

# Cost Analysis of an Automated and Manual Cataloging and Book Processing System

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*A comparative cost analysis of an automated network system (WLN) and a local manual system of cataloging and book processing at Washington State University Libraries indicates that the automated system is about 20 percent less costly than the manual system. A per-unit cost approach was used in calculating the monthly cost of each system based on the average number of items processed per month under the automated system. The process and the results of the analysis are presented in a series of charts which detail the tasks, items processed, unit and total monthly costs of both the manual and automated systems. The higher costs of the manual system were essentially staff costs.*

The Technical Services Division (TSD) of Washington State University Libraries (WSUL) has had considerable experience in the use of automated techniques in selected areas of technical processing. An in-house automated acquisitions system was developed and implemented in 1967; that in-house system was eventually replaced by the acquisitions component of the Washington Library Network (WLN). Since November 1977, the Technical Services Division of WSUL has used the WLN bibliographic component for data verification (searching) and cataloging of materials.

Although the Library has generally known its total automation expenditures, it has lacked a more precise breakdown of cost data on automated processing. Moreover, the library has practically no cost data on manual processing. This report deals only with the costs of using the WLN bibliographic system, *not* the WLN acquisitions component. An analysis was made of the total costs of both the automated and manual book processing systems. The objectives in undertaking the cost analysis were threefold: (1) to identify the essentially unknown costs of manual processing; (2) to provide more exact cost data on automated processing; and (3) to develop comparable data on the costs of each system.

**METHODOLOGY**

The methodology used in this cost analysis was a per-unit cost approach. First, each process or task in which the staff were engaged in cataloging and book processing was identified. Second, the per-unit cost—e.g., staff, data base, materials—of each process was calculated. Finally, monthly costs were determined by multiplying the average number of items processed per month by the unit cost per task. The cost analysis charts (tables 1(a)–1(e)—manual system; tables 2(a)–2(d)—automated system), which detail the tasks, items processed, and unit and total costs form the body of the analysis. Equipment costs—purchase, lease, maintenance—were calculated separately, and are included in the summary cost data for each system (table 3).

**IDENTIFICATION OF PROCESSES**

The staff of the TSD Cataloging and Book Processing Unit perform the following functions: bibliographic verification, bibliographic record production, bibliographic record maintenance, the marking of materials, binding preparation and receipt (for most of the library system), and the preparation of book cards.

Table 1(a). Cost Analysis: Manual Cataloging and Book Processing System

Process	Staff	Data	Subscription	Materials	Total	Average	Total
	Costs	Base				Cost	
	Per	Costs/	Costs/Item	Costs/Item	Per	Per	Per
	Item	Item			Item	Month	Month
<i>Bibliographic Searching</i>							
<i>IDC Microfiche Search (LC and CIP Copy)</i>							
LT I (.084/min @ 3 min/item)	\$ .252		\$ .21		\$ .462	2484	\$1,148
LT II (.094/min @ 3 min/item)	.282		.21		.492	496	244
LT III (.117/min @ 3 min/item)	.351		.21		.561	992	557
Subscription costs—IDC (\$10,000/yr ÷ 47,664 searches/yr = .21/search)							
Microfiche Search Subtotal						3972	\$1,949
<i>National Union Catalog, etc., Search</i>							
LT I (.084/min @ 15 min/item)	\$1.26		\$ .19		\$1.45	588	\$ 853
LT II (.094/min @ 15 min/item)	1.41		.19		1.60	169	270
LT III (.117/min @ 20 min/item)	2.34		.19		2.53	418	1,058
LT III (.117/min @ 40 min/item)	4.68		.19		4.87	100	487
Subscriptions (\$2,940/yr ÷ 15,300 searches/yr = .19/search)							
Manual Search Subtotal						1275	\$2,668
Bibliographic Searching Total						5247	\$4,617

Table 1(b). Cost Analysis: Manual Cataloging and Book Processing System

Process	Staff Costs Per Item	Data Base Costs/ Item	Subscription Costs/Item	Materials Costs/Item	Total Cost Per Item	Average Number Processed Per Month	Total Cost Per Month
<i>Bibliographic Record</i>							
<i>Production-Processing and Products</i>							
1. Cataloging with LC Microfiche Copy							
<i>Type abbreviated fanfold (4-part 3x5 slips)</i>							
Timeslip (.03/min @ min/item x 72)	\$ .803				\$.02/ fanfold		
LT I (.084/min @ 10 min/item x 985)							
<i>Check Series</i>							
LT I (.084/min @ 2 min/item)	.168						
<i>Revise fanfold</i>							
Supervisor I (.126/min @ 3 min/item)	.38						
<i>Check fanfold against book; separate fanfold</i>							
LT II (.094/min @ 2 min/item x 540)	.22						
Supervisor I (.126/min @ 2 min/item x 517)							
<i>Arrange and file shelflist copy of fanfold</i>							
Timeslip (.03/min @ 1.5 min/slip)	.045						
<i>Revise shelflist filing of fanfold slips</i>							
LT II (.094/min @ 1 min/slip)	.094						
<i>Verify Authorities (Subject and name) (1057x4)</i>							
Timeslip (.03/min @ 4 min/item)	.12						
<i>Type multilith master for card production</i>							
LT I (.084/min @ 6 min/master)	.504			.06/ master			
<i>Revise typed multilith master</i>							
LT I (.084/min @ 3 min/master)	.252						
<i>Run multilith masters</i>							
Multilith Operator (.13/min @ 3.5 min/set)	.455			(Cost of cards see below)			
Microfiche Copy Cataloging Subtotal	\$ 3.04			\$.08/ item	\$3.12	1057	\$3,298
2. Cataloging with Modified Copy (NUC/LC)							
<i>Type fanfolds (4-part 3x5 slips)</i>							
LT I (.084/min @ 15 min/item)	\$ 1.26			\$.02/ fanfold			

Table 1(b) (cont.)

