

# Cost Accounting and Analysis for University Libraries

*The approach to library planning studied in this paper is the use of accounting models to measure library costs and implement program budgets. A cost-flow model for a university library is developed and tested with historical data from the General Library at the University of California, Berkeley. Various comparisons of an exploratory nature are made of the unit costs and total costs for different parts of the Berkeley system.*

## THE COST-FLOW ACCOUNTING MODEL

THERE DOES NOT APPEAR to be any uniform method by which libraries account for their internal costs. Considerable attention is given to the development of budgets along organizational lines and to the control of expenditures for labor and materials. But these data are not used to measure the cost of performing some function or rendering some service in the manner of industrial cost accounting. For example, in order to estimate the cost of holding a journal and to compare it with the cost of using a regional lending service, Williams<sup>4</sup> had to develop his own basic data in four libraries by means of interviews and other sampling techniques. In their re-

cent study of the M.I.T. Libraries, Rafael and Shishko<sup>3</sup> had to augment the existing data base considerably in order to estimate the cost of various library functions and programs. In addition, the papers of Penner<sup>2</sup> and Landau<sup>1</sup> provide a good review of previous cost studies.

A basic notion in the development of a cost control system is the idea of a "cost center" for which there is a clear definition of function and responsibility. The cost centers serve as focal points in the system for the collection and evaluation of cost data. There appear to be two major kinds of cost centers in libraries: processing centers and service centers. The processing centers serve an intermediate role in the flow of resources to the service centers, and all of their costs are passed on to the service units. The service centers can include branch libraries or specialized facilities within a central library. These units offer a schedule of services to certain users at certain "prices" which together comprise the output of the library. A library program may be identified with a single service unit or may cut across several or all units. Shishko divided the mission of the M.I.T. Libraries between research and instruction without subdi-

---

*Dr. Leimkuhler is Dean of the School of Industrial Engineering, Purdue University, Lafayette, Indiana, and Dr. Cooper is assistant professor at the School of Librarianship, University of California, Berkeley.*

*This work was supported by a Ford Foundation grant no. 68-267 (Research Projects in University Administration) to the Office of the Vice-President—Planning and Analysis, University of California, Berkeley. Copies of the full report may be obtained from Dr. Cooper.*

viding it by subject area. In a branch library system most branches would contribute to both research and instructional programs and their individual output would have to be divided under the two main headings, if this is desired. In accounting for costs and developing costs of service estimates it is important that these figures be related to a true decision-making function in the organization; that is, they should have a quality called "accountability." It is meaningless to develop numbers about which nothing can be done.

A simplified cost accounting plan for modelling the flow of cost through a library organization is shown in Figure 1. This plan incorporates the notion of standard cost as a measure of performance. The standard costs are based on the number of items processed, acquired, or held by the library unit. Other measures of performance could be used to gauge the flow of costs. These standards should be evaluated each year and modified accordingly so as to provide the best estimate of what is expected for the next year. "Variance" accounts can be used to collect the difference between what is expected and actually occurs; that is, between standard cost and "full" cost. This is a common and useful way to maintain control over costs and to generate management-by-exception reports. In Figure 1 only one variance account is shown for each category, but in practice one may develop separate variance measures for the amount and the unit cost of a flow. For example, if labor is costed at different wage rates for different kinds of labor hours used, it would be possible to maintain separate variance accounts for the wage rate and the labor hours to explain total labor variance. Standard costing assumes that the cost is directly proportional to the basis for unit cost; however, routine corrections can be made to account for any predictable bias from the variance figures.

#### A COST MODEL OF THE BERKELEY LIBRARIES

The cost accounting plan in Figure 1 was applied to the Libraries of the University of California at Berkeley in order to show how costs are generated and flow through the system to the various branch and special libraries. The resulting simplified cost model of the Berkeley Libraries is shown in Figure 2. No variance accounts are included in this model, since it is based on the cost history of a single year. However, variance accounts and standard costing could be introduced. The model conforms closely to the organizational structure of the Berkeley Libraries except in the case of the Serials and Documents Department, where a division had to be made between their function as a central processing unit and their function as a special service unit for readers. A similar division was made at the branch libraries to separate the cost of selecting and accessioning new items from the cost of maintaining and providing service from the shelved collection.

The main kinds of costs in the model are the direct costs for materials and labor and the indirect costs for space and overhead. The costs of space and university overhead do not enter into the ordinary budget estimates of operating costs, but they are important parts of the total cost of operating libraries and cannot be ignored. All space for the libraries was costed at the same unit price except for the depository space, and the university overhead was applied at a uniform rate. This permitted the development of a total labor, space, and overhead figure for each organizational unit of the library.

The main distinction in the flow of materials is between monographs and serials, and between purchased items and gift and exchange items, although the latter distinction is dropped after acquisition processing. For serials, a dis-

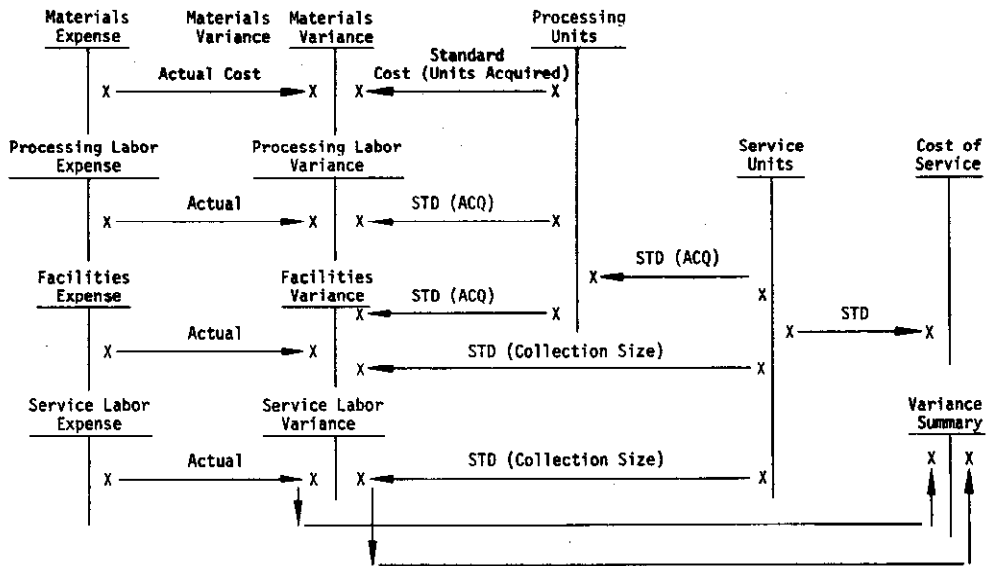


Figure 1

FLOW OF LIBRARY COSTS IN A SIMPLIFIED STANDARD COST ACCOUNTING PLAN

inction is maintained between new items and continuing items because of the difference in cataloging treatment. The total number of items and their distribution through the system are based on data from the annual reports of the Berkeley Libraries for the year July 1, 1967, to June 30, 1968 (1967/1968), although in some instances it was necessary to develop estimates from the Libraries' files of orders.

