

Cost of Providing Technical Information Service to *Fortune* "500" Chemicals Industry Group[†]

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While costs of technical information services in the chemical industry have been considered proprietary, deductions of their magnitude can be made from open sources such as standard directories of information centers and their staffs, professional society salary surveys, indexes of literature materials/services costs, and reports of corporate research and development expenditures. Work under way since 1965 on technical information services of *Fortune* "500" companies shows statistical comparisons within industrial groups to be statistically valid. Further, chemical and chemically related firms operating internationally lead many categories of measures among industrial groups. Extension of work into *Business Week* "600" firms showed that those with recognized technical information services spend 5 times as much on research and development as do the remaining firms. Best estimates are that *Fortune* "500" chemicals industry spends \$34 million in the conventional budget elements of personnel, materials, services, and supplies. When fringe benefits, facilities, and other elements usually imbedded in overhead are added, an "extended budget" raises the grand total to \$50 million. Recommendations for the sharing of cost information in the future is made.

INTRODUCTION

Budgets and costs of industrial information centers or libraries are usually considered proprietary by higher technical management to whom they typically report. Although these costs were low enough 20 years ago for one corporate research and development director to state at an Engineers Joint Council meeting that they were "below the nuisance level to track", the situation has changed.

Our personal work, extending for over a decade, which begins with open information and uses colleague-checked deductions, has lead to the conclusion that the million dollar industrial information center/library system (hereafter referred to as TIC/Library System) is now commonplace. (In fact that system may include one or more units within it that each cost 1 million dollars annually.) Hence, the sums involved today are well worth management attention.

Sources of open information include *Fortune* "500" listings and similar *Business Week* "600" tabulations, directories of industrial research laboratories, directories of special libraries and information centers, salary surveys of professional special library/information science associations, surveys of present information materials costs done by publishing trade associations and for the National Science Foundation, and catalogs of equipment, services, and supplies providers. More recently, real estate occupancy cost surveys have been included.

Given the personnel costs are the major component of technical information center/library costs and that they are becoming available in greater detail, plus the evidence that comparability, in statistics along industry group lines exists, then increasing attention is due the rates at which the units of other budget categories (services, supplies, and equipment) are incrementing. The results show that a realistic picture of costs emerges.

Opportunities to cross-check these cost results in industrial groups outside our direct past experience occur at professional society gatherings where "corrections" may be volunteered. In addition subsequent consulting assignments have permitted detailed comparison of the pertinent industry's figures with those of their own information center/library system in some cases, while in others it leads to their decision to find out for

the first time what their costs were.

The opportunity to participate in the Symposium on the Cost of Providing Information from an Industrial Information Center was welcomed inasmuch as the chemical industry (as defined by the *Fortune* "500" listings) was the leader in several of the statistical criteria used previously and near the top of others. Further, the concept of an "expanded budget", i.e., one that includes a number of items conventionally retained in the corporate overhead and not "broken out" for the information center/library system, was emerging and was seen to need quantification. Personnel fringe benefits would be relatively easy to determine at one extreme; telephone and other telecommunications costs would be rather more difficult. Records management services and competitor analysis activities were items whose costs could not yet be established.

Exchange of agreed-upon cost items via a neutral intermediary seems attractive, but initial inquiries of logical agents before the Symposium had negative results. Presumably, a broad mandate is needed before more productive explorations could take place.

PREVIOUS WORK

The initial requirements of our Research Laboratories management in the 1960s for comparative data on how its level of TIC/Library Systems support compared with that of other similar firms was satisfied through numerous telephone calls to close professional colleagues, who shared approximate budget levels on condition that their firms were not identified and that only mean values were used and those just internally.

Coincident with the move to another high technology firm was the appearance of the first of Kruzas's directories of special libraries and TIC/Library Systems¹ (it is now in its seventh edition, is multivolumed, and is computer typeset). Kruzas spent a summer analyzing the statistical implications of his first directory, and the results are in the report literature. About the same time, we began using the annual listings of *Fortune* "500" industrials in discussions with colleagues on marketing staffs to determine if there would be a market for information retrieval equipment worthy of the Corporation's attention. The results were inconclusive.

The possibility of cross-checking the Kruzas and *Fortune* information to establish probable budget levels of major industrial TIC/Library Systems naturally arose. The initial results were internal company reports. We moved to academe before the planned establishment of budget guidelines for the

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Corporation's large TIC/Library System on the basis of these results were far advanced.

