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# **Use of Statistics in Management Decisions**

## **ABSTRACT**

In using statistics in decision making, library managers can draw on five types of available data: library statistics, library salaries, employment outlook statistics, indexes of inflation and living costs, and demographic and economic data. In applying these data to management decisions, library managers can also utilize five strategies: taking the user's point of view, comparing libraries, tracking trends and making projections, indexing inflation and cost of living, and putting libraries in context. Each of these strategies is a proven success, and examples of their use are provided.

## **INTRODUCTION**

Statistics. The mere word sends cold chills up backs, wipes smiles from faces, and silences a room faster than the mention of E. F. Hutton in their commercials. It recalls the purgatory of math classes and the sweaty-palmed dread of standardized tests. And, for all too many of us, it still makes our eyes glaze over as we ponder seemingly endless pages of numbers that are supposed to mean something to us, but do not. (Lance, 1991, p. 206)

This paper is about how library managers can use statistics in making decisions. It begins with a review of the many types of helpful data available to library managers. That is followed by a discussion of five strategies for using such statistics in library management. Each of these strategies is a proven success, so examples of their use are provided.

## TYPES OF AVAILABLE DATA

Library managers can draw on five types of available data to inform their decision making: statistics on public and academic libraries and school library media centers, data on library salaries and benefits, employment outlook statistics for library workers, indexes of inflation over time and cost-of-living differences from place to place, and demographic and economic data on the people libraries serve.

### Library Statistics

Although specific data elements collected from different types of libraries vary, there are some common categories of items in most collections: the population served (residents of a jurisdiction; students enrolled in a school, college, or university), staffing levels (usually distinguishing professionally trained or credentialed librarians from other staff), finances (income or expenditures), collection size by format, services provided (e.g., visits, circulation, reference, and interlibrary loan transactions), and, increasingly, output or performance measures (e.g., fill, reference completion, and document delivery rates).

These statistics are produced by individual libraries and compiled by state library and higher education agencies, the Library Statistics Unit of the National Center for Education Statistics (National Center for Education Statistics, 1992; Podolsky, 1991), professional library associations (e.g., Pritchard & Finer, 1991), individual researchers (e.g., Miller & Shontz, 1991) and the private sector (e.g., Quality Education Data, 1991).

In selecting a source of available data on libraries, seven questions should be answered:

Does this source cover the type and size of library on which data are needed? For example, the latest data on public libraries serving populations of 100,000 or more are available in the Public Library Association's (1991) *Public Library Data Service Statistical Report '91*, while data on larger university libraries may be found in the Association of Research Libraries *ARL Statistics* (Pritchard & Finer, 1991).

How current are the available data in question, particularly compared with how current they need to be for a given purpose? Of the two major annual reports of U.S. public library statistics, the Public Library Data Service (PLDS) statistical report is more current than the report generated by the Federal-State Cooperative System (FSCS) for Public Library Data, *Public Libraries in the 50 States and the District of Columbia* (National Center for Education Statistics, 1992).

How comprehensive and representative are the available data for the type and size of library in question? FSCS reports cover the entire universe of public libraries in the United States, while PLDS reports focus on those serving populations of 100,000 and over.

Are the available data collected from a defined universe of libraries? The FSCS project is developing a universe file of public library agencies. It will be the only source of such universe-defining data.

To what extent are the comparability and quality of data assessed by the data compiler? The FSCS project takes longer to produce a report than its PLDS counterpart because it requires that data be collected based on a strict set of definitions and compiled at the federal level only after it has passed numerous edit checks by the state library agencies.

Do available data provide the range of data needed? If one is looking for data on fill rates, community characteristics, or roles played by a public library, PLDS reports provide such data.

In what form and in what ways are the data available? PLDS reports provide print access to individual library data, but that project does not release its machine-readable data files. Instead, PLDS offers custom research services on a fee basis. FSCS reports include only summary data for the states and the nation, but machine-readable data files are available.

## **Library Salaries**

Like statistics on library inputs and outputs, data on library salaries are available for most types of libraries, although such data on larger libraries of all types are more readily available.

The more familiar suppliers of these data for different library types are their own professional associations. The American Library Association (Lynch, Myers, & Guy, 1991) reports salaries for specific staff positions in larger public and most academic libraries; the Association of Research Libraries (Fretwell & Pritchard, 1991) reports salaries for staff of larger academic libraries; and the Special Libraries Association (1991) reports salaries for different types of staff in a wide variety of special libraries of all sizes. Results and analyses of these salary surveys appear in regular articles in appropriate journals (Brimsek, 1990; Lynch, 1991b).