<i>Check Series</i>					
LT I (.084/min @ 2 min/item)	.168				
<i>Revise fanfold</i>					
Supervisor I (.126/min @ 5 min/item)	.63				
<i>Review fanfold cataloging</i>					
Librarian (.155/min @ 5 min/item)	.775				
<i>Separate fanfolds</i>					
LT II (.094/min @ 30 sec/item)	.047				
<i>Arrange and file shelflist copy of fanfold</i>					
Timeslip (.03/min @ 1.5 min/slip)	.045				
<i>Revise filing of shelflist copy</i>					
LT II (.094/min @ 1 min/slip)	.094				
<i>Verify authorities (984 x 4)</i>					
Timeslip (.03/min @ 4 min/item)	.12				
<i>Type multilith master for card production</i>					
LT I (.084/min @ 6 min/master)	.504				.06/ master
<i>Revise typed multilith master</i>					
LT I (.084/min @ 3 min/master)	.252				
<i>Run multilith masters</i>					
Multilith Operator (.13/min @ 3.5 min/set)	.455				(Cost of cards see below)
Modified Copy Cataloging					
Subtotal	\$ 4.35				\$ .08/ item
		\$4.43	984	\$4,359	
3. Original Cataloging					
<i>Catalog material</i>					
Librarian (.155/min @ 60 min/item x 200)	\$ 9.60				
Librarian (.205/min @ 60 min/item x 22)					
<i>Revise cataloging</i>					
Librarian (.205/min @ 5 min/item)	1.03				
<i>Type fanfolds (4-part 3x5 slips)</i>					
LT I (.084/min @ 15 min/item)	1.26				\$.02/ fanfold
<i>Check Series</i>					
LT I (.084/min @ 2 min/item)	.168				
<i>Revise fanfold</i>					
Supervisor I (.126/min @ 5 min/item)	.63				
<i>Separate fanfolds</i>					
LT II (.094/min @ 30 sec/item)	.047				
<i>Arrange and file shelflist copy of fanfold</i>					
Timeslip (.03/min @ 1.5 min/item)	.045				
<i>Revise filing of shelflist copy</i>					
LT II (.094/min @ 1 min/slip)	.094				



Table 1(c). Cost Analysis: Manual Cataloging and Book Processing System

Process	Staff	Data			Total	Average	Total
	Costs	Base	Subscription	Materials	Cost	Number	Cost
	Per	Costs/	Costs/Item	Costs/Item	Per	Per	Per
	Item	Item			Item	Month	Month
<i>Bibliographic Record Maintenance</i>							
<i>Count sets of cards and match against cataloging copy</i>							
LT I (.084/min @ 2 sets/min)	\$ .042				\$ .042	4297	\$ 180
<i>Type subject and added entries on card sets</i>							
Timeslip (.03/min @ 3 min/set)	.09				.09	4297	387
<i>Revise card sets</i>							
LT II (.094/min @ 3 min/set)	.282				.282	2520	711
LT III (.117/min @ 3 min/set)	.351				.351	1803	633
<i>Type subject and name authority slips</i>							
Timeslip (.03/min @ 1 min/slip)	.03				.03	4526	136
<i>File subject and name authority slips</i>							
Timeslip (.03/min @ 1 min/slip)	.03				.03	4526	136
<i>Separate card sets</i>							
LT I (.084/min @ 2 sets/min)	.042				.042	4297	180
<i>File subject catalog cards (2263x2)</i>							
LT II (.094/min @ 1 min/card)	.094				.094	4526	425
<i>File A/T catalog cards (2263x3)</i>							
LT I (.084/min @ 1 min/card)	.084				.084	6789	570
<i>File shelflist cards (2)</i>							
Timeslip (.03/min @ 1 min/card)	.03				.03	4526	136
<i>Revise subject card filing</i>							
LT III (.117/min @ 1 min/card)	.117				.117	4526	530
<i>Revise A/T card filing</i>							
LT III (.117/min @ 1 min/card)	.117				.117	6789	794
<i>Revise shelflist filing (2)</i>							
LT II (.094/min @ 1 min/card)	.094				.094	2340	220
<i>Supervisor I (.126/min @ 1 min/card)</i>							
	.126				.126	2186	275
<i>Alphabetize and date workslips</i>							
LT I (.084/min @ 4 slips/min)	.021				.021	2263	48
<i>Pull card sets (withdrawals and card corrections)</i>							
Timeslip (.03/min @ 10 min/set)	.30				.30	100	30
<i>Revise card pulling (100 sets/month)</i>							
Supervisor I (.126/min @ 2 min/set)	.252				.252	100	25
<i>Correct card sets (50 sets/month)</i>							
LT II (.094/min @ 5 min/set)	.465				.465	50	23
<i>Revise card corrections</i>							
Supervisor I (.126/min @ 2 min/set)	.252				.252	50	13
<i>Process added copies (Record accession # on shelflist; record call # in book; type slip for marking)</i>							
LT II (.094/min @ 15 min/item)	1.41				1.41	50	71

Table 1(c) (cont.)