**DIRECT COSTS: MATERIALS**

Materials costs for the Berkeley library are limited to two classes of items: monographs and serials. Any type of library material for which a standing order can be placed is considered a serial.

Through the budgeting process each branch library is allocated money for purchase of monographs. For each branch a branch fund is maintained from which all disbursements are made. In all, more than 150 funds are used

for materials purchasing for the General Library.

Each order for a monograph may call for the receipt of one or more volumes. A random sampling procedure was undertaken to determine the number of volumes per order. Eighteen hundred orders from thirteen funds were examined. From this data, the number of volumes per order was determined to be 1.20. Certain funds such as those used to buy back sets and serials and duplicate copies of high usage monographs had significantly different ratios—2.20 for both. For these funds, the latter factor was used.

Table 1 summarizes the number of monographs acquired during the fiscal year 1967/1968. The average price per monograph for the Berkeley General Library was \$7.44, for a total of 81,350 items acquired. The number of items acquired by the branches was 21 percent of the total, while expenditures were 20 percent of the total (\$605,588).

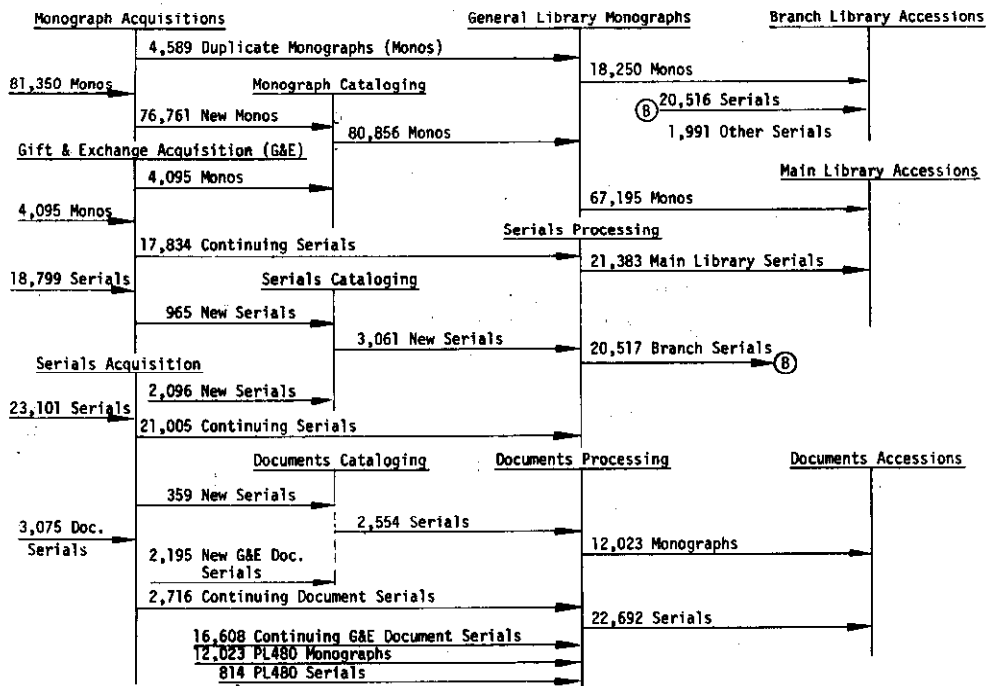


Figure 2  
ITEMS PROCESSED

A second category of materials that enter into the library system is serials. To determine the average price per paid serial for the libraries, a sample of the order file of 25,450 cards was taken. Of the 1,378 orders (5.4 percent) examined, 975 (3.8 percent) were found to be related to items received and paid for in the 1967/1968 fiscal year. The results of the sample are also shown in Table 1. The average price of a serial received by a branch library was \$27.23 while all other General Library units averaged \$13.13 per serial. The overall average price per serial was \$20.01.

Williams [1968] reports that for the four university libraries he sampled, the subscription prices per title year were \$12.62, \$22.62, \$21.55, and \$17.06.

In addition to paid serials representing 54 percent of the total received,

more than 19,000 serials are received through gift and exchange operations. Table 2 shows the distribution of all serial items across branches.

#### DIRECT COSTS: LABOR

Aside from materials cost, the second component of direct costs is labor. The Berkeley library divides the labor force into three classes: professional, nonprofessional, and general assistance. Almost all student employees are hired in the general assistance category. Mean salary rates per year for each category are shown in Table 3. The nonprofessional category includes the "library assistant" job titles as well as secretary, bookmender, editor, etc.

Organization charts for the library, in conjunction with published salary

TABLE 1  
MONOGRAPH AND SERIALS PURCHASE COSTS 1967/1968

Branch Library	Number of New Monographs Purchased (vol.)	Purchase Expenditure (\$) for Monographs	Unit Price for Monographs	Number of Items in Serials Sample	Cost of Serials Items Sampled (\$)/Year	Sample Cost/Serial Title/Year
Agriculture (AG)	790	5,879	7.44	48	2,682	55.88 <sup>1</sup>
Art/Anthropology (A/A)	812	5,217	6.42	13	96	7.38
Astronomy/Math/Stat (AMS)	390	3,550	9.10	15	309	20.60
Biochemistry (BIOCHEM)	72	930	12.92	9	231	25.67
Biology (BIOL)	658	6,358	9.66	76	2,848	37.47 <sup>2</sup>
Chemistry (CHEM)	181	2,373	13.11	22	535	24.32
Earth Sciences (ES)	489	4,065	8.31	9	85	9.44
East Asiatic (EAL)	4,665	21,620	4.63	28	455	16.25
Education/Psychology (E/P)	1,841	9,878	5.37	40	351	8.78
Engineering (ENG)	713	8,670	12.16	55	2,118	38.51
Entomology (ENT)	NA	NA	NA	NA	NA	NA
Environmental Design (ED)	1,564	11,925	7.62	28	1,376	49.14
Forestry (FOR)	272	2,706	9.95	14	188	13.43
Graduate Soc. Sci. (GSSL)	1,468	9,607	6.54	32	360	11.25
Library School (LSL)	465	1,857	3.99	22	374	23.38
Music (MUS)	1,258	11,922	9.48	14	171	12.21
Optometry (OPT)	195	1,716	8.80	2	12	6.00
Physics (PHY)	313	3,284	10.49	13	259	19.92
Public Health	976	7,522	7.71	26	441	16.96
Social Welfare/Crim (SW)	425	2,347	5.52	10	71	7.10
Branch Libraries Total	17,547	121,426	6.95	476	12,962	27.23
Main Library Total	63,803	484,162	7.59	499	6,550	13.13
TOTAL	81,350	605,588	7.44	975	19,512	20.01

<sup>1</sup> Includes one \$2,000 item.

