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ABSTRACT

The basic rationale for this study was that attempts to measure the service capabilities of public libraries, either in relation to the needs of their communities or to the standards adopted by the profession, are hampered by the lack of criteria of quality or effectiveness. It was recognized that new measures were needed to gauge effectiveness while eliminating extraneous factors. Specifically, these two phases reported upon here were designed to (1) identify measurement criteria which would discriminate among public library services, (2) develop an operational methodology whereby local librarians could collect the necessary data for processing and refinement, and (3) demonstrate that the measurement criteria could be put into a theoretical model which would provide a professional basis for assessing the activity of basic programs. The following criteria were studied: description of collection, building usage, circulation, facilities usage, patterns of reference usage, and public service personnel. (Author/SJ)

# MEASUREMENT OF EFFECTIVENESS OF PUBLIC LIBRARY SERVICE STUDY

## A Report on Phases I and II

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Submitted to: Public Library Association
A Division of
The American Library Association



Bureau of Library and Information Science Research

Rutgers the State University

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## PREFACE

On behalf of the Bureau of Library and Information Science Research, Rutgers The State University and the research team which has conducted the study, I am pleased to submit this report to A.L.A.-P.L.A. The report should be viewed as "interim" in that it covers only the first two of four phases. As originally submitted and agreed to by the U.S.O.E., the proposal emphasized that each of the four phases was dependent on the results of each preceding phase. Phase IV was carefully detailed as the final stage for analysis and writing.

However, since U.S.O.E. funds were not immediately available for Phases III and IV, the research team agreed to complete a "final" report on Phases I and II. Obviously, given the original proposal and subsequent work schedule, this decision curtailed any further efforts in Phase II. Also, only partial analysis of the data collected in Phases I and II has been undertaken.

Each of the 24 public libraries which have participated in the study were promised compilations of the data they collected. Each library has received that information. However, follow-up with each library was planned as part of Phase III. Consequently, the research team has not been able to discuss the findings with the librarians, for purposes of clarification and modification--a serious limitation. On behalf of A.L.A. and the research team I want to express my deep gratitude for their active and enthusiastic participation which made the success of Phases I and II possible.

A research project as complex and extensive as this one requires the energy and thinking of many people. The key members of the research team are listed on the title page of the report. Specifically, without the contributions of Dr. Altman and Ellen Clark, the project could not have succeeded.

The others who have shared their time and thinking with us include Ralph Blasingame, Jewel Walton, Henry Voos, Phil Clark, Kay McGinty, Harold Ray, Ben Weintraub and Mary Springman. To all the others, too numerous to mention, our appreciation.

Finally, I want to thank the members of our Advisory Committee whose encouragement and many suggestions proved extremely helpful, especially in keeping the project on course. To Dr. Frank Sessa, Chairman; Eleanor Ferguson, Walter Curley, Mary E. Phillips, Phyllis I. Dalton, Harold Goldstein, John C. Frantz, our thanks.

A special and personal debt of gratitude to Mr. Gerald M. Born, Executive Secretary of the Public Library Association, whose continued assistance allowed us to overcome many obstacles.

Ernest R. DeProspo
Project Director

# NARRATIVE REPORT ON PHASES I AND II

Ernest R. DeProspo
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Bureau of Library and Information Science Research
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# INTRODUCTION

The first two phases of the four phase study on The Measurement of Public Library Effectiveness have been completed. Specifically, these two phases were designed to (1) identify measurement criteria which would discriminate among public library services, (2) develop an operational methodology whereby local librarians could collect the necessary data for processing and refinement, and (3) demonstrate that the measurement criteria could be put into a theoretical model which would provide a professional basis for assessing the activity of basic library programs.

The notion of "measurement" is one which tends to exacerbate an already complex set of circumstances. The multiple views and long standing doubts over the meaning and use of this term often gets in the way of methodology. It is important, therefore, to state briefly the views of the research team on "measurement" and the values which were brought to the study.

Too often numbers or statistics are treated as having an intrinsic scientific value. Techniques of measurement have been developed which are so subtle and so powerful that using them is often seen as all that is worthwhile. Just as the overemphasis on definitions often approaches a faith in the power of the word, the mystique of quantity is often an exaggerated regard for the significance of measurement, just because it is quantitative, without regard for what has been measured or what can subsequently be done with the measure. What is really important is how one can learn more than he knows or how one can become more sure of what he thinks he already knows. Although measurement is by no means the only method of extending of solidifying our knowledge, clearly it has an important role to play in this understanding process.