Process	Staff Costs Per Item	Data Base Costs/ Item	Subscription Costs/Item	Materials Costs/Item	Total Cost Per Item	Average Number Processed Per Month	Total Cost Per Month
<i>Locate materials in process</i>							
LT II (.094/min @ 15 min/item)	\$1.41				\$1.41	50	\$ 71
<i>Prepare books for binding decision</i>							
Supervisor I (.126/min @ 1 min/item)		.126			.126	50	6
<i>General Supervision</i>							
Librarian (\$12.34/hr @ 65 hours/month)							802
Bibliographic Record Maintenance Total							\$6,402

Table 1(d). Cost Analysis: Manual Cataloging and Book Processing System

Process	Staff Costs Per Item	Data Base Costs/ Item	Subscription Costs/Item	Materials Costs/Item	Total Cost Per Item	Average Number Processed Per Month	Total Cost Per Month
<i>Marking</i>							
<i>Sort materials for processing (marking)</i>							
OA II—Typing (.105/min @ 30 sec/item)	\$ .053				\$ .053	2263	\$ 120
<i>Place materials on table</i>							
OA II—Typing (.105/min @ 20 items/min)	.005				.005	2263	11
<i>Process materials (type and paste labels, pockets, &amp; date due slips; type book cards)</i>							
Timeslip (.03/min @ 20 min/item)	.60			\$.029/ label; pocket; date due slip; book card	.629	400	252
<i>Process materials with tab book cards (type and paste labels, pockets, &amp; date due slips)</i>							
Timeslip (.03/min @ 16 min/item)	.48			.032/	.512	1555	796
OA II—Typing (.105/min @ 16 min/item)	1.68			label; pocket; date due slip; book card	1.712	308	527

Table 1(d) (cont.)

<i>Keypunch bookcards</i>				
LT I (.084/min @ 2.4 min/card)	.201	.201	1863	374
<i>Verify book cards</i>				
LT III (.117/min @ 2 min/card)	.187	.187	1863	348
<i>Revise Processing</i>				
LT I (.084/min @ 2 min/item)	.168	.168	1500	252
LT III (.117/min @ 2 min/item)	.234	.234	763	179
<i>Sort materials for delivery</i>				
OA II—Typing (.105/min @ 1.5 items/min)	.07	.07	2263	158
<i>Unpack bindery materials, pull slips</i>				
LT I (.084/min @ 1 min/item)	.084	.084	550	46
<i>Verify bindery slips; check price</i>				
LT III (.117/min @ 2 min/item)	.234	.234	550	129
<i>General supervision, bindery account &amp; statistical data</i>				
LT III (7.04/hr @ 15 hrs/mo)				106
Supervisor II (8.97/hr @ 128 hrs/mo)				1,148
Librarian (12.34/hr @ 15 hrs/mo)				185
Marking Total				\$ 4,631
Cataloging and Book Processing Total				\$28,793

Table 1(e). Total Monthly Costs (Summary)

Staff Costs Per Month	Data Base Costs/Month	Subscription Costs Per Month	Material Costs Per Month	Total Cost Per Month
\$25,775		\$1,076	\$1,942	\$28,793

Table 2(a). Cost Analysis: Automated Cataloging and Book Processing System

Process	Staff Costs	Data Base	Subscription	Materials	Total Cost	Average Number	Total Cost
	Per Item	Costs/Item	Costs/Item	Costs/Item	Per Item	Per Month	Per Month

*Bibliographic Searching*

1. WLN Data Base Search  
*Items searched, no Inquiry charges*

LT II (.094/min @ 1 min/item)

Terminal use (4 @ .06) \$ .094 \$ .24 \$ .334 2443 \$ 816

Terminal use (3 @ .06) .094 .18 .274 100 27

Table 2(a) (cont.)

Process	Staff Costs Per Item	Data Base Costs/ Item	Subscription Costs/Item	Materials Costs/Item	Total Cost Per Item	Average Number Processed Per Month	Total Cost Per Month
<i>Items searched, Inquiry charges assessed</i>							
LT II (.094/min @ 1 min/item)							
Inquiry (3 @ .069)	.094		.39		.484	1429	692
Terminal use (3 @ .06)							
Data Base Search Subtotal						3972	\$1,535
2. National Union Catalog, etc.							
Search (Manual)							
LT II (.094/min @ 10 min/item)	.94		.31		1.25	508	635
Subscriptions (\$1,860/yr ÷ 6096 searches/yr)							
Manual Search Subtotal						508	\$ 635
Bibliographic Searching Total						4480	\$2,170

Table 2(b). Cost Analysis: Automated Cataloging and Book Processing System

Process	Staff Costs Per Item	Data Base Costs/ Item	Subscription Costs/Item	Materials Costs/Item	Total Cost Per Item	Average Number Processed Per Month	Total Cost Per Month
<i>Bibliographic Record</i>							
<i>Production—Processing and Products</i>							
1. Materials Cataloged							
Via WLN							
a. <i>Cataloging with WLN Data base copy</i>							
Attach holdings; order cards							
LT II (.094/min @ 6 min/item)	\$ .564						
<i>Data Base Costs</i>							
Inquiry costs (no charge)							
Cost per record use		\$1.60					
Cost per request		.15					
Shelflist cards (4 @ .055)		.22					
COM (cost per record)		.43					
Terminal use (1 @ .06/use)		.06					
WLN Data Base Copy Subtotal	\$ .564	\$2.46			\$3.024	1376	\$4,161
b. <i>Cataloging with CIP Copy</i>							
<i>Upgrade data base copy</i>							
LT II (.094/min @ 11 min/item)	\$1.034						
<i>Revise upgraded copy</i>							
Librarian (.155/min @ 5 min/item)		.775					
<i>Attach holdings order cards</i>							
LT II (.094/min @ 6 min/item)	.564						

Table 2(b) (cont.)