<sup>2</sup> Includes one \$1,250 item.

schedules, were used to calculate the direct labor cost per branch and main library unit (see Tables 4 and 5). To the extent that the organization charts do not reflect the true staffing situation, and to the extent that the mean salary figures do not represent the true salaries, the data in Tables 4 and 5 are biased.

Total direct labor expenditure amounts to \$3.6 million, and of this, 22 percent is branch labor. Of the 120 Full Time Equivalent (FTE) employees in the branches, 31 percent are professional, 39 percent are nonprofessional, and 30 percent are general assistance. The 443 FTE for the Main Library is made up of 22 percent professionals, 49 percent nonprofessionals, and 29 percent

general assistance.

#### INDIRECT COSTS: OVERHEAD AND SPACE

The cost of library building space is estimated to be about \$5.00 per square foot per year. This figure is intended to represent current replacement value of the building space including equipment and fixtures and the cost of utilities and maintenance. The simplified method used to make this estimate is shown below. The numbers used were obtained from the studies by Raffel and Shishko<sup>3</sup> and Williams,<sup>4</sup> and from consultation with the Berkeley and University Architects Offices, the Berkeley Grounds and Building Office, and the University Real Estate Office. These numbers, however,

TABLE 2  
SIZE OF THE GENERAL LIBRARY  
JUNE 30, 1968

Branch Library	Volumes	Current Serials	Total Items <sup>2</sup>	Ratio of Volumes to Serials
Agriculture	63,799	2,437	66,236	26.18
Art/Anthropology	27,024	1,158	28,182	23.34
Astronomy/Math/Stat	24,574	827	25,401	29.71
Biochemistry	5,427	140	5,567	38.76
Biology	144,090	3,221	147,311	44.73
Chemistry	18,342	335	18,677	54.75
Earth Sciences	42,199	977	43,176	43.19
East Asiatic	241,811	1,237	243,048	19.55
Education/Psychology	65,455	1,385	66,840	47.26
Engineering	63,162	1,638	64,800	38.56
Entomology	8,579	246	8,825	34.87
Environmental Design	50,728	1,293	52,021	39.23
Forestry	20,281	1,334	21,615	15.20
Graduate Social Sciences	39,014	2,616	41,630	14.91
Library School	25,520	2,014	27,534	12.67
Music	70,360	197	70,557	357.16
Optometry	2,872	82	2,954	35.02
Physics	15,276	190	15,466	80.40
Public Health	41,111	906	42,017	45.38
Social Welfare/Crim	12,857	275	13,132	46.75
Branch Total	982,481	22,508	1,004,989	43.65
Main Building	2,200,562	44,075	2,244,637	49.93
Total General Library	3,183,043	66,583	3,249,626	47.81

<sup>1</sup> Includes 22,692 documents.

<sup>2</sup> A serial title is considered as an item.

TABLE 3  
SALARY SCHEDULE

Title	1967/1968
	Mean Salary (\$) Per Year
Professional	
Librarian I	\$ 7,075
Librarian II	8,450
Librarian III	9,975
Librarian IV	11,575
Librarian V	13,725
Nonprofessional	
Library Assistant I	5,250
Library Assistant II	6,078
Library Assistant III	7,044
General Assistance	
Clerk	4,650

are not to be considered as official or certified figures in any sense, but only as representative cost figures for the purpose of analysis.

The annual cost for the Richmond Inter-Campus Library Facility ICLF(N) is estimated to be about \$2.50 per square foot per year to cover the cost of pur-

chase, remodeling, equipment, utilities, and maintenance. Tables 4 and 5 summarize the space costs for the General Library.

In addition to direct labor costs, the library incurs expenses for fringe benefits and salary administrative overhead for its employees. Discussions with the University Office of the Vice President for Planning and Analysis indicated that administrative overhead is approximately 10 percent of direct labor cost. Salary administrative overhead ranges between 9 and 13 percent of direct labor, depending on job title. This study assumed that administrative overhead was 10 percent. Thus, fringe benefits plus administration total 20 percent.

Within the library itself, the costs of the librarian's office, the business office, the personnel office, and the space used by these departments were considered as part of the library overhead charge. In addition, supplies and general ex-

TABLE 4  
LABOR AND SPACE COSTS—MAIN LIBRARY 1967/1968

Main Library Unit	Total FTE	Total Direct Salary Expenditures (\$)	Total Assignable Square Feet (ASF)	Total Annual Space Cost at \$5.00/Square Foot
Acquisitions Department	66.75	481,763	13,793	68,965
Bancroft Library	35.075	249,355	31,599	157,995
Business Office	17.375	105,742	4,358	21,790
Catalog Department	76.75	500,420	6,375	31,875
Catalogs (Public)	—	—	9,899	49,495
Documents Department	26.045	162,584	31,064	155,320
General Reference Service	17.25	128,369	3,066	15,330
Inter-Campus Library Facility North (ICLF) Depository	3.50	16,875	55,840	139,600 <sup>2</sup>
Librarians Office	6.75	83,891 <sup>1</sup>	1,566	7,830
Library Pers. Office	3.375	23,470	447	2,235
Library Photo. Service	23.50	141,285	4,665	23,325
Loan Department	88.125	464,667	100,901	504,505
Morrison Library	3.745	20,708	5,487	27,435
Reading Rooms	—	—	16,748	83,740
Serials Department	69.125	381,007	31,440	157,200
Storage Selection	1.25	5,813	—	—
Undergrad. Library Selection Project	4.50	32,906	4,791	23,955
<b>Total Main Library</b>	<b>443.115</b>	<b>2,798,855</b>	<b>322,039</b>	<b>1,470,595</b>

<sup>1</sup> Estimated.