Measurement serves as a key device for standardization, a process through which we are convinced of equivalances among varied objects. As such, measurement allows more subtle discriminations and, correspondingly, more precise descriptions. Such quantitative specification allows us to bring our differing professional disagreements into a sharper and more illuminating focus. In the final analysis, however, it should be remembered that whether one can measure something is dependent on how one is able to conceptualize about the things to be measured. Conceptualization is dependent on our knowledge of the things to be measured and, most importantly, on the skill and ingenuity which is brought to bear on the process.

In a broader context, measurement is the delimitation and establishment of our ideas of thing. The Measurement of Public Library Effectiveness project needed to establish the appropriate limits, obviously, before becoming operational. That is, initial decisions were needed to determine which elements of the public library program could/should be measured before the project team could conceptualize them. Consequently, after many and various staff sessions, and after an extensive review of the existing literature, the following "formula" was postulated as a representation in

time: Document Availability, Staff Assistance, Physical Facilities and System Involvement minus Inconveniences constitute the key measurement criteria.

The elements or factors incorporated in the "formula" are similar to those utilized in other studies. However, the approach is unique from any other measurement study undertaken in the way in which data is collected for each factor and in the way they are interrelated to produce a measure of effectiveness profile. Essentially, then, the project looks at effectiveness through three broad-based objectives of the public library: (1) materials availability, (2) staff availability, and (3) facilities usage. Against these three objectives we interact the user either through simulation or through actual observation.

## A Brief Overview of the Project

This section briefly describes the four intended phases of the study. In addition, the specific rationale for the study is reviewed. A comment on the methodology is included with a concise cataloguing of the principal measurement criteria, or items, used.

As originally conceived, the study involved four distinct phases: Phase I--Developing criteria which appear descriptive of the effectiveness of a public library program; development of a methodology for the process of data collection for the selected criteria; data collection on the selected criteria in a small number of pilot test libraries; and, establishment of tentative ranges of performance for each criterion. Phase II--Test of the criteria and methodology developed during Phase I in a carefully selected sample of public libraries on a nationwide basis; preparation of a profile for each of the sample libraries. Phase III--On-site visitation of some of the Phase II libraries to determine if the measurement indicators developed from the refined criteria coincide with professional judgment about the effectiveness of service provided by those libraries; and, in order to review and evaluate the profiles, a conference would be held. (Preliminary analysis of the criteria developed would provide the prime basis for the particular approach used in Phase III.) Phase IV--Completion of analysis and preparation of a final report.

The basic rationale for this study was simply put in the proposal: "Attempts to measure the service capabilities of public libraries, either in relation to the needs of their communities or to the standards adopted by the profession, are hampered by the lack of criteria of quality or effectiveness." New measures are needed which "...must gauge effectiveness while eliminating extraneous factors. The required data must be such that library staffs can collect them with a reasonable expenditure of time. Some investigators have suggested such measures, but have not taken the second step proposed here of matching the results against objective professional judgements of effectiveness."

A few caveats are in order. It is important to state what the study is not and to describe the considerations which have imposed constraints on the study. The especially strong "humanistic" strain which runs through

the profession requires that open and honest consideration be given to the emotional and intellectual factors which approaches at "measurement," "evaluation," "quantification," etc., present. For many librarians the doubt that one can infer quality from quantity is sufficiently strong that any method which asserts, per se, that numbers will provide the basis for professional consensus on what constitutes "acceptable levels of performance" runs the likely risk of outright rejection.

Obviously, not all library activities are subject to reasonable quantification or objective verification. Furthermore, numerous library activities take place which are considered valuable to "society" but not particularly as efficient or measureable as such, e.g., the time a librarian spends with a senior citizen. Indeed, the study to date shows more clearly than in the past writings what some of the limitations are in quantification. Thus, this study should be viewed as a first step effort at a fairly general or macro level at identifying some important common core library activities which are amenable to quantification. Refinement which gets at detailed and specific analysis, or micro level analysis, must await further study.

The project has proceeded within the following constraints. First, library data necessary for the particular measurement tests developed must be collectable by the local librarian. Second, the measurement tests, while objectively based should be construed in a manner suitable for interpretation and action at the local level; that is, these tests are not to satisfy the interests solely of the researcher. While certain complex measurement procedures can be simplified beyond meaning, every effort has been made to develop measurement tests which are likely to have high priority in the public library and which are likely to be grasped quickly for purposes of understanding and action.

