalog Maintenance Department required seven fewer librarians and paraprofessional positions after installation of the OCLC Cataloging Support Module, and that two other paraprofessional positions had been downgraded. Three of the released positions were reassigned to other areas of the technical services. The greatest impact on staffing changes came in the catalog maintenance tasks where the staff had been reduced from nineteen in FY 1972/73 to thirteen in FY 1974/75. The entire credit for the staff saving cannot in itself be assigned to the implementation of an automated system; rather, it is the combined effect of reorganizing whole departments, realignment and reassignment of staff and tasks, new patterns of work-flow, new forms and work schedules, stratification of tasks and a careful consideration of requirements of a man-machine environment.

It is estimated, however, that this particular automated cataloging system is now saving the Cornell libraries approximately one dollar per title cataloged on the system. Because the Central Technical Services has been cataloging approximately 45,000 new titles annually since October 1973 on four OCLC Model 100 terminals, it is readily evident that substantial cost benefits have already occurred to the library. In further examination of this data, it should be noted that the amount of direct labor for cataloging presently accounts for only $1.65 of the total processing cost. Additional minor reduction might be made in this cost area, but the total processing cost would obviously not be affected to any great extent.

I am somewhat pessimistic about future savings due to the continuing increases in various cost elements such as the OCLC first-time use charge (utilizing an OCLC record for cataloging purposes), communication charges, terminal maintenance charges, and for the first time, catalog card costs for FY 1976/77. I believe that the OCLC Cataloging Support Module first-time charge is now carrying an inordinate share of the expense for the recent large capital investments in bigger and better computers (Xerox Sigma 9's), systems development and maintenance costs at OCLC. If these cost increases

continue beyond the next fiscal year, OCLC will drive many marginally cost-beneficial on-line cataloging operations out of the OCLC system.

Computer Terminal and Cataloging Rates

In determining the total processing costs reported above, valuable data was also obtained regarding computer terminal and cataloging rates utilizing the OCLC Cataloging Support Module (see Table 4). These rates were ascertained when the average response time for the OCLC system was nine seconds or better, and comparable results could only be forthcoming under the same operational conditions.

Prior to the installation of the OCLC system, the library staff decided that for a large operation such as Cornell's it would probably be more efficient to stratify the various tasks to be accomplished. The operation was broken down into the components of searching, cataloging, inputting and proofreading. Various levels of staff were trained in these operations and scheduled for 2-hour shifts on the computer terminals. The searching tasks were assigned to two full-time positions in the Catalog Department, and this personnel accomplished all computer searching as well as any manual searching required in the libraries' union catalog or the National Union Catalog. Cataloging and proofreading tasks were assigned to librarians and paraprofessional catalogers and the inputting tasks were assigned to typists in the Catalog Maintenance Section. This system has worked extremely well—work-flow is smooth and all tasks are usually accomplished on schedule.

The reported searching time of .8 minutes per title includes two researches. At the time of this study, each title was originally searched immediately upon receipt in the Catalog Department. This initial search resulted in locating 65.8 percent of cataloging copy in the data bank. Subsequent researches for remaining titles were made at two 4-week intervals; the second search locating 13.3 percent and the third locating 6.1 percent of cataloging copy. All remaining titles after the 8-week period were sent to the cataloging teams for original cataloging and inputting into the OCLC data bank. The total quantity of cataloging copy located in the OCLC data bank for this social sciences sample lot is substantially higher than for all material cataloged on the OCLC system. In 1974/75 catalog copy (LC MARC and member) was located for 64.7 percent of the 45,642 titles processed on the system. Cornell is currently experiencing a substantial increase in this percentage figure due mainly to increased availability of LC MARC copy for Germanic, Spanish and Portuguese materials as well as additional member copy.