<i>Data Base Costs</i>			
Cost per record use		\$1.60	
Cost per request		.15	
Shelllist cards (4 @ .055)		.22	
COM (cost per record)		.43	
Terminal use (1 @ .06/use)		.06	
CIP Copy Subtotal	\$2.373	\$2.46	
			\$4.833    153    \$ 739
c. Cataloging with Modified Copy (e.g., NUC/LC copy)			
<i>Prepare cataloging worksheets</i>			
LT II (.094/min @ 15 min/item)	\$1.41		
<i>Revise cataloging worksheets</i>			
LT II (.094/min @ 10 min/item)		.94	
<i>MARC TAG Worksheets</i>			
Supervisor II (.15/min @ 15 min/item)	2.25		
<i>Revise MARC tagged worksheets</i>			
Librarian (.155/min @ 8 min/item)	1.24		
<i>Input cataloging data; attach holdings; order cards</i>			
Timeslip (.03/min @ 25 min/item)		.75	
<i>Revise data input and verify authorities</i>			
Librarian (.155/min @ 10 min/item)	1.55		
<i>Data base costs</i>			
Cost of input per record		\$ .14	
Cost of Authority checks (7 checks @ .069/entry)		.48	
Shelllist cards (4 @ .055)		.22	
COM (cost per record)		.43	
Terminal use (7 @ .06/use)		.42	
Modified Copy Subtotal	\$8.14	\$1.69	
			\$9.83    95    \$ 934
d. Original Cataloging			
<i>Catalog and MARC Tag material</i>			
Librarian (.155/min @ 60 min/item)	\$ 9.30		
<i>Revise Cataloging and MARC tagging</i>			
Librarian (.205/min @ 5 min/item)	1.03		
<i>Input Cataloging data; attach holdings; order cards</i>			
LT II (.094/min @ 25 min x 104)			

Table 2(b) (cont.)

Process	Staff	Data	Subscription	Materials	Total	Average	Total
	Costs	Base				Cost	
	Per	Costs/	Costs/Item	Costs/Item	Per	Per	Per
	Item	Item			Item	Month	Month
Timeslip (.03/min @ 25 min x 118)	1.49						
<i>Revise input; verify authorities</i>							
Librarian (.155/min @ 10 min/item)	1.55						
<i>Data base costs</i>							
Cost of input per record		\$ .14					
Cost of authority checks (7 checks @ .069/entry)		.48					
Shelllist cards (4 @ .055)		.22					
COM (cost per record)		.43					
Terminal use (7 @ .06/use)		.42					
Subtotal	\$13.37	\$1.69			\$15.06	222	\$ 3,343
WLN Cataloging Total						1846	\$ 9,177
2. <i>Materials Cataloged via Other Methods</i>							
a. <i>Microform Cataloging from Publisher's Copy</i>							
<i>Review and revise copy; complete processing; revise card sets</i>							
Librarian (.25/min @ 2.7 min/item)	\$ .675						
<i>Xerox card sets (10 cards/set)</i>							
Timeslip (.03/min @ 1 min/title)	.03			\$.55/ set			
Microform Subtotal	\$ .705			\$.55/ set	\$1.255	407	\$ 511
b. <i>Cataloging Music Scores</i>							
<i>Catalog scores; prepare for card production; revise card sets</i>							
Librarian (.25/min @ 28 min/item)	7.00						
<i>Xerox card sets (14 cards/set)</i>							
Timeslip (.03/min @ 2 min/title)	.06			.77/ set			
Music Score Subtotal	\$ 7.06			\$.77/ set	\$7.83	10	\$ 78
Non-WLN Cataloging Total						417	\$ 589
Cataloging Total						2263	\$9,766

Table 2(b) (cont.)

3. Miscellaneous Costs					
<i>Assign class numbers to theses</i>					
Supervisor II (.15/min @ 2 min/item)	\$ .30		\$ .30	30	\$ 9
<i>Retrieve "RUSH" monographs</i>					
Supervisor II (.15/min @ 15 min/item)	2.25		2.25	75	169
<i>Correct/update WLN data base information</i>					
LT II (.094/min @ 10 min/item)					
Terminal use (1 @ .06/use)	.94	\$.06	1.00	360	360
<i>Assign Subject Headings for Audio Visual Materials</i>					
Librarian (.155/min @ 2 min/set)	.31		.31	30	9
<i>File Subject Authority Slips for Microform Materials</i>					
Librarian (.155/min @ 1.15 min/slip)	.18		.18	55	10
<i>Resolve Problems; General Supervision</i>					
LT II (5.68/hr x 13 hrs/mo)					74
Supervisor II (8.97 hrs x 89 hrs/mo)					798
Librarian (\$12.34 hr x 52 hrs/mo)					642
Miscellaneous Costs Subtotal					\$ 2,071
Bibliographic Record					
Production Total					
					\$11,837

Table 2(c). Cost Analysis: Automated Cataloging and Book Processing System

Process	Staff	Data			Total	Average	Total
	Costs Per Item	Base Costs/Item	Subscription Costs/Item	Materials Costs/Item	Cost Per Item	Number Per Month	Cost Per Month
<i>Bibliographic Record</i>							
<i>Maintenance—TSD</i>							
<i>Collate card sets from WLN (7384 cards)</i>							
LT I (.083/min @ 30 sec/card)	\$ .042				\$ .042	7384	\$ 310
<i>Insert card sets in books</i>							
LT II (.094/min @ 1.6 min/item)							
<i>Process New Books (1846)</i>	1.51				.151	1846	279
<i>Review cards against books; add accession number and stamp date on shelflist card; correct series (when needed); separate card sets and distribute</i>							
Timeslip (.03/min @ 10 min/item)	.30				.30	145	44





Table 2(e). Total Monthly Costs (Summary)