With these considerations and constraints in mind, a number of criteria descriptive of public library programs were hypothesized after interviews, dialogue with the Advisory Committee to the project, and reviews of literature on past efforts at statistical measurement. The following criteria, or "measurement indicators", have been refined and developed to date. The project personnel are highly confident that these criteria are descriptive and look forward to their analysis to determine the extent to which they are integrative; that is, to ascertain the degree to which one is or may be a function of the others.

The following is a description of the criteria studied and the aspects of these criteria that were measured. The criteria differs substantially from the traditional data collected in that an attempt is made to relate systematically the various pieces which constitute a profile estimating the library's effectiveness of service to its users.

I. Description of Collection: Materials availability, as tested through "BPR", Periodical, and Title availability sampling reduces the importance of the current practice of counting all the items for either external reporting or in-house tabulations. That is, utilizing samples of 500 items or less, the library is able to profile its materials within the context of user availability.

A. "BPR" Probability Sample--Based on the fact that there is a positive relationship between the recency of a collection and its use, this measurement test was developed to indicate the chances a user would have to obtain any book published in the last five years.

B. Periodical Availability Sample--This measurement test was developed to determine the chances that a user would have of finding an article cited in any one of eight common indexes: Social Science and Humanities, Business Periodicals Index, PAIS, Biological and Agricultural Index, Applied Science and Technology Index, Education Index, Art Index, and Readers Guide. The test involves both the probability of ownership of a journal as well as the probability of obtaining a specific article.

C. Title Availability Sample--This measurement test involved sampling the collection of a library in order to determine the probability a user would have of obtaining any book owned by the library. In addition, this particular test provides data descriptive of the collection such as a breakdown by fiction and non-fiction, adult and juvenile, and so forth.

II. Building Usage

A. Description of Users--Users, in this case, were defined as those that actually come to the library. The description categories are:

1. Sex
2. Student-Nonstudent
3. Grade Level of Students
4. Occupation of Nonstudents

B. Time User Entered and Left the Library--This information was used to determine the pattern of use for the library facility such as average length of stay, high and low use time periods, and so forth.

C. User Satisfaction--This measurement was designed to determine the satisfaction of actual users of the library based on their most recent experience in the library

III. Circulation: In-Library Circulation is defined as those items which patrons actually sat down to read or examine, but which are not reflected in the normal circulation record. Outside Library Circulation is simply defined as any item(s) which the patron has checked out of the library.

A. In-Library Circulation--This measurement test was designed to determine the use made of materials within the library by the user. A breakdown is provided for both the type of materials used and the frequency of their use as well as the proportion of total in-library circulation each type of material accounts for.

B. Outside Library Circulation--This aspect of the study provides information on the number of items circulated, the number of users circulating books, the average number of items circulated per user, and the percentage of users checking out books.

IV. Facilities Usage

This indicator is concerned with the use of equipment and special facilities within the library by its patrons. Information is provided on the highest incidence of use by item and the time of day when this occurred. These facilities include table seating, photocopier, meeting rooms, microfilm readers, and so forth.

V. Patterns of Reference Usage

A. Reference Activity by Time of Day--This aspect of the study provides information on the flow of reference activity during the day including peak and slow periods.

B. Type of Question--A distinction is made between source related and directional questions and the number and percentage of each is determined.

C. Source Related Questions--Further information on source related questions includes who asked the question, how it was asked, i.e., by phone or in person, who answered the question if it was answered, and the source used to answer the question.

VI. Public Service Personnel

Public service personnel are defined as those employees of the library that have direct contact with the users. Data is gathered to supply information on their age, length of employment in the library, years of library experience, hours per week at public service, sex, highest degree earned, and scheduling by hour of day.

## Existing Library Statistics

The research team did not assume that existing library statistics are inadequate for purposes of measurement. An extensive effort was made to collect and analyze these statistics. The following account describes this effort.

State Library Statistical Gathering

All state library agencies were asked to send copies of their latest public library statistical reports. Thirty-seven agencies responded. Preliminary analysis of these reports revealed the following.

From the reported data, forty-eight key statistical items on public libraries across the country were identified. Of these items, 50 percent or more states report on sixteen. These are:

1. Name, address and telephone number of library
2. County
3. Name of library director
4. Name of library system, where applicable
5. Population served
6. Hours open per week or per day
7. Total number of volumes added to collection
8. Total number of volumes at year end
9. Total circulation figures
10. Income from local sources
11. Income from state sources
12. Income from other sources
13. Total figure of all income sources
14. Expenditure on salaries
15. Expenditure on library materials
16. Total figure of all expenditures

It can be seen that the most universal statistics shown in state reports cover basic facts about public libraries such as book stock, circulation, income and expenditures. While useful, they remain at best generalized reports directed towards the uninitiated lay public, and offer little direct evidence of effective service to the patron.