The average cataloging time of 3.96 minutes per title is very similar to that reported in study of thirty-six Ohio academic libraries which reported an average cataloging time of approximately 4.3 minutes per title.[11] As can be

	Terminal Rates (Minutes/Title)		Cataloging Rates (Minutes/Title)	
Searching			*LC Copy*	
(Including 2 Researches)		.8	Desk Work	9.66
			Terminal	3.83
				13.49
Cataloging			*Member Copy*	
Average		3.96	Desk Work	14.75
LC Copy	3.83		Terminal	6.18
Member Copy	6.18			20.93
Inputting		6.05	*Original*	
			Desk Work	26.26
			Inputting	6.05
			Proofreading	3.05
				35.36
Proofreading		3.05		

Table 4. OCLC Cataloging Support Module

seen from the data in Table 4, there is a substantial difference in the cataloging rates with LC copy (13.49 minutes), member copy (20.93 minutes), and original (35.36 minutes). It is the opinion of Cornell's cataloging staff that original cataloging takes substantially more time than it did with the manual system. Cataloging with member copy takes approximately 50 percent longer than cataloging with LC MARC copy due in large part to variation in entries, nonstandardized subject heading and incomplete cataloging data. Because increasing amounts of member copy are now available through the OCLC system, it is imperative that excellent standards of cataloging be followed by all member libraries and complete MARC records be input into the data bank. In order to bring records below par up to MARC standards, it is suggested that data bank records be edited by regionally located libraries.

Management Data Systems

The cost analysis data which have been discussed in this paper are not in themselves very useful in making rational planning decisions concerning a large technical services operation. Such data must be supported by and utilized in conjunction with other statistical and organizational information

in order for the manager to assess past performance effectively and to project future trends in the technical services. A combination of outputs, workloads, backlog counts and processing costs are only a sample of the types of data required for this purpose. Such information should be easily compiled and computed from regularly maintained budget and statistical information. For this purpose the following tables have been found most useful: "Technical Services Cost Ratio" (Table 5), "Cataloging Outputs and Costs" (Table 6), and "Analysis of New Volumes and Titles Cataloged" (Table 7).

The Technical Services Cost Ratio (TSCOR) was developed in the early 1960s by the ALA Resources and Technical Services Division's Technical Services Cost Ratio Committee.[12] It is "a ratio made up of the total cost of technical service salaries divided by the amount spent for library material during a given period of time." The result of this calculation is a decimal form for the amount which it costs in staff salaries to spend one dollar for library materials (books, periodicals and binding). This ratio has been computed annually since the committee issued forms and instructions for computation; Table 5 records TSCOR for the period 1968/69-1974/75 with the exception of 1969/70. The mean professional salaries for each year are also given because this processing cost indicator is certainly susceptible to increases in salaries and the ratio can be expected to change upward by this factor.

One slight variation has been made in the committee's instructions in that, starting in 1970/71, automation acquisition production costs were added into the basic figures on the assumption that such costs should be equated to direct labor costs. In 1973/74, all OCLC production costs for the cataloging module were also added. The resulting rise and decline in the TSCOR ratio since 1970/71 appears to substantiate previously presented production cost data for both automated systems.

As for the utility of this ratio as a measure of a technical services organization's performance, it is believed that a benchmark can be set by the individual libraries in order to judge total achievement. A ratio of less than one for a large research library is a commendable goal. TSCOR is a useful indicator for managers to be aware of and utilize as a performance measure.

Library management often requests information concerning cataloging output, cataloging costs and total volumes, and titles processed. Tables 6 and 7 are compiled annually for this purpose and because they cover more than one year, comparisons can be made and analyzed. Since the OCLC Catalog Support Module was installed in October 1973, it is interesting to note in Table 6 that output per cataloger increased for all three categories: (1) new titles cataloged; (2) new, reclassified and recataloged titles; and (3) new, reclassified and recataloged volumes. This fact is particularly pleasing when one realizes that the cataloging staff had been reduced by almost three full-time equivalent (FTE) catalogers, and yet total outputs were up. Cataloging cost per unit increased slightly but this was due in most part to higher-than-

Technical Services Cost Ratio (TSCOR) is a ratio made up of the total cost of technical services salaries divided by the amount spent for library materials during a given period of time. The figure obtained by putting this ratio in decimal form is the amount it costs in staff salaries to spend one dollar for library materials.