Staff Costs Per Month	Data Base Costs/Month	Subscription Costs Per Month	Materials Costs Per Month	Total Cost Per Month
\$16,849	\$5,480	\$157	\$304	\$22,790

Table 3. Cataloging and Book Processing System: Summary Comparison Costs

Manual System		Automated System	
Category	Costs/Month	Category	Costs/Month
Staff	\$25,775	Staff	\$16,849
Data Base		Data Base	5,480
Subscriptions	1,076	Subscriptions	157
Materials	1,942	Materials	304
Equipment	462	Equipment	890
Total	\$29,255/month	Total	\$23,680/month
<i>Cost Comparison—Difference</i>			
Manual	\$29,255/month		
Automated	\$23,680/month		
			\$ 5,575/month/\$66,900/year

Since 1978 this unit, as well as all units in the Technical Services Division, have periodically analyzed unit activities, and recorded the data collected on Work Assignment/Staffing profile sheets (see table 4 for sample profile sheet). The primary purpose of the profiles was to develop a detailed account of work distribution throughout TSD in order to determine the staffing requirements necessary for each unit to maintain an even workflow. In the cost analysis, the Cataloging and Book Processing (CBP) profile was used to identify each unit process, as well as to provide the basic data on the number and level of staff and the time required to perform each process. Additionally, for the automated system, the CBP profile sheets, together with WLN invoices (see figure 1 for sample invoice) and WLN monthly activity reports (see figure 2 for sample activity report) were used to determine the average number of items processed per month. For example, since about 85 percent of the cataloging done in TSD is via WLN, it was possible to derive exact figures from WLN invoices for the average number of items cataloged per month. The WLN invoices also differentiated between data-base copy cataloging and original data entry. The CBP profile sheets were used to determine average number of non-WLN items cataloged.

Using a combination of WLN invoice and profile data, a chart was constructed of the average number of items searched and cataloged per month under the automated system (see table 5). In order to make costs comparable, an assumption was made that the same average number of items was searched and cataloged under the previous manual system and a similar chart was made for it (see table 6). In reality, the available staff under the manual system *could not* process the same amount of material per month.

Table 4. Technical Services Division Work Assignment/Staffing Profile: November 1978

Unit: Cataloging and Book Processing. Subunit: LC Copy Editing.

Tasks or Processes	Average Number of Items Received for Processing	Average Time Per Item	Average Number of Items Processed	Staff Hours Needed Per Task	Level of Staff	Total Staff Hours Available at Designated Level
Order card sets, check item against data base, enter holdings	2100/mo(monos)	6 min/item	10/hr	210/mo	LT I	124.1
	63/mo(serials)	6 min/item	10/hr	6.3/mo	LT II	85.9
Prepare worksheets	210/mo	10 min/item	6/hr	35/mo	LT III	6.3
					LT I	17.5
Prepare TSD series cards	126/mo	2 min/item	30/hr	4.2/mo	LT II	17.5
Do series check	350/mo	2 min/item	30/hr	11.7/mo	LT I	4.2
Update CIP records	134/mo	10 min/item	6/hr	22.3/mo	LT I	22.3
Input original cataloging data	210/mo(mono)	25 min/item	2.4/hr	87.5/mo	LT II	22.3
	21/mo(serials)	25 min/item	2.4/hr	8.75/mo	LT III	87.5
Process "RUSH" monographs	168/mo	15 min/item	4/hr	42/mo	LT II	42
Process corrections—data base information	360/mo	10 min/item	6/hr	60/mo	LT II	30
Receive materials—sort series					Sup II	30
Resolve problems; locate materials	2100/mo	3 items/min	180/hr	11.6/mo	LT II	11.6
Prepare and sort series decisions materials	NA	NA	NA	31.2/mo	LT II	18.6
					LT III	13
Sort Mail	168/mo	8 min/item	7.5/hr	22.4/mo	LT III	22.4
	NA	NA	NA	42/mo	LT III	42

STAFF COSTS

In the cost analysis of the automated system, the monthly wages for staff members of the Cataloging and Book Processing Unit were based on current monthly salaries (as of February 1980) plus estimated fringe benefits (21 percent). The total wages were added together for each level of staff and divided by the number of staff at that level to give an

WASHINGTON LIBRARY NETWORK		BILLING DATE - 12/31/79			
CUSTOMER INVOICE		REF. INVOICE NO. - 000001311			
WASHINGTON STATE UNIVERSITY	*****				
HOLLAND LIBRARY	*INVOICED EXPENDITURE BREAKDOWN*				
PULLMAN WA 99164	* ACCOUNT NUMBER / SYSTEM *				
	4000 00				
ALLENE F SCHNAITTER	* RECURRING CHANGES-BIB SYSTEM *				
	*****		PAGE NO. 0001		
SERVICES CHARGES	QUANTITY	UNITS	TOTAL CHARGES	CREDITS	NET CHARGES
COM CATLG PROCESSING W/S HOLD	18,750.00	@ 4c A TITLE	750.00		750.00
COM CATLG FIGHE COPIES	459.00	@ 15c A COPY	68.85		68.85
ONLINE-ATTACH SUM HOLD-COL 1	810.00	@ \$1.60 RECRD	1,296.00		1,296.00
ONLINE-REQ CAT CARDS-COL 1	1,003.00	@ 15c EACH	150.45		150.45
ONLINE INPUT OF BIB REC-COL 1	378.00	@ 14c EACH	52.92		52.92
ONLINE INQUIRY INTO DATABASE	5,335.00	@ 6.9c EACH	368.11		368.11
CATALOG CARDS	5,541.00	@ 5.5c CARD	304.75		304.75
TOTAL SERVICES CHARGES			2,991.08		2,991.08 *
TOTAL CHARGES			2,991.08		2,991.08 *

Fig. 1. Washington Library Network Customer Invoice.