The availability of student assistance, the continuing involvement of my colleague-wife, and the inclusion of the widely known SPSS programs on the University of Texas at Austin's Computer Center equipment led to fresh efforts in the 1972-1975 period to examine 29 *Fortune* "500" industry groups (of which one is Chemicals) with 31 statistical measures. While the results were reported in a journal article² and a supplementary ERIC Report,³ the most convenient summary appears in our monograph "Industrial Information Systems".⁴

Briefly, comparisons within each industry group had the greatest significance and reliability. In defining the Chemicals industry, *Fortune* excludes the chemistry portion of related industries such as Pharmaceuticals, Petroleum Refining, Food, Metal Manufacturing, Paper and Wood Products, Soaps and Cosmetics, and Rubber. Still, Chemicals lead all other industry groups in number of libraries, number of companies with international library systems, number of professional librarians, and an overall measure we termed "library penetration". Further, Chemicals ranked high on these cross correlations: libraries vs. employees (first place), holdings vs. assets (third place), professionals vs. assets (fourth place), and professionals vs. employees (fourth place).

Certain reviewers of the above work suggested that the annual listings of research and development expenditures by *Business Week* "600" corporations might also prove useful. Outside of the finding that such corporations that had TIC/Library Systems spent 5 times as much on research and development as did those without them, the *Business Week* figures could be safely ignored in the future. Work with the 1978 versions of both periodicals' lists did lead to an ERIC Report⁵ containing the estimate that private industrial support for formal TIC/Library Systems was about 1% of the total research and development expenditures, with Chemicals being somewhat higher. Additional work involving the Special Libraries Association's "SLA Salary Survey, 1976" and King's "Statistical Indicators, 1960-1980"⁶ led us to conclude that the 1975 expenditures of 311 corporations for formal TIC/Library Systems were no less than \$108.8 million and no more than \$145 million.

PRESENT WORK

While I prepared a working paper as a basis for my remarks at the Symposium, the existing body of budget information was updated through use of the following: the early results of the "SLA Salary Survey, 1982", new materials cost indexes from a number of personal sources, plus the University of Texas at Austin's departmental library in chemistry and chemical engineering. There was also a brand new edition of Bowker's "Directory of Industrial Research Laboratories"⁷ to employ. While spot checking the new seventh edition of the "Directory of Special Libraries and Information Centers"⁸ formerly compiled by Kruzas, I discovered that most of the changes between the fifth edition and the seventh were cosmetic or related to the transfer to the computer-assisted type-setting program. Accordingly, I decided to stay with the verified and cross-checked fifth edition directory results.

A holiday-season telephone survey of colleagues managing industrial chemical libraries outside the companies included in *Fortune* "500" Chemicals industry group (a petroleum refining firm, for example) led to most useful information in matters not previously of concern. Included in the latter category were personnel fringe benefits, costs of on-line bibliographic and numeric data base searching, photocopies, document delivery products, computer system analysis/programming charges, occupancy, and utilities costs among others.

(As an example, the modal response for cost of on-line searching was \$52 000 per year per TIC/Library System, but the range included an example twice that.) The above-mentioned new categories of budget information plus a growing personal concern that the corporate senior managements deserved to know more of what the costs for TIC/Library Systems really were led to the computation of what was termed "extended budget" in addition to the "conventional budget" costs reported earlier.

In response to the anticipated objection that each firm does not account for each of the items in the extended budget in the same way, I observe that past experience has shown that even Divisional Comptrollers in the same corporation do not necessarily all report costs the same way. In fact, reaching agreement among TIC/Library managers on precise definitions of each statistic reported will be one of the delaying factors in the inauguration of any effective cost clearinghouse.

From the calculations briefed below and listed in Table I, I conclude that the 120 TIC/Libraries in *Fortune* "500" Chemicals industry firms spend more than \$34 million/year for conventional budget items and a total of over \$50 million when extended budget items are included. (Microfiche copies of the working paper for the Symposium are available from me at P.O. Box 7576, Austin, TX 78712. Included are the detailed bases for the calculation of each item quantified.) The average figures per TIC/Library are \$250 000 and \$410 000, respectively.

An important difference between these new figures and those reported in our monograph and related references is that the latter reproved Pareto's law (i.e., 20% of the population had 80% of the resources) whereas the new figures show that four chemical firms have about half of the total TIC/Library System resources and expenses for the industry (see Tables II-IV). That is, Du Pont, Union Carbide, Monsanto, and Dow (hereafter referred to as the Top "4") account for more than \$16 million of the conventional budget totals and more than \$20.5 million of the extended budget totals. The averages per TIC/Library System are \$320 000 and \$410 000, respectively, for the Top "4" as compared to \$246 000 and \$303 000 for the TIC/Libraries of the remaining 25 companies.