Less familiar, but frequently more comprehensive sources of salary data are professional associations for the larger institutions of which libraries are part. The International City Management Association (1991) includes public library directors among the city officials for whom it collects salaries. These data are extracted from the *Municipal Year Book* each year and published in an article in *Public Libraries* (Lynch, 1991a). At least one of its state-level counterparts, the Colorado Municipal League (1991) also collects data on employee benefits, such as types of retirement plans, insurance, employer contributions, accrual rates for vacation and sick leave, and the like. The College and University Personnel Association (1991) collects salary data for library and other types of staff at academic institutions, and the National Education Association (1991) collects salary data for library media specialists as well as for other school workers.

In addition, many library surveys conducted by state library agencies collect salary data, usually for directors and starting librarians and, occasionally, for specific position titles (Boucher, Lance, & Crocker, 1991). The newest library salary survey is one for support staff. It began in 1989 and is reported the following year in the July/August issue of *Library Mosaics*, a journal specifically for library support staff (Martinez & Roney, 1990).

Some compilers of library salary data provide mean and median salaries for different positions in different sizes of libraries. Many also provide quartiles, percentiles, or averages for the highest and lowest 10 percent.

### **Employment Outlook Statistics**

For five-year periods, the U.S. Bureau of Labor Statistics (1992) and state labor departments (Colorado Department of Labor and Employment, 1991) estimate current employment in hundreds of occupations and project numbers of new positions (growth), turnover in existing positions (separations), and total openings (growth plus separations). Both professional librarian and library assistant/bookmobile driver are among these occupations. These figures are broken out in several ways, including geography (for the nation, by state, and, frequently if not always, for state planning districts or counties) and industry (e.g., public librarians are counted in public administration—i.e., government).

### **Indexes of Inflation and Living Costs**

Analyses of budgetary trends from year to year for a given library are often thwarted by the eroding effects of inflation on the library's

purchasing power. This is especially true where library materials are concerned. Book prices are inflated at a higher rate than general consumer prices, and periodical prices are inflated at an even higher rate than books. Library managers cannot afford to overlook these facts in making budget decisions. Comparisons of salaries from library to library are thwarted similarly because living costs can vary dramatically from place to place. So, library managers must also be prepared to adjust such figures for differences in living costs.

The index used most commonly to assess inflation is the consumer price index (U.S. Bureau of Labor Statistics, 1992). But this index is inadequate for most library purposes because it underestimates—sometimes grossly—the impact of inflation on materials budgets.

There are many different sources of average materials prices and price indexes. These include annual articles on books (Grannis, 1991b) and periodicals (Carpenter & Alexander, 1991), which provide the most current data, as well as reports of recent figures in the *Bowker Annual* (Bentley, 1991; Grannis, 1991a).

Managers of different types of libraries also have their own indexes to draw upon. Research Associates of Washington publishes the Higher Education Price Index and the Elementary-Secondary School Price Index (Research Associates of Washington, 1991; also Halstead, 1991). The former contains a subindex, the Library Price Index, which itself contains separate index scores for different portions of an academic library budget (e.g., staff, materials, equipment, contracted services). The latter contains subindexes for librarians (i.e., library media specialists) and materials by level (i.e., elementary or secondary) and format (e.g., books, periodicals, cassettes). There is no comparable index of prices for public libraries. However, the Library Research Center at the University of Illinois, Urbana-Champaign, produces the Index of American Public Library Expenditures annually (Palmer, 1991). This index is not nearly so pure a measure of inflation as the others, but it does break out comparable index scores for staff, materials, and other expenses.

Despite a common misconception, the consumer price index does not provide a basis for comparing living costs from place to place. For an index of cost of living, library managers must turn to the American Chamber of Commerce Researchers Association (American Chamber of Commerce Researchers Association [ACCRA], 1991), which publishes a quarterly cost-of-living index for all urban areas in the United States. (Sample uses of all of these indexes will be described later.) Notably,

ACCRA's monopoly in this area is about to be challenged by Research Associates of Washington (1992), which is publishing its own annual cost-of-living index report.

### **Demographic and Economic Data**

As library funding grows tighter and tighter, it becomes increasingly important for libraries of all types to understand the different types of users they serve and how best to serve them. In such a climate, demographic and economic data on those a library serves can be invaluable. Yet, most library managers are unaware of the many available sources of such data on which they can draw at little or no cost.