MONTHLY ACTIVITY REPORT FOR PERIOD 11/01/79 TO 11/30/79

LIBRARY *****	TOTAL HOLDINGS AS OF 11/30/79	HOLDINGS ADDED	RECORDS INPUT	CONTRIBUTION FACTOR	RCPS FROM 11/01 TO 11/28	ACQ ORDERS CREATED	INQUIRY TRANSACTIONS
WaPaC	2,059	38	0	.0%	0	0	311
WaPIP	41,549	416	385	92.5%	588	1,472	6,607
WaPoN	33,801	566	89	15.7%	616	0	5,243
WaPS (WSU LIBRARY)	44,866	1,630	197	12.0%	2,013	1,674	19,013

Fig. 2. *Washington Library Network Monthly Activity Report (selective sample).*

average monthly wage. This average was then divided by 174 (the standard figure for university staff hours per month) to determine the average hourly rate. To calculate staff costs per minute, it was necessary to carry the per-minute costs to the third decimal to approximate the total dollars expended for staffing (see table 7). No other indirect costs, e.g., breaks, annual leave, or holidays, were included in staff wages; however, in order to determine the staff hours available to perform the functions being analyzed, nonproductive hours or staff hours devoted to other assignments had to be calculated and deducted. These calculations were made according to the following formula:

$$\begin{array}{l}
 \text{hours/year} \quad \text{committee assignment (varied)} \\
 \text{hours/year} \quad \text{unit meetings (varied)} \\
 120 \text{ hours/year} \quad \text{breaks (standard)} \\
 \text{hours/year} \quad \text{annual leave (varied)} \\
 88 \text{ hours/year} \quad \text{holidays (standard)} \\
 96 \text{ hours/year} \quad \text{sick leave (standardized)} \\
 \text{based on hours earned per month} \\
 \text{hours/year} \div 12 = \text{--- hours/month}
 \end{array}$$

The primary reasons for variation in the nonproductive hours were length of service and whether a staff member was faculty or classified. Staff costs under the manual system were based on current monthly wages; however, the number and level of staff are essentially that which existed at the time the manual system was functioning (see table 8). Timeslip costs were *not* based on the minimum hourly wage, since a large number of hours were work/study during the period of the analysis. The total hours worked were divided by the total monthly expenditure to derive the per-minute timeslip costs. No effort was made to reconstruct actual timeslip costs under the manual system, but the same per-minute timeslip costs were used in order to avoid unnecessary skewing of staff costs under the manual system.

## DATA BASE COSTS

The per unit costs of using the WLN bibliographic system, both for performing processes and securing products, were based on the 1979-80

Table 5. Type and Average Number of Items Searched/Cataloged Per Month on Automated System (Based on WLN Invoice Data and CBP Work Assignment/Staffing Profile)

	Searched (WLN)/Month	Found/Month	Not Found/Month	NUC Searched/Month
Book Approvals	600	420 (70%)	180	
Firm Orders	700	406 (58%)	294	
Form Approvals		244 (60%)		
Regular		162 (40%)		
New Acquisitions (Re-searched)	295	90 (30%)	205	
Precats	1380	414 (30%)	966	
Documents	125	25 (20%)	100	50
Serials	100	10 (10%)	90	30
RUSH	75	32 (42%)	43	43
Gifts	100	5 (5%)	95	95
Monographic Series	300	120 (40%)	180	—
Originals	222	0 (0%)	222	222
Reinstates	75	7 (10%)	68	68
	3972	1529 (38.5%)	2443	508

*Type and Quantity of Bibliographic Data Found in Data Base*

1529  
 1376 LC Copy  
 153 CIP Copy (10%)

*Type and Quantity of Original Data Entry*

Monographs 192  
 Serials 30  
 NUC/LC 95  


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 Total 317

*Total Materials Cataloged*

WLN Data Base Copy 1529  
 WLN Original Data Entry 317  
 Non-WLN Microform 407  
 Non-WLN Music 10  


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WLN schedule of charges. The average number of items processed was derived from the WLN invoices. The per-record cost of the COM catalog was calculated by taking the total costs of producing the COM catalog from July 1979 to February 1980 and dividing these costs by the number of titles contained in the COM catalog. Although the WLN schedule of charges stipulates a charge of .069 cents per data-base inquiry, three kinds of processes allow a given number of inquiries without charge. Since not all allowable inquiries are always used for these processes, there are generally a number of inquiries which can be made without charges being assessed. Between July 1979 and February 1980, the average number of monthly inquiries for which there was a charge was 11,800; the average number per month for which there was no charge assessed was 8,044. For this reason, in the cost analysis of the automated system (table 2(a)), there appears a category "Items Searched, No Inquiry Charges" under the Bibliographic Searching section.

Table 6. *Type and Average Number of Items Searched/Cataloged Per Month on Manual System (Based on CBP Work Assignment/Staffing Profile)*

	Searched (IDC)/Month	Found/Month	Not Found/Month	NUC Searched/Month
Book Approvals	600	300 (50%)	300	
Firm Orders	700	280 (40%)	420	420
New Acquisitions (Re-searched)	295	59 (20%)	236	
Precats	1380	276 (20%)	1104	
Documents	125	12 (10%)	113	113
Serials	100	5 (5%)	95	95
RUSH	75	23 (30%)	52	52
Gifts	100	5 (5%)	95	95
Monographic Series	300	90 (30%)	210	210
Originals	222	0 (0%)	222	222
Reinstates	75	7 (10%)	68	68
Total	3972	1057 (26.5%)	2915	1275

*Type and Quantity of Materials Cataloged*

IDC Copy	1057
Modified Copy	984
Original Cataloging	222
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(Note: Part of the "no charge" inquiries are generated and used by the Acquisitions Unit and are therefore not included in this analysis.)