<sup>2</sup> Total annual cost of \$2.50 per square foot.

TABLE 5  
LABOR AND SPACE COSTS—BRANCH LIBRARIES 1967/1968

Branch Library	Total FTE	Total Direct Salary Expenditure (\$)	Total ASF	Total Annual Space Cost at \$5.00/Square Foot
Agriculture	4.805	33,009	7,746	38,730
Art/Anthropology	4.045	24,387	5,307	26,535
Astronomy/Math/Stat	3.94	23,783	4,009	20,045
Biochemistry	.512	4,014	1,503	7,515
Biology	14.225	81,617	21,480	107,400
Chemistry	3.08	19,276	11,025	55,125
Earth Sciences	3.08	20,104	5,782	28,910
East Asiatic	18.875	153,834	13,698	68,490
Education/Psyc.	13.50	84,532	13,308	66,540
Engineering	5.875	35,498	6,125	30,625
Entomology	1.52	9,947	1,796	8,980
Environmental Des.	8.08	54,376	14,522	72,610
Forestry	4.97	37,436	5,319	26,595
Grad. Soc. Sci.	11.69	77,415	23,713	118,565
Library School	2.75	17,679	3,321	16,605
Music	6.375	44,096	8,858	44,290
Optometry	1.03	6,897	1,014	5,070
Physics	3.58	23,958	4,833	24,165
Public Health	5.64	36,149	7,873	39,365
Social Welfare	3.20	17,439	4,205	21,025
<b>Total Branch Library</b>	<b>120.772</b>	<b>805,446</b>	<b>165,437</b>	<b>827,185</b>
<b>Total Main Library</b>	<b>443.115</b>	<b>2,798,855</b>	<b>322,039</b>	<b>1,470,595</b>
<b>TOTAL</b>	<b>563.887</b>	<b>3,604,301</b>	<b>487,476</b>	<b>2,297,780</b>

Cost of on-campus or nearby real estate	\$12.00 per gross sq. ft.
Total building construction project cost	<u>38.00 per gross sq. ft.</u>
Total building and site cost	\$50.00 per gross sq. ft.
Assignable space factor with 80 percent utilization	1.25
Effective cost of assignable space	\$62.50 per sq. ft.
Cost of fixtures, furniture, shelving, etc.	<u>4.00 per sq. ft.</u>
Total initial cost of space and furnishings	\$66.50 per sq. ft.
Capital recovery factor	0.06
Equivalent annual cost of space and furnishings	\$ 3.99 per sq. ft. per yr.
Annual cost of utilities and maintenance	<u>1.00 per sq. ft. per yr.</u>
Total annual cost for library building space	\$ 4.99 per sq. ft. per yr.

penses as well as equipment and fixtures were included in the overhead charge and allocated to library units on a salary basis. The overhead charges for these departments and items amounted to 21 percent. The total overhead charge for library units was 41 percent (20 percent + 21 percent).

#### PROCESSING COST CENTERS: ACQUISITION AND CATALOGING COSTS

As materials are introduced into the processing centers of the library, they undergo transformations which ultimately result in items ready for circulation. Figure 2 shows the flow of items through the processing centers, and Table 6 indicates unit costs. The monographs and/or serials enter at each processing center. To these "raw materials" is added a labor, space, and overhead charge. Thus, as a unit passes out of the processing center, a value is added corresponding to the cost of processing the item.

For purposes of the model, monographs are considered to be acquired from two sources—purchases and gifts. Purchased monographs enter the system at a cost of \$7.44 per item. Gift monographs enter at zero cost per item. To the direct material cost for purchased monographs is added a labor and space charge of \$3.04 per item. The \$3.04 is the cost for the Administrative and Processing Divisions of the Acquisitions

Department, plus overhead.

New monographs enter the cataloging department from the Gifts Division and the normal acquisition ordering procedure. Once in the cataloging department, a labor, space, and overhead charge of \$5.40 per monograph is added. Binding, selection, and other miscellaneous charges are also added.

A monograph acquired by a branch has a final cost of \$25.00, while a monograph acquired by the main library costs \$19.85.

Similar flows can be observed for serials and documents. A paid serial has an

TABLE 6  
UNIT COSTS

	Monographs	Serials
Purchase Price	\$ 7.44	\$20.00
Selection		
Main Library	2.84	2.84
Branch Library	4.00	4.00
Acquisition Labor and Space	3.04	2.65
Cataloging Labor and Space	5.40	49.61
Serials Check-In Labor and Space		3.04
Miscellaneous		
Binding	1.54	5.03
Postage, Insurance, Taxes	.15	.15
Total*		
Main Library	19.85	33.87
Branch Library	25.01	39.03

\* Columns do not add to total since not all units are processed by all departments.

initial subscription cost of \$20.00. After cataloging for a new serial and proc-



essing (check in/entering) for all serials, the branch cost is raised to \$39.03 and the main library cost becomes \$33.87.

Miscellaneous charges include binding expenditures as well as postage, insurance, and taxes on acquisitions. Binding charges are made up of the cost to operate the bindery, the Bindery Preparation Division, and the Binding Pickup Department. Including space and overhead charges, this amounts to \$337,197 for 55,880 items bound (excluding mending). When the total expenditure is divided between monographs and serials in the ratio 20,899 to 34,981 (1 to 1.67) and the resulting cost divided by the total monograph and serial items processed, a cost of \$1.54 per monograph and \$5.03 per serial results. These amounts represent proportional charges for future binding that a processed item incurs.

In addition to binding and postage charges, a received serial has added to it a charge reflecting its check-in cost. This amounts to \$3.24 per serial title per year.

SERVICE COST CENTERS:  
MAIN LIBRARY AND BRANCH LIBRARIES  
COSTS

Once the labor and space costs have been established for the processing functions, it is then possible to determine the service costs and the total library costs. Tables 7 and 8 summarize the total library cost for the system. Out of a total of \$8.3 million, \$3.7 million (46 percent) is spent in the process of acquisition of materials. Of this, only \$1.2 million (14 percent) is for the purchase of raw materials, i.e., monographs and serials.

Total acquisition cost of \$3.7 million has three components: materials cost, labor cost, and space cost. Materials are either monographs or serials, and enter the system at a unit price of \$7.44 and

\$20.00, respectively. Gift items enter at zero cost. Acquisition labor cost includes the cost of all units involved in processing the items; i.e., acquisitions processing, cataloging, serials processing, documents processing, and branch processing. The space cost is that associated with each of the processing units.