Year	TSCOR	Salary
1967/68	.749	$ 8,439
1968/69	.75	$ 8,811
1969.70	N.A.	$ 9,132
1970/71	.89*	
1971/72	.96	$10,158
1972/73	.96	$10,168
1973/74	.75**	$11.276
1974/75	.81	$12,382

*Includes Acquisitions and In-Process Control System's costs for the first time.
**Includes OCLC cataloging module's costs for full year.

Table 5. Technical Services Cost Ratio

	1973/74	1974/75
Cataloging Positions		
Professional	26.25*	22.50
Paraprofessional	10.00	11.00
Totals	36.25*	33.50*
Salaries		
Professional	$262,358	$278,500
Paraprofessional	65,207	77,835
Totals	$327,565	$356,335
Total Outputs		
New Titles (only)	69,975	70,363
New Titles, Titles Reclass., Titles Recat.	80,975	80,054
New Volumes, Vols. Reclass., Vols. Recat.	120,572	122,274
Cataloging Output Per Cataloger		
New Titles	1930.3	2100.4
New, Reclass., Recat. Titles	2233.8	2389.4
New, Reclass., Recat. Volumes	3326.1	3650.0
Costs		
Per New Title	$4.68	$5.06**
Per Title (new, reclass., recat.)	$4.05	$4.45**
Per Volume (new, reclass., recat.)	$2.71	$2.91**

*Incl. Catalog Librarian, 1/4 Catalog Editor's time, 2.5 Serials Catalogers and their salaries.
**Incl. salary increments given in December, 1974; retroactive to July, 1974.

Table 6. Cataloging Outputs and Costs

Year	Total Staff (FTE)	New Vols. Cataloged	New Titles Cataloged	New Titles Cataloged Per Man Yr.	New Titles Per Man Yr. % of 540.3
1969/70	142.00	132,389	75,004	528	97.7
1970/71	140.00	127,244	75,541	540	99.9
1971/72	137.82	115,130	69,021	501	92.7
1972/73	131.45	123,307	75,005	571	105.7
1973/74	126.65	111,527	69,975	553	102.4
1974/75	128.25	113,241	70,363	549	101.6

1969/70: New Vols Cataloged/New Titles Cataloged = 132,389/75,004 = 1.765
1974/75: New Vols Cataloged/New Titles Cataloged = 113,241/70,363 = 1.609

Table 7. Analysis of New Volumes and Titles Cataloged

normal salary increases given in 1974/75. It is obvious that the implementation of the OCLC Cataloging Support Module has been cost beneficial.

Table 7 attempts to establish a percentage indicator for new titles cataloged per man-year for the entire technical services staff. This analysis is made in order to take into consideration all efforts by the technical services staff in processing new materials. A norm was established by averaging new titles cataloged per man-year and the percentage, as is shown for 1972/73 through 1974/75, has exceeded 100 percent of an established norm. The usefulness of this established norm will be watched carefully in the coming years to see what the future effects will be of: (1) additional on-line processing modules, (2) the increased availability of cataloging copy from LC MARC and OCLC member libraries, (3) the numerous changes in entry rules and subject headings, and (4) the trend to further standardization of cataloging copy.

Future library planning needs the input of timely and useful management data. Library managers need to make concerted and continuing efforts to define the library's objectives to determine adequate performance measures and norms, and to design and implement management information systems in order to accomplish their library's mission in the most cost-beneficial manner possible. Such a system would have the greatest impact on management if the data were automatically collected and analyzed as part of the daily library routines. Unfortunately, no such system exists at this time, and the future prospects for its development look dim. In the meantime, reliance must be made upon such cost analysis and management data as are discussed in this paper.

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