The federal government is a major data producer. The U.S. Bureau of the Census, the U.S. Bureau of Labor Statistics, and the National Center for Education Statistics collect and make available staggering quantities of demographic and economic statistics on the general population.

To promote the use of U.S. Census data, every state has a State Data Center, which is responsible not only for facilitating use of U.S. Census data, but also for compiling and making accessible a variety of state and local data, and referring users to other state and federal agencies that make data available (U.S. Bureau of the Census, 1990). Besides simply providing data in print or machine-readable form, State Data Centers offer other services, including data mapping and locator services. Two examples illustrate these types of services.

The Minnesota State Planning Agency (1991), that state's State Data Center, has created an online data mapping system, DATANET PLUS, which can draw on most of the data available from the agency to produce professional presentation-quality maps in color at relatively modest cost. The DATANET PLUS mapping software is now available to every state library agency through the generosity of the National Commission on Libraries and Information Science and the National Center for Education Statistics.

Colorado's Site Selector and Electronic Atlas is a computerized locator service which, for example, permits a library manager to select any intersection at which a new branch library might be constructed and obtain any available data he or she desires for a one-, three-, or five-mile radius (Colorado Division of Local Government, 1990).

In addition to public sector data providers, there is a rapidly growing private sector data industry. Perhaps the leading company in this field, the Claritas Corporation, has assigned every zip code in the United States to one of 40 lifestyle clusters based on a phenomenal amount of data drawn from such diverse sources as the U.S. Census, voting

records, lists of magazine subscribers, television ratings, and new product warranty surveys (Weiss, 1988). Through an exclusive contract with Claritas, Quality Education Data (1990) has had every public library and school library media center in the United States assigned to one of ten lifestyle types (collapsed from the original Claritas 40). Another exemplary firm, National Demographics and Lifestyles (1990), will analyze its data on an organization's clientele and profile them in terms of customized clusterings or market segments identified from that data.

## STRATEGIES FOR USING STATISTICS IN MANAGEMENT DECISIONS

Library managers can utilize five strategies in using statistics to make management decisions: taking the user's point of view, comparing libraries, tracking trends and making projections, indexing inflation and cost of living, and putting libraries in context.

### **Taking the User's Point of View**

In taking the user's point of view, library managers have three proven tactics from which to choose: the market basket approach, the competitive market, and the taxpayer's perspective.

Converting total statistics to per capita figures helps to make them somewhat more understandable but is really just a first step in adopting this strategy. The market basket approach involves "fleshing out" per capita figures by identifying specific examples of the types of use they enumerate. For example, instead of simply reporting that users borrowed an average of six circulating items per capita during a year, why not add the names of the six items that were borrowed most that year (Library Research Service, 1989)? Another way of making library statistics meaningful to the general public is to view them in the competitive market. For example, voters might be persuaded to support a sales tax increase for a library by suggesting how little its annual cost per household—about \$17.00—would buy otherwise, such as one tankful of gasoline, one family meal at a fast food restaurant, one extra large pizza (Boulder Public Library, 1987). A third angle on presenting library statistics from the user's viewpoint is taking the taxpayer's perspective. For example, a library's annual budget might be put in perspective by considering how long users work to pay the taxes that support it. Tax Liberation Day usually falls in early May. One recent year, Colorado's public libraries celebrated Library Tax Liberation Day at 11:00 A.M. on January 1 (Library Research Service, 1988)!

### **Comparing Libraries**

Comparing one library with another (or group of others) is probably the most popular strategy for using statistics to support management

decisions. Important issues to consider when making comparisons include: how to identify “peers,” whether to use data on individual libraries or groups of libraries, and, if using grouped data, whether to compare to the mean (average) or median (middle) value for the group.

For public libraries, peers are most often identified on the basis of population served, operating expenditures, or political structure (city, county, library district). For academic libraries and school library media centers, peers are usually selected on the basis of level (elementary versus secondary, community college versus university) or enrollment. Data on individual libraries may be ranked, mapped, and—if the group is not too large—charted. A recent *Wall Street Journal* article (Hirsch, 1991) used data from the Federal-State Cooperative System for Public Library Data to rank the 50 states and the District of Columbia on total public library operating expenditures per capita. These figures were also mapped.