Branch labor acquisition cost was determined by means of interviews with each branch librarian. The librarian was asked to indicate what percentage of time each employee spent in the acquisitions process. This time was intended to reflect the cost of selection of materials, typing of orders, and other associated tasks. The cost of branch processing of items (cataloging, filing, etc.) was estimated from a survey of three branch libraries.

Service labor and service space costs reflect the cost of providing service to the patron. This is in distinction to the total processing cost which reflects the cost of obtaining and processing raw materials.

COMPARISON OF THE COSTS OF  
CIRCULATION, HOLDING, AND  
ACQUISITION

Several measures have been selected for use in evaluating the performance of the library and aiding in planning and analysis. If the total cost for the branch service operations is divided by the total number of items held, a measure of the holding and acquisition cost per item is obtained. Figure 3 plots this relationship for the branch libraries. The plot exhibits a declining cost per item held as the number of items held by the library increases. Evidently some economies of scale are present. The smallest branch library, Optometry, has the second highest cost among all branches (\$7.05). (Libraries cited are circled in subsequent figures to aid the reader in interpreting the data.) The Graduate Social Science Library has the

TABLE 7  
TOTAL LIBRARY COST—BRANCH LIBRARIES  
1967/1968

Branch	Service Labor Cost	Service Space Cost	Total* Processing Cost	Total Library Cost
Agriculture	21,372	37,749	115,916	175,037
Art/Anthropology	18,886	25,931	66,572	111,389
Astronomy/Math/Stat	23,938	19,674	42,553	86,165
Biochemistry	3,997	7,450	7,364	18,811
Biology	84,942	106,226	143,041	334,209
Chemistry	23,129	54,967	17,850	95,946
Earth Sciences	16,859	28,462	51,007	96,328
East Asiatic	171,330	66,714	165,330	403,374
Education/Psychology	93,595	65,543	102,532	261,670
Engineering	31,657	29,908	82,706	144,271
Entomology	12,131	8,906	9,601	30,638
Environmental Design	53,969	71,728	91,641	217,338
Forestry	40,311	26,109	59,216	125,636
Graduate Social Sciences	77,108	117,313	140,752	335,173
Library School	5,646	15,854	90,856	112,356
Music	50,456	43,833	70,476	164,765
Optometry	7,515	4,984	8,325	20,824
Physics	29,777	24,009	15,666	69,452
Public Health	36,078	38,785	61,061	135,924
Social Welfare	19,022	20,808	21,934	61,764
Branch Total	821,718	814,953	1,364,399	3,001,070
Main Total	1,618,531	1,282,612	2,425,481	5,328,624
TOTAL	2,440,249	2,097,565	3,789,880	8,327,694

\* Includes materials, labor, space, and overhead costs connected with nonservice activities.

TABLE 8  
TOTAL LIBRARY COST—MAIN LIBRARY  
1967/1968

Unit	Service Labor Cost	Service Space Cost	Total Materials Acquisition Cost	Total Library Cost
Central Collection				
Loan Department	\$ 435,940	\$ 430,115		
Public Catalog		49,495		
Reading Rooms		83,740		
Reference Department	181,000	14,050		
Reserve Book Room	196,224	49,240		
Humanities Grad. Service	23,045	25,150		
Bancroft Library	301,310	125,360		
Rare Books Room	33,249	30,495		
Mark Twain Collection	17,030	2,140		
Morrison Library	29,198	27,435		
Serials Department	49,425	43,482		
Newspapers Room	48,799	95,870		
Undergrad. Library Project			\$ 76,783	
Documents Department	61,469	128,790	353,586	
Maps Room	10,640	16,325		
Library Photo Service	199,212	23,325		
ICLF(N) Depository	23,794	139,600		
Storage Selection	8,196			
Subtotal	1,618,531	1,284,612	430,369	
Main Library Materials Acquisition			1,995,112	
Total	\$1,618,531	\$1,284,612	\$2,425,481	\$5,328,624