When one looks at the overall conventional budget figures, it is no surprise that the salaries of managerial persons and professionals are the largest component at \$7.3 million, but it is unexpected that four other items each approximate \$5.5 million: nonprofessionals, books and monographs, periodicals and serials, and on-line bibliographical and numeric reference (data base) services. Periodicals and serials would normally be expected to exceed books and monographs. It is still early in the development of on-line services to have a firm idea of its rate of growth. The relative level of maturity of the Chemicals industry's TIC/Library Systems is shown in the conventional budget by the relative proportion of personnel costs to others, 40%/60%, with 50%/50% being normal. There are still too many unknowns among the extended budget items to determine what its proportions will be.

The TIC/Library Systems exist for the use of the professional chemists, chemical engineers, physical and biological scientists, the technicians and auxiliaries on the same staffs, and others needing technical input to their decision-making process. The hard core of these people are listed in Bowker's "Industrial Research Laboratories of the U.S.", and they are served by the people listed in the "Directory of Special Libraries and Information Centers". Table III shows that the Top "4" companies have at least 41% of the technical professionals (with Monsanto being under reported) and 57% of the technicians and auxiliaries. Significantly, the Top "4" have 60% of all doctorates. The 50 TIC/Libraries in the Top "4" have 120 information professionals and 145 others, while the

Table I. Probable Costs^a of Chemical Industry TIC/Library Systems' Services

	total (120 libraries)	Top "4" companies (50 libraries)	remaining 25 companies (70 libraries)	av/Co.	
				Top "4"	remaining
Conventional Budget for Personnel					
managerial and professional	7317	3554	3764	888	151
nonprofessional	5335	2872	2562	718	98
subtotal	12652	6426	6226	1606	249
travel	583	270	313	68	13
total	13235	6696	6539	1674	262
Extended Budget for Personnel ^b					
managerial and professional	9513	4620	4893	1155	196
nonprofessional	6935	3734	3201	933	128
subtotal	16448	8354	8094	2088	324
cont. educ.	1166	540	626	135	25
total	17614	8894	8720	2223	349
Conventional Budget for Materials ^c					
books and monographs	5677	3005	2671	751	107
periodicals	5597	2826	2771	707	111
govern. documents, maps, patents	1419	751	668	188	27
photocopies	1008	420	588	105	24
document delivery products	396	165	231	41	9
total	14097	7167	6929	1792	278
Extended Budget for Materials ^d					
books and monographs	7096	3756	3339	939	134
periodicals and serials	6997	3533	3464	883	139
govern. documents, maps, patents	1774	939	835	235	33
total	15867	8228	7638	2057	306
Conventional Budget for Services					
on-line bibl and numeric ref service	5760	2610	3150	653	126
on-line tech product service	720	300	420	75	17
binding of periodicals	240	100	140	25	6
total	6720	3010	3710	753	149
Extended Budget for Services					
computer systems support	3000	1250	1750	313	70
telephone and telecommun	191	92	99	23	4
records mgt	1353	564	789	141	32
total	4544	1906	2638	477	106
Extended Budget for Facilities ^f					
occupancy at level "C" costs ^g	3826	1564	2262	391	90
total	3826	1564	2262	391	90
Conventional Budget for Supplies					
technical processing	120	50	70	13	3
Extended Budget for Supplies					
capital fund requirements	<i>h</i>	<i>h</i>	<i>h</i>	<i>h</i>	<i>h</i>
Totals					
total for conventional budget	34172	16920	17248	4232	692
total for extended budget	41851	20592	21258	5148	851
net unduplicated additions from conventional budget	8827	3915	4912	980	199
grand total budget ⁱ	50678	24507	26170	6128	1050

^a Cost in thousands of dollars. ^b Costs are currently unavailable for temporary assistance and development of "bench mark" costs.^c Costs are currently unavailable for research reports, external and commercial catalogs, pamphlets, and dissertations. ^d Costs are currently unavailable for research reports (external and internal), membership dues and information providers, and security classified reports—related.^e Costs are currently unavailable for on-line "high ticket" marketing information services, publications and dissemination services, word processing, and competitor analysis services. ^f Costs are currently unavailable for records management off-site costs. ^g Includes energy, alterations, insurance, and taxes. ^h Costs are currently unavailable. ⁱ Slight discrepancies due to rounding off.Table II. Selected Materials Resources in TIC/Library Systems of Companies in *Fortune* "500" Industry Category 26 (Chemicals)^a

	books ^b		bound vols ^b		subtotal		subscriptions ^b	
	no. ^c	percent	no. ^c	percent	no. ^c	percent	no.	percent
Top "4" companies								
Du Pont	124.8	14.8	94.8	12.0	219.5	13.0	7.1	19.0
Union Carbide	106.4	12.6	115.3	14.7	222.7	13.6	5.7	15.3
Monsanto	99.3	11.8	84.5	10.8	183.8	11.3	3.8	10.3
Dow	68.1	8.0	149.0	19.0	217.1	13.3	2.3	6.1
subtotal	398.6	47.2	443.6	56.5	843.1	51.6	17.9	50.7
25 remaining companies	444.6	52.7	341.9	43.5	785.5	48.4	18.3	49.3
grand total	843.2		785.5		1628.7		37.1	