Outside of these sixteen basic items, some states break down these items into types of material held (New York), various sources of income (Pennsylvania), and attempt at providing unit costs of certain services (Utah). Beyond this breakdown the individual reports range freely, providing anything from the year of foundation (Colorado and Indiana) to numbers of reference transactions (California and South Carolina).

A few states endeavor to put 'life' into these statistics by reporting on the use made by the public of a service provided. California, Pennsylvania, and South Carolina, for example, provide figures on inter-library loans.

Iowa and Minnesota show the percentage of population unserved by libraries, although it is not clear if the figures relate to the lack of a library in a given area or, more important, that a percentage of the population does not avail itself of library service.

Kansas breaks down the total circulation figures by patron/schools/ hospitals/ other institutions loans, which make these figures more meaningful. Indiana and Tennessee give details of bookmobile service showing the number of stops and breaking these down into kinds of patrons served.

Some states provide a breakdown of audio-visual materials held, but neglect to provide circulation figures for these non-book items.

Finally, only nine states report on the numbers of professionals and nonprofessionals serving the patron.

## U.S.O.E. Library Statistics

Extensive analysis of library statistics published by the United States Office of Education was undertaken by the research team. A separate report details the results of that analysis. The basic conclusion is that the "data categories presently reported are insufficient and incomplete measures of library effectiveness..."

## Public Library Questionnaire Survey

In September 1971, questionnaires were sent to a stratified random sample of two hundred and fifty-four public libraries in the United States. The sample, drawn from the American Library Directory, was stratified primarily in terms of size. Since there is considerable variation in the size of libraries, this variable had to be taken into consideration in any attempt to measure effectiveness. Libraries with greater resources might be able to offer a broader range of programs, specialized services and the like; elements that may be lacking in other libraries due to their more limited resources, for example. In such a case, comparison would be misleading. Thus, since all earlier research has concluded that the most reliable factor for determining size is budget, libraries in this sample were classified in terms of size by the following budget categories:

| | |
|---|---|
| Small Libraries | $100,000 - $249,999 |
| Medium Libraries | $250,000 - $749,999 |
| Large Libraries | $750,000 - $3,499,999 |

Given the limitations of time and money, it was decided that both the very small and the very large public library would not be included within the universe of public libraries at this point and throughout the study. Secondarily, there was also an attempt to obtain an equitable geographical distribution within the sample.

The one hundred and twenty-four respondents to this questionnaire answered eighty-five questions on the ease or difficulty that their library would have in providing different types of information for the last five years. Each library was asked to respond in the following way to each of the items:

| | |
|---|---|
| E-- Easy to Provide | I have the exact figure (s) requested or a very similar breakdown in my files and records |
| D -- Difficult to Provide | I do not have the exact figure(s) on hand, but my files or records contain the information which would allow me to compute the requested figure (s). |

| | |
|---|---|
| I -- Impossible to Provide | I have neither the exact figure(s) on hand nor the files or records to compute the necessary figure(s). I would be required to set up a new record-keeping system or do a special study in order to provide the information. |
| C -- Detailed Records are not Retained | The information is currently collected but a record for past years is not retained. |
| N -- Not Applicable | |

On the basis of the responsis to the information questions, an analysis of the relative availability of different types of information was made. The following provides a breakdown on the eighty-five items of information for all public libraries responding as well as for each public library size:

Availability of Library Statistics-1965-1970

| (Bases) | Total (124) | Large (34) | Medium (43) | Small (47) |
|---|---|---|---|---|
| Total square feet of building | 98% | 100% | 98% | 98% |
| Budgeted amount for equipment/supplies | 98 | 97 | 100 | 96 |
| Total number of volumes in collection | 98 | 97 | 98 | 100 |
| Total number of volumes added yearly | 98 | 97 | 98 | 98 |
| Total number of volumes withdrawn | 98 | 94 | 100 | 98 |
| Annual per capita expenditure | 97 | 97 | 98 | 96 |
| Total number of people in service area | 96 | 100 | 95 | 94 |
| Budgeted amount for professional salaries | 94 | 94 | 98 | 89 |
| Budgeted amount-nonprofessional salaries | 94 | 94 | 98 | 89 |
| Total square feet of stack area | 94 | 94 | 93 | 94 |
| Total square feet of reading room | 94 | 91 | 95 | 96 |
| Budgeted amount-building maintenance | 93 | 94 | 95 | 89 |
| Budgeted amount - print resources | 90 | 94 | 91 | 87 |
| Total number of phonograph records | 89 | 94 | 88 | 85 |
| Budgeted amount - nonprint resources | 87 | 94 | 86 | 83 |
| Total number of items circulated yearly | 87 | 91 | 86 | 85 |
| Number ILL items borrowed annually | 86 | 91 | 86 | 83 |
| Number ILL items loaned annually | 82 | 85 | 91 | 72 |
| Total number of microforms in collection | 82 | 82 | 86 | 79 |
| Total number of periodical titles | 82 | 82 | 74 | 89 |
| Number of registered borrowers (total) | 81 | 71 | 81 | 87 |
| Total number of other A-V materials | 79 | 79 | 65 | 58 |
| Hours of staff time on building mainten. | 78 | 79 | 81 | 75 |
| Total number juvenile fiction volumes | 78 | 74 | 81 | 79 |
| Hours of staff time on technical services | 77 | 79 | 81 | 72 |
| Hours of staff time on circulation | 77 | 79 | 79 | 72 |
| Hours of staff time on administration | 76 | 76 | 81 | 70 |