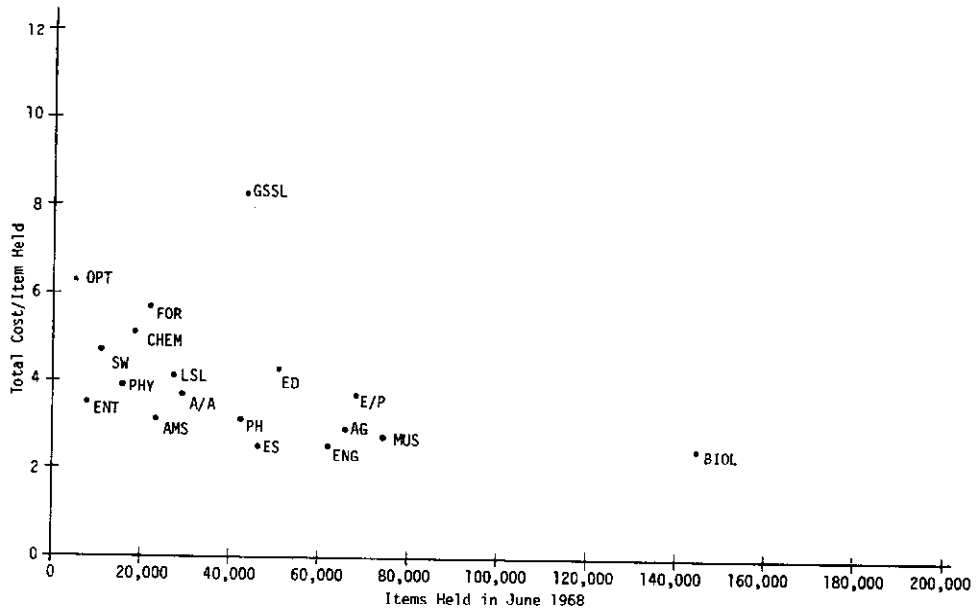


Figure 3  
TOTAL COST PER ITEM HELD

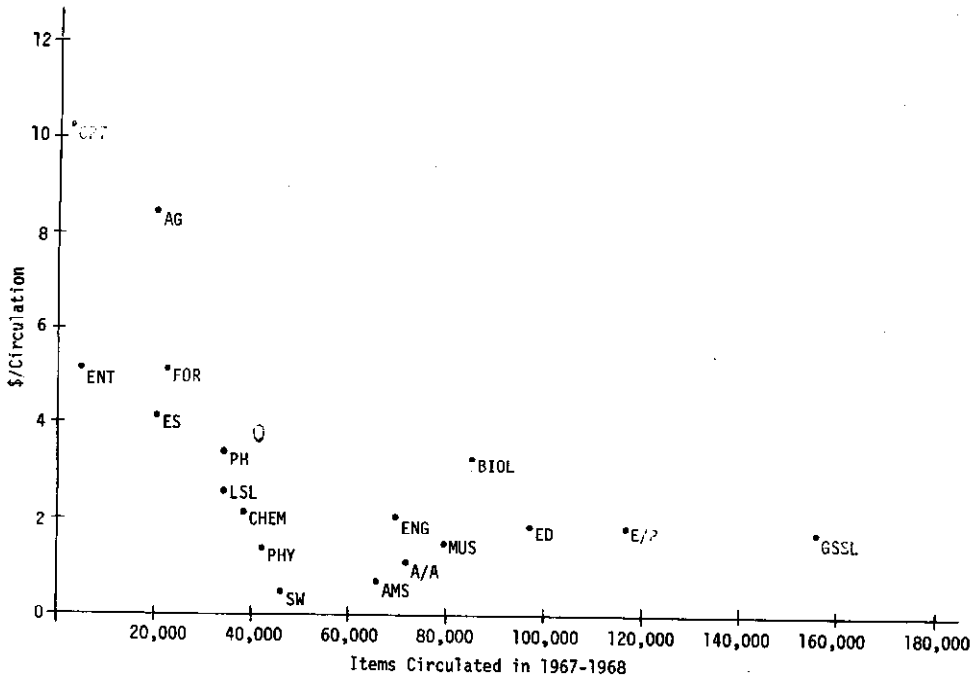


Figure 4  
TOTAL COST PER UNIT OF CIRCULATION

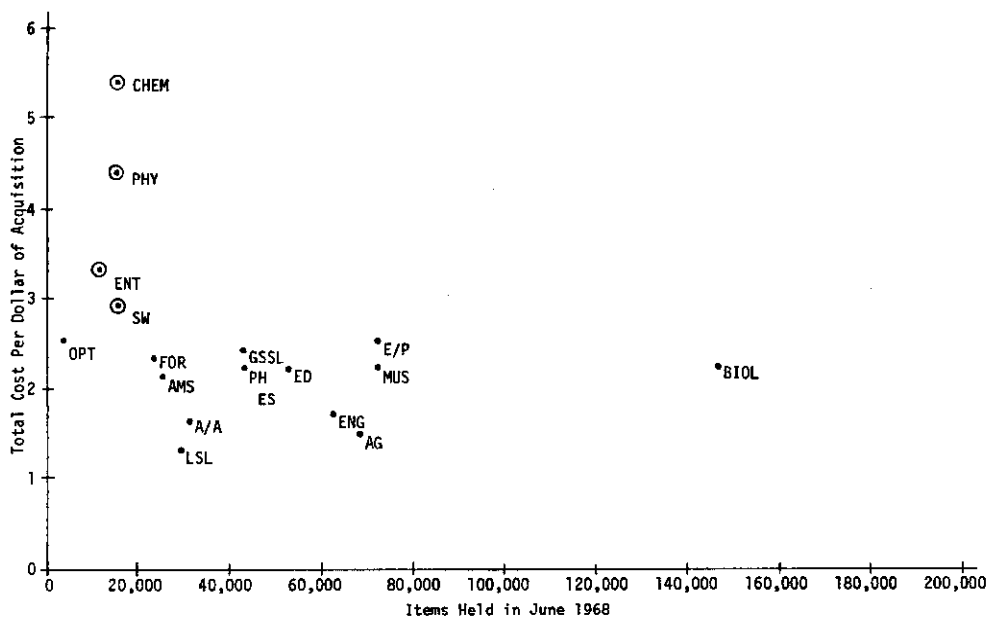


FIGURE 5

## TOTAL COST PER DOLLAR OF ACQUISITION

highest cost per item held, but this can be accounted for by the large amount of unused stack capacity of the library. The largest branch library (not shown on graph), East Asiatic, has the lowest cost per item held (\$1.66).

Branch libraries average \$2.99 while the main library averages \$2.37 per item held. The overall average holding cost per item is \$2.56.

The total cost per unit of circulation is plotted for branch libraries in Figure 4. Each data point represents the total cost of the branch service center divided by the total circulation for that branch. The average cost per unit of circulation is \$3.53 for the General Library. Main library cost is \$4.16 per item, while branch cost is \$2.77.

The minimum cost per unit of circulation is reached for branches having 50,000 to 70,000 circulations per year. The highest cost per unit of circulation

is recorded for the branch library having the smallest circulation. The branch library with the highest circulation, the Graduate Social Sciences Library, has a cost of \$2.07 per unit of circulation as compared with the \$2.77 average branch cost.

Total cost per dollar of acquisition is calculated as the total library cost by branch divided by the total acquisition cost for that branch. A lower cost per dollar of acquisition reflects the fact that more money is being put into materials than labor or space. Figure 5 shows that the Library School Library devotes a major share of its resources to acquisition. The Chemistry library, on the other hand, spends a small amount of money on acquisitions relative to labor and space. In general, small branches (Social Welfare, Entomology, Physics, and Chemistry) exhibit a much higher than average cost per dollar of