Although the terminal service and line charges might simply have been added as a total amount to the data-base costs, it seemed more meaningful to distribute these costs on a per-use basis. The method used to distribute these charges was to identify each use of the bibliographic data base, and to divide the total monthly costs of terminals and lines by the total monthly units of use (see table 9). This method of distributing terminal service and line charges not only provided per-unit terminal use costs, but also served to categorize kinds and quantity of data-base use.

**SUBSCRIPTION AND MATERIAL COSTS**

Subscription costs include only those bibliographic tools purchased for use in TSD for the purpose of bibliographic searching. As a result of the increased growth of the bibliographic data base, fewer tools are being used for searching under the automated system than under the manual system. Prior to the implementation of WLN, the library subscribed to bibliographic data (LC and CIP copy) on microfiche supplied by the Information Dynamics Corporation (IDC). The per-unit costs of all subscriptions are presented in the cost analysis charts (tables 1(a) and 2(a)).

Material costs include only those materials unique to cataloging and book processing; general supplies, such as pencils and paper, are not included. The calculation of the per-unit cost of most materials is generally straightforward. It should be noted, however, that under the automated system, products, i.e., materials, are included in the data-base

Table 7. Staff Costs: Automated Cataloging and Book Processing System

Staff Costs/Month	Salaries Month	Plus 21% (Fringe Benefits)	Costs/ Month
Classified Staff			
OA II	\$ 912	\$192	\$ 1,104
LT I (4)	2,888	606	3,494
LT II (4)	3,269	686	3,955
LT III (2)	2,024	425	2,449
Supervisor II (2)	2,578	541	3,119
			Subtotal
			\$14,121
Faculty			
Catalogers (3½) (Monos)	\$4,691	\$985	\$ 5,676
Unit Head	1,774	373	2,147
			Subtotal
			\$ 7,823
<i>Staff Costs/Minute</i>			
Timeslip	\$1,456/mo ÷ 809 hrs = 1.80/hr ÷ 60 = .03/min		
OA II	1,104/mo ÷ 174 = 6.34/hr ÷ 60 = .105/min		
LT I (4)	3,494/mo ÷ 4 = \$874/mo ÷ 174 = 5.02/hr ÷ 60 = .083/min		
LT II (4)	3,955/mo ÷ 4 = \$989/mo ÷ 174 = 5.68/hr ÷ 60 = .094/min		
LT III (2)	2,449/mo ÷ 2 = \$1,225/mo ÷ 174 = 7.04/hr ÷ 60 = .117/min		
Supervisor II (2)	3,119/mo ÷ 2 = \$1,560/mo ÷ 174 = 8.97/hr ÷ 60 = .15/min		
Catalogers (3½)	5,676/mo ÷ 3.5 = \$1,622/mo ÷ 174 = 9.32/hr ÷ 60 = .155/min		
Unit Head	2,147/mo ÷ 174 = 12.34/hr ÷ 60 = .205/min		
<i>Total Staff Costs/month</i>			
Timeslip—809 hrs			
@ \$1,456/mo	\$ 1,456		
Special Projects Librarian	345*		
Classified Staff	14,121		
Faculty	7,823		
Total (All Staff)	\$23,745		

\*Amount of time (wages) assigned to cataloging.

costs, and only those materials used independent of the data base, e.g., book pockets and book cards, are listed as material costs on the charts. Under the manual system, due to the divisional arrangement of the library system and the number of card catalogs being maintained, the formula for producing sets of cards for a single title was complex. For this reason, the costs and number of cards produced for the titles cataloged per month are listed as a separate line item.

### EQUIPMENT COSTS

Equipment costs include only equipment unique to cataloging and book processing, i.e., required for processing or products. General equipment, such as desks, book trucks, typewriters, are not included.

#### *Equipment—Automated System*

During the period covered by the cost analysis, November 1977 to February 1980, the following equipment was purchased for the automated system:

7 Bibliographic terminals	\$24,360
10 Modems or modem contention units	5,433
2 Printers	<u>6,500</u>
	\$36,293
Tax	<u>1,887</u>
	\$38,180

Two pieces of equipment are currently being leased (maintenance included):

Keypunch	@ \$ 92.61
Verifier	@ <u>101.12</u>
	\$193.73/month

#### *Summary of Monthly Equipment Costs*

Purchases (5-year amortization)	\$636.33
Maintenance	60.00
Leased equipment	<u>193.73</u>
	\$890.06/month

#### *Equipment—Manual System*

If the automated system had not been implemented, the following equipment would have been purchased during this period:

2 Card catalogs	\$ 3,755
5 Kardex units	4,475
2 Linedex units	<u>2,944</u>
	\$11,174
Tax	<u>581</u>
	\$11,755

Although the anticipated life span of this equipment should be considerably greater than that of terminals and modems, it has also been amortized over a five-year period. The rationale for this period of amortization is that the rate of growth of the files for which the equipment is used results in the purchase of additional equipment equivalent to the expected replacement of electronic equipment. Therefore, the initial cost of these purchases amortized would have been \$196/month.