^a "The *Fortune* Double 500 Directory...1978"; Time, Inc.: New York, 1978. ^b "Directory of Special Libraries and Information Centers", 5th ed.; Gale Research Co.: Detroit, MI, 1979. ^c Numbers in thousands.

Table III. Personnel Resources in Research Laboratories^a of Companies in *Fortune* "500" Industry Category 26 (Chemicals)^b

	professionals		doctorates		technicians and auxiliaries		total no.
	no.	percent	no.	percent	no.	percent	
Top "4" companies							
Du Pont	3691	45.0	1909	51.7	4523	55.0	8214
Union Carbide	2279	50.2	893	19.6	2259	49.7	4538
Monsanto	1312	33.2	389	9.9	2641	66.8	3953
Dow	5040	59.0	713	13.9	2100	40.1	7140
subtotal	12322	40.7	3904	60.3	11523	57.0	23845
25 remaining companies	17972	59.3	2570	39.6	8709	43.0	26681
grand total	30294		6474		20232		50526

^a "Industrial Research Laboratories of the U.S.", 17th ed.; Bowker: New York, 1982. ^b "The *Fortune* Double 500 Directory...1978"; Time, Inc.: New York, 1978.

Table IV. Personnel Resources in TIC/Library Systems^a of Companies in *Fortune* "500" Industry Category 26 (Chemicals)^b

	professionals		others		total no.	ratio of research professionals to information professionals
	no.	percent	no.	percent		
Top "4" companies						
Du Pont	54	20.8	68	25.1	122	68.4
Union Carbide	22	8.5	26	9.6	48	103.6
Monsanto	26	10.0	25	9.2	51	50.5
Dow	18	6.9	26	9.6	44	280.0
subtotal	120	46.3	145	53.5	265	102.7
25 remaining companies	139	53.7	126	45.5	265	129.3
grand total	259		271		530	117.0

^a "Subject Directory of Special Libraries and Information Centers, 5th ed.; Gale Research: Detroit, MI, 1979. ^b "The *Fortune* Double 500 Directory...1978"; Time, Inc.: New York, 1978.

remaining companies have 139 professionals and 126 non-professionals in their TIC/Libraries (Table IV).

One void in the professional literature is partially filled with this study, which shows the ratio of technical professionals to informational professionals. In the Top "4" companies, the ratio is 103/1 and in the remaining companies it is 129/1 or about 117/1 overall (Table IV).

When one turns to TIC/Library Systems conventional costs per technical professional, they are at least \$1300 per technical professional and \$138 000 per technical information professional in the Top "4" companies. For the remaining companies they are \$910 and \$117 500, respectively.

To help place these sums in perspective, SRI International's looseleaf *Chemical Economics Handbook* was consulted. Interpolations between tables revealed that 1981 median sales for each chemical company employee were \$119 400; median assets for that year were \$94 300 per employee, and 1981 median research and development expenses were \$2000 per employee. Note that 2% of the latter figure would be the expenses for TIC/Library Services per company employee (\$40/year), and this is my best estimate as of mid 1983.

That the inclusion of the "extended budget" figures (insofar as they are available today plus inflation) only doubles the rate of research and development expenses utilized for TIC/Library Systems over those foreseen in our ERIC Report of 1980 is disappointing. It is not unexpected given the lack of an industry-wide TIC/Library System statistics clearinghouse, with agreed definitions of terms and following unthreatening mechanisms of statistics acquisitions and dissemination of results. Models for such statistical clearinghouses, less the

industrial proprietary considerations, exist within the Federal education establishment.

In conclusion, please note that Table I with its budget elements for personnel, materials, services, facilities, and supplies forms the most current, concise status report on this matter as of midsummer 1983.

ACKNOWLEDGMENT

I appreciate the encouragement received from industrial professional colleagues (such as those who responded to the holiday telephone survey mentioned earlier). Graduate students in special libraries courses have tested interim results in term paper projects. My colleague-wife continues interest in this area and contributed to the final form of this article.

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