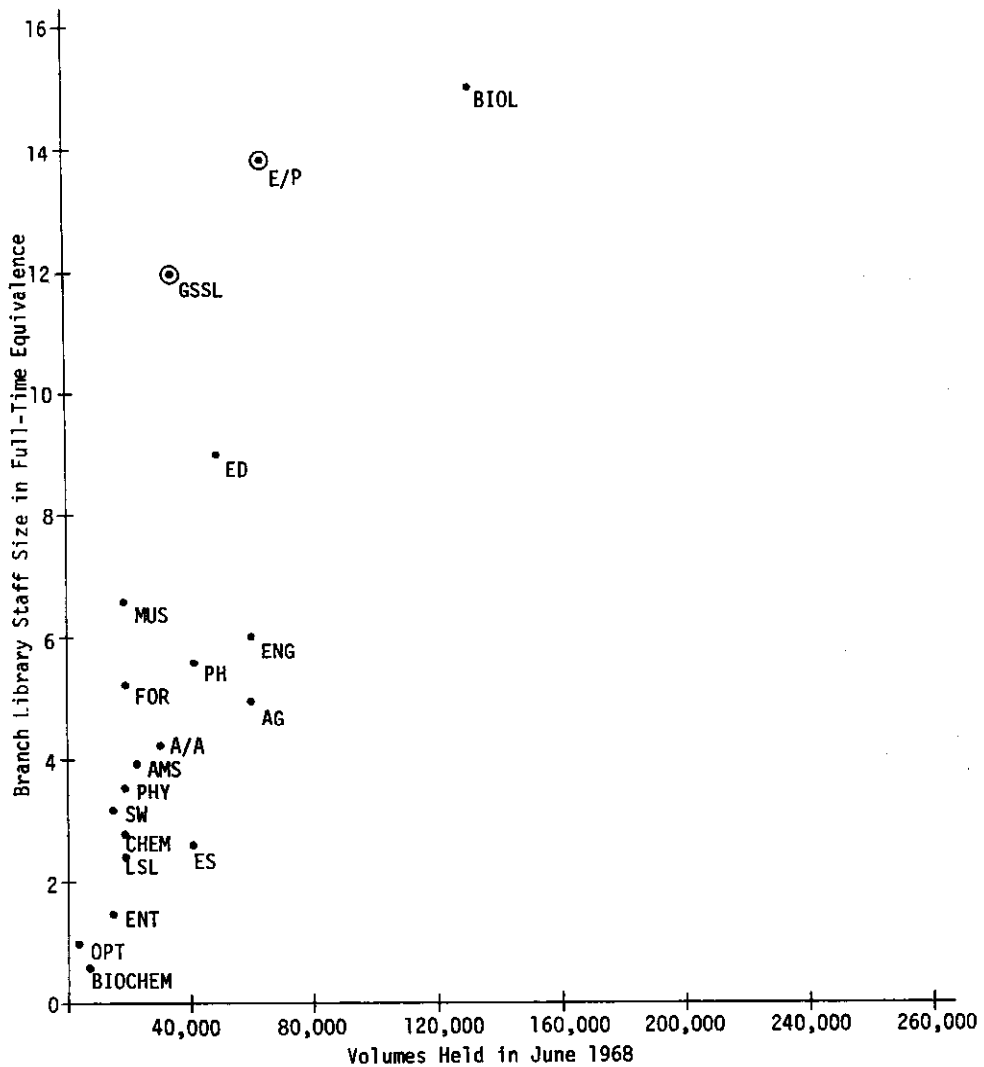


Figure 6  
VOLUMES—FTE BY BRANCH LIBRARY

acquisition. The cost for the remaining branch libraries seems to stabilize in the \$1.20 to \$2.70 range.

COMPARISONS OF LABOR AND SPACE COSTS

Nearly \$3.6 million out of \$8.3 million was spent for direct labor in the

General Library in 1967/1968. Since this constitutes a relatively large expenditure, it is important to try to develop tools for detecting significant changes in staffing needs.

The relation between FTE and the number of volumes held is presented in Figure 6. As the number of volumes

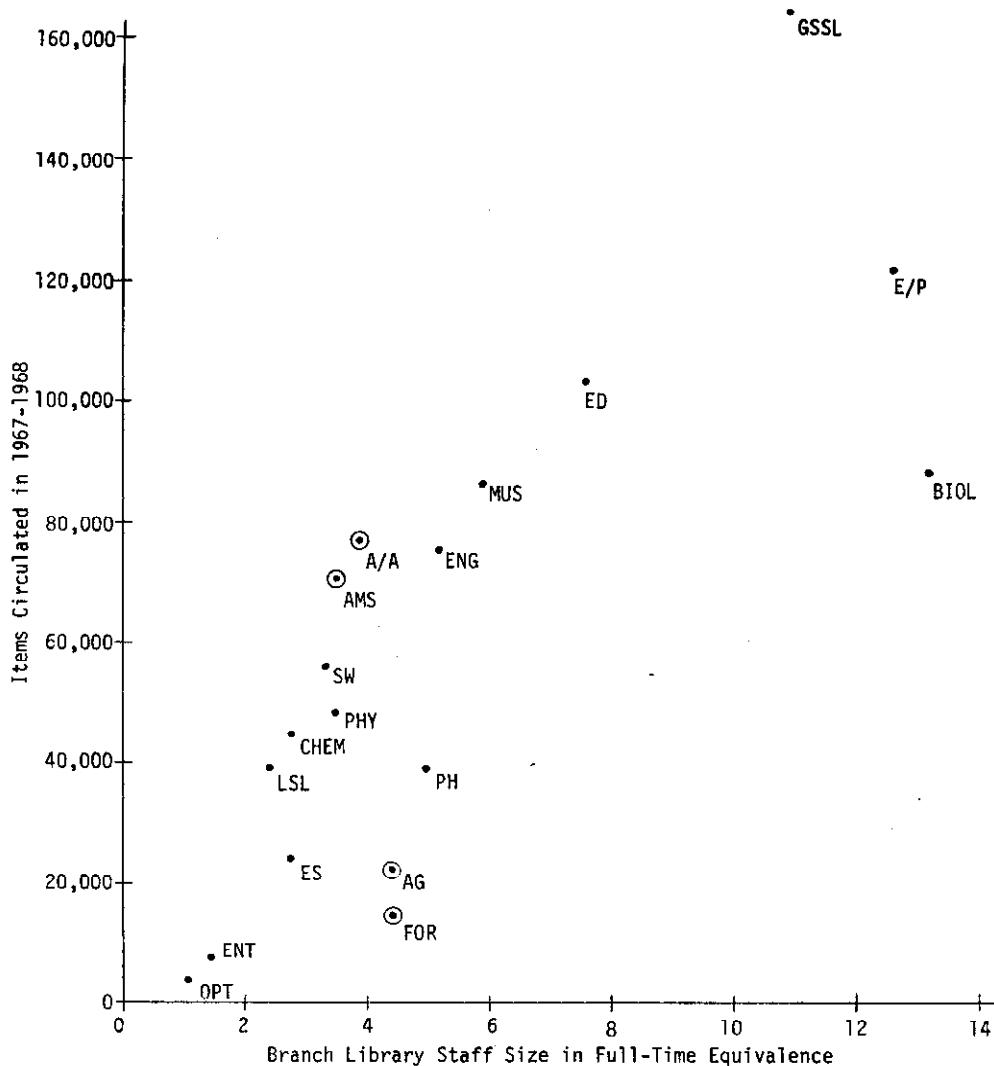


Figure 7  
FTE—CIRCULATION

held increases, FTE staff increases. This relationship may be due to the manner in which staff is allocated to the branches.