Since the multilith has been owned by the library for more than twenty years, its purchase price is not applicable to this analysis. However, maintenance on the multilith is \$72.24/month. Two pieces of equipment were being leased under the manual system (maintenance included):

Keypunch	@ \$ 92.61
Verifier	@ <u>101.12</u>
	\$193.73/month

**Summary of Monthly Equipment Costs**

Purchases (5-year amortization)	\$196.00
Maintenance	72.27
Leased equipment	193.73
	<hr/>
	\$462.00/month

**SUMMARY AND CONCLUSION**

The cost analysis clearly indicates that at Washington State University Libraries the automated cataloging and book processing system is less expensive than its previous manual system. By using the bibliographic component of the Washington Library Network, the library has reduced the costs of searching, cataloging, and record maintenance by almost 20 percent (see table 10—summary comparison costs by function). The higher costs of the manual system are essentially staff costs. Under that

*Table 8. Staff Costs: Manual Cataloging and Book Processing System (Based on the 1977 Staffing Levels at Current Staff Costs)*

<i>Staff Costs/Month</i>	<i>Salaries Month</i>	<i>Plus 21% (Fringe Benefits)</i>	<i>Costs/ Month</i>
OA II—Typing	\$ 912	\$ 192	\$ 1,104
LT I (11)	7,950	1,670	9,622
LT II (3)	2,434	511	2,945
LT III (5)	5,060	1,063	6,123
Supervisor I (2)	2,175	457	2,632
Supervisor II	1,289	271	1,560
Offset Duplicator Operator	1,135	238	1,373
			<hr/>
		Subtotal	\$25,359
Faculty			
Catalogers (3.5)	4,691	985	5,676
Unit Head	1,774	373	2,147
			<hr/>
		Subtotal	\$ 7,823

*Staff Costs/Minute*

Timeslip	\$2,174/mo ÷ 1208 hrs. = 1.80/hr ÷ 60 = .03/min.
OA II—Typing	1,104/mo ÷ 174 = 6.34/hr ÷ 60 = .105/min
LT I (11)	9,622/mo ÷ 11 = 875/mo ÷ 174 = 5.03/hr ÷ 60 = .084/min
LT II (3)	2,945/mo ÷ 3 = 982/mo ÷ 174 = 5.64/hr ÷ 60 = .094/min
LT III (5)	6,123/mo ÷ 5 = 1,225/mo ÷ 174 = 7.04/hr ÷ 60 = .117/min
Supervisor I (2)	2,632/mo ÷ 2 = 1,316/mo ÷ 174 = 7.56/hr ÷ 60 = .126/min
Supervisor II	1,560/mo ÷ 174 = 8.97/hr ÷ 60 = .149/min.
Offset Duplicator Operator	1,373/mo ÷ 174 = 7.89/hr ÷ 60 = .13/min
Catalogers (3.5)	5,846/mo ÷ 3.5 = 1,670/mo ÷ 174 = 9.60/hr ÷ 60 = .155/min
Unit Head	2,147/mo ÷ 174 = 12.34/hr ÷ 60 = .205/min.

*Total Staff Costs/Month*

Timeslip—1208 hrs	
@ \$2,174/mo	\$ 2,174
Classified Staff	25,359
Faculty	7,823
	<hr/>
Total (All Staff)	\$35,356

Table 9. *Bibliographic Data Base Use Per Month (One Unit = One Access to or Process in Data Base)*

Category	Quantity of Terminal Use
Searching	10688
Cataloging (Data Base Copy)	1529
Cataloging (Original Data Entry)	317
Authority Verification (317 x 7)	2219
Bibliographic Changes/Corrections	360
ILL, REF, General	537
	Total Units 15650

WLN Terminal Service and Telecommunication Line Charges/Month

5½ terminals @ \$140/mo = \$770/mo

5½ lines @ \$40/mo = 220/mo

\$990/mo

$\$990 \div 15650 = \$0.06/\text{terminal use for Cataloging and Book Processing System}$

Table 10. *Cataloging and Book Processing System: Summary Comparison Costs by Function (Excluding Equipment Costs)*

Function	Number of Items	Costs Per Month
<i>Manual System</i>		
1. Bibliographic Searching	5247	\$ 4,617
2. Bibliographic Record Production (Cost of Catalog Cards Distribution)	[2263]*	[\$13,143]†
LC copy cataloging	1057	4,092
Modified copy cataloging	984	5,021
Original cataloging	222	3,343
Miscellaneous	NA	687
3. Bibliographic Record Maintenance	NA	6,402
4. Marking	NA	4,631
Total		\$28,793
<i>Automated System</i>		
1. Bibliographic Searching	4480	\$ 2,170
2. Bibliographic Record Production (Cost of Catalog Cards Included)	[2263]*	[\$11,837]†
LC and CIP copy cataloging	1529	4,900
Modified copy cataloging	512	1,523
Original cataloging	222	3,343
Miscellaneous	NA	2,071
3. Bibliographic Record Maintenance	NA	4,194
4. Marking	NA	4,589
Total		\$22,790

\*Total of items listed below.

†Total of costs listed below.

system, eleven more staff and 1,365 more timeslip hours were needed per month to process the same amount of materials as is processed under the automated system. In fact, compared to the staff costs of both the manual and automated systems, the costs of equipment, data-base use (including products), terminal service, and telecommunication lines

of the automated system are a relatively small percentage (27 percent) of the total cataloging and book processing costs. This analysis serves to underscore a basic reality of the current library organization: personnel is one of its largest expenditures and staff-intensive systems are very costly.

This cost analysis has not directly addressed the issue of the quality of processing and products of either the manual or automated systems. The analysis suggests, however, that the automated system is more efficient in terms of staff time. Moreover, the TSD staff has found that not only can more be done with fewer staff, but the automated system also provides more accurate data and has the flexibility to accommodate with relative ease the many corrections and changes that must be made to the library's bibliographic files.

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**Joselyn Druschel** is assistant director for automation and technical support at the Washington State University Libraries. She is currently chairing a staff task force which is developing specifications for the Libraries' on-line catalog.