Grouped data are often more useful rhetorically and usually lend themselves to being charted simply and dramatically. The American Library Association’s annual *ALA Survey of Librarian Salaries* reports means and medians as well as first and third quartiles for public and academic libraries nationwide and in four regions—North Atlantic, Great Lakes and Plains, Southeast, West and Southwest (Lynch, Myers, & Guy, 1991). In addition, public library figures are reported for two population ranges (100,000 and over and 25,000-99,999), and academic library figures, by level (two-year college, four-year college, and university). Besides demonstrating the rhetorical value of grouped data, this widely quoted annual publication also illustrates the potential differences between means and medians. For example, in 1991, the mean salary for a beginning librarian in the North Atlantic region was \$27,700; the median salary was only \$24,000. When comparing such figures, one should be aware that means are sensitive to extreme cases, while medians reflect more typical figures.

### Tracking Trends and Making Projections

Tracking trends is another popular strategy for using statistics in management decision making. One of its strengths is that it calls for local data only, avoiding the sometimes troublesome issues of locating comparable data on other libraries and identifying meaningful “peers.” This strategy may be employed in a variety of ways: comparing a given statistic from an earlier year with the same statistic for a later year, comparing or contrasting change over time in one statistic with change in another statistic, and comparing or contrasting change over time in a single statistic for a given library with such change for another library or groups of libraries.

There are many excellent examples of this strategy. Here are two. For many years, the annual *Directory & Statistics of Oregon Public Libraries* (Scheppke, 1991) has included a series of charts reporting year-to-year trends on a variety of statewide statistics, including population served, circulation, reference questions, and interlibrary loans. An example of comparing libraries to each other and to change over time is provided by the Management Profiles produced by the Illinois State Library (ISL) for Illinois public libraries. The Library Research Center (LRC), as part of its Statistical Services Contract with the ISL compiles the annual public library statistics submitted by each individual library. In addition to other statistical reports and products, the LRC compiles selected statistics into a packet of information called a Management Profile (Library Research Center, 1991). The packet has three profiles, each designed to provide comparative information to Illinois public library directors. The first profile includes statistics about library operations; the second, financial statistics; and the third, a comparison of selected current statistics from the first two profiles to the average of each of two peer groups selected by population served and income and expenditures values. Each peer group includes ten libraries. The profiles track trends by comparing the same statistics from one year to another. Since the profiles are produced annually, library managers are also able to compare change in statistics for one library with change in the same statistics for a group of peer libraries. Three customized graphics are included with each packet illustrating the most significant comparisons.

### **Indexing Inflation over Time and Cost of Living from Place to Place**

The price indexes described earlier are very useful when tracking fiscal trends. These indexes can (and should) be used to adjust dollar figures for inflation over time or cost-of-living differences from place to place. The customized statistical reports received by Illinois public libraries also include a line chart illustrating five-year trends for circulation and operating expenditures in actual and constant (1985) dollars (Library Research Center, 1991). A recent example of using a cost-of-living index to adjust for place to place differences is provided by the Library Research Service (1990). Starting librarian salaries for metropolitan public libraries in the western states were ranked and then re-ranked after adjusting them for cost-of-living differences using the index produced by the American Chamber of Commerce Researchers Association.

Although most price indexes report changes during the recent past, there are a few agencies that make projections about future price changes.

These figures can be very useful in projecting a library's future budget needs. A recent "Library Market Outlook" column in *Library Journal* (Selsky, 1991, p. 42) reported projected 1992 increases in consumer prices and book prices. When such index projections are unavailable, credible projections might be made by extrapolating from past changes, assuming there are no known conditions that would preclude doing so.

### Putting Libraries in Context

A final strategy for using statistics in making library management decisions is putting libraries in context. In applying this strategy, there are three important steps: scanning the social, political, and economic environment, identifying issues of concern to critical decision makers (e.g., board members, voters), and finding and using creatively appropriate data.

In 1988, when Colorado's governor targeted state library programs to be cut in favor of support for a new Denver airport, economic development programs, and efforts to promote tourism, the Library Research Service (Lance, 1988) responded with the following statistics:

- As many Coloradans are registered to use public libraries as are registered to vote.
- Circulation of books and other materials by Colorado libraries outnumbers passenger traffic out of Stapleton airport two to one annually.
- Visits to Colorado libraries outnumber ski lift ticket sales six to one annually.
- Participants in cultural and educational programs sponsored by Colorado's public libraries each year would fill Mile High Stadium seven times and McNichols Arena 29 times.

### FOR MORE INFORMATION

This paper has described a wide variety of available data on libraries and those they serve as well as several proven strategies for analyzing and presenting such data. The many bibliographies, directories, and how-to handouts that accompanied the presentation during the Allerton Institute may be obtained by writing to the following address: Library Research Service, 201 East Colfax Avenue, Room 309, Denver, Colorado 80203. Requests may also be made by telephone (303/866-6737) or fax (303/830-0793).

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