When FTE and circulation by branch are compared (Figure 7), the same increasing pattern emerges. If a curve were fitted to the data of Figure 6, it would seem that the Graduate Social Sciences library and the Education/

Psychology library fall in line with the staffing-circulation relationships of the other branches.

Interviews with the Art/Anthropology and Astronomy/Mathematics/Statistics librarians have indicated a shortage in FTE for the amount of circulation of their respective branches. This seems to be confirmed by Figure 7. In addition, the graph indicates that Agricul-

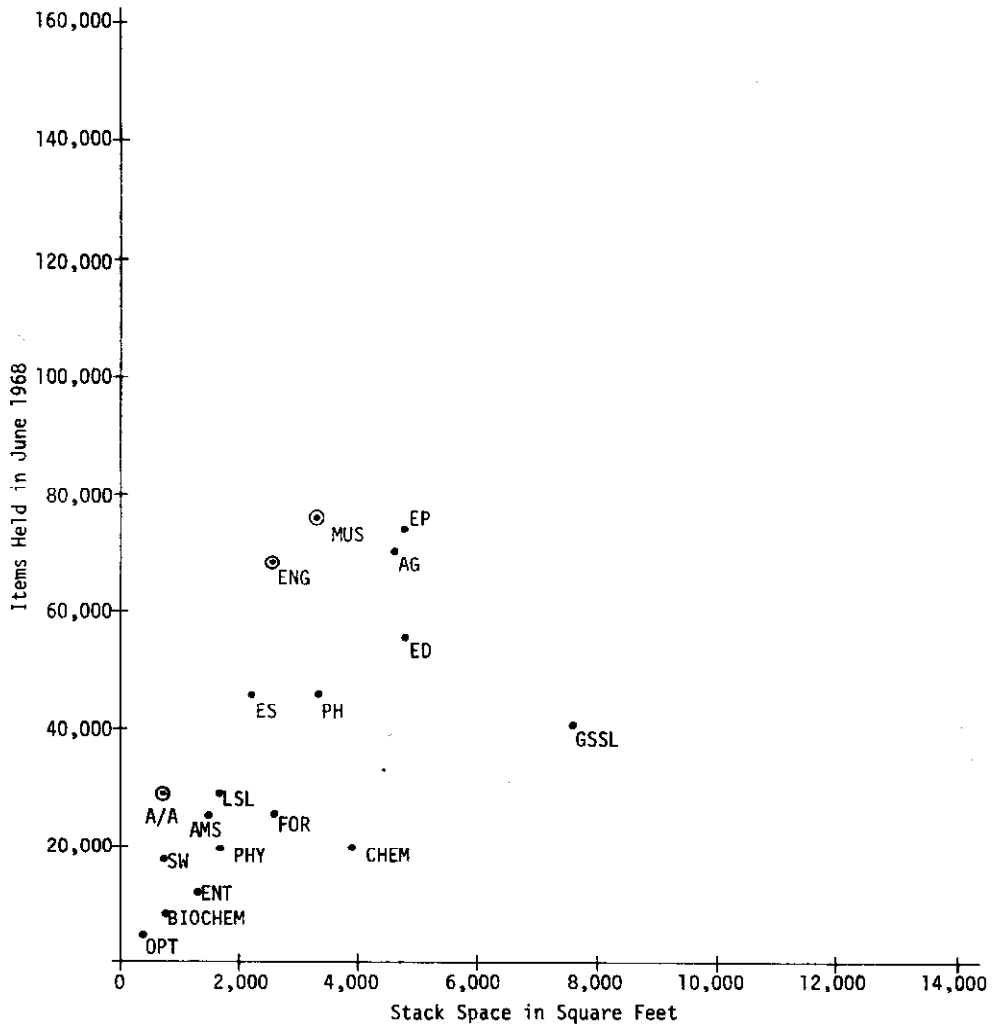


Figure 8  
STACK CAPACITY

ture, Biology, and Forestry are over-staffed for the amount of circulation.

The storage of materials constitutes a second area in which planning and control must be exercised. Since facilities cannot be constructed in short periods of time, management must be in a position to predict when a branch will no longer be able to store all the items it would like.

The stack capacity (in square feet) for each of the branches is plotted

against the total items held by that branch in Figure 8. From the graph it is apparent that the Chemistry and Graduate Social Sciences library have room for expansion while Art/Anthropology, Engineering, and Music seem to be relatively crowded.

SUMMARY

A cost-flow accounting model has been presented and data from the University of California Berkeley General Library

has been used to illustrate the model's applicability. Unit and total cost comparisons have been made and evaluative tools have been proposed for use in library management. From the analysis, a number of conclusions can be drawn.

With respect to circulation, holding, and acquisition costs, it appears that a lower cost per item held is found in branch libraries having a large number of items. In addition, branch libraries with a circulation in the range of 50,000 to 70,000 are found to have the minimum cost per unit of circulation. The analysis also indicates that small branch libraries spend more of their resources on acquisition of material than they devote to labor.

Analyses of labor and space costs also yield useful planning information. From these costs it is possible to detect staffing needs and staffing patterns. This is done by determining the relationship between FTE and circulation and FTE and items held for the branch libraries. In addition, by determining the relation between volumes held and stock capacity across all branches, the librarian is in a position to see where construction resources can be used most effectively, or where collection weeding might take place.

#### ACKNOWLEDGMENTS

The authors acknowledge the generous assistance of Dr. James E. Skipper, university librarian, for making available all necessary data for the cost analysis. Mrs. Helen M. Worden, associate university librarian, was especially helpful in clarifying many of the problems incurred in the analysis of the Berkeley library. Miss Coralia Serafim conducted the survey of branch librarians. Dr. Robert M. Hayes and Dr. Patrick Wilson made valuable suggestions to preliminary drafts of this document.

#### BIBLIOGRAPHY AND REFERENCES

1. Landau, Herbert B. "The Cost Analysis of Document Surrogation: A Literature Review," *American Documentation* 20:302-10 (Oct. 1969).
2. Penner, Rudolph J. "The Practice of Charging Users for Information Services: A State of the Art Report," *Journal of the American Society for Information Science* 21:67-74 (Jan.-Feb. 1970).
3. Raffel, Jeffrey, and Shisko, Robert. *Systematic Analysis of University Libraries*. M.I.T. Press, 1969.
4. Williams, Gordon. *Library Cost Models: Owning Versus Borrowing Serial Publications*. Center for Research Libraries: Chicago, 1968. PB 182 304.