| (Bases) | Total (124) | Large (34) | Medium (43) | Small (47) |
|---|---|---|---|---|
| Hours of staff time on reference | 73% | 74% | 77% | 70% |
| Total number juvenile nonfiction volumes | 73 | 68 | 75 | 77 |
| Total number of films in collection | 71 | 88 | 70 | 60 |
| Number of juvenile registered borrowers | 71 | 65 | 68 | 79 |
| Annual per-registered-borrower expenditure | 71 | 59 | 74 | 77 |
| Number of adult registered borrowers | 70 | 62 | 68 | 79 |
| Total adult/young adult non-fiction vols. | 69 | 62 | 77 | 68 |
| Total adult/young adult fiction volumes | 69 | 59 | 79 | 66 |
| Total number of reference volumes | 68 | 68 | 67 | 68 |
| Percent time spent at reference desk | 68 | 59 | 74 | 68 |
| Circulation of audio visual materials | 66 | 82 | 65 | 55 |
| Hours staff time on org. and main. of coll. | 65 | 65 | 65 | 64 |
| Hours staff time on public relations | 64 | 71 | 58 | 64 |
| Total number of periodical volumes | 61 | 62 | 65 | 58 |
| Percent time spent selecting books | 57 | 41 | 60 | 64 |
| Total number of titles added yearly | 56 | 85 | 61 | 32 |
| Total number of filmstrips in collection | 53 | 56 | 58 | 47 |
| Total number of volumes lost yearly | 50 | 50 | 58 | 43 |
| Circulation of adult fiction | 50 | 44 | 47 | 57 |
| Circulation of adult nonfiction | 50 | 44 | 47 | 57 |
| Number of ILL requests you did not satisfy | 49 | 47 | 49 | 51 |
| Circulation of juvenile fiction | 48 | 44 | 42 | 55 |
| Budgeted amount - technical services | 46 | 51 | 51 | 34 |
| Circulation of juvenile nonfiction | 46 | 41 | 42 | 53 |
| Budgeted amount for administration | 44 | 53 | 51 | 30 |
| Amount received to provide system services | 41 | 50 | 49 | 28 |
| Budgeted amount for circulation | 40 | 53 | 47 | 26 |
| Amount spent for system services | 39 | 35 | 49 | 32 |
| Circulation for periodicals | 38 | 29 | 32 | 49 |
| Total number of titles withdrawn yearly | 36 | 29 | 49 | 28 |
| Budgeted amount for reference services | 35 | 44 | 40 | 23 |
| Hours of staff time on system activities | 34 | 44 | 35 | 21 |
| Total number of titles in collection | 34 | 38 | 42 | 23 |
| Number requests sent via teletransmission | 33 | 47 | 35 | 21 |
| Budgeted amount - other reader services | 33 | 44 | 37 | 21 |
| Number requests rec'd via teletransmission | 32 | 47 | 33 | 21 |
| Number reference questions referred elsewh. | 32 | 27 | 33 | 36 |
| Total number of reference titles | 32 | 21 | 37 | 36 |
| Total number of government documents | 31 | 50 | 33 | 17 |
| Total number adult/young adult fict.titles | 31 | 32 | 42 | 21 |
| Total no. adult/young adult nonfic. titles | 31 | 32 | 40 | 23 |
| Total number juvenile fiction titles | 31 | 24 | 47 | 23 |
| Total number juvenile nonfiction titles | 29 | 21 | 42 | 23 |
| Number ref. requests you ans. for other | 28 | 27 | 28 | 30 |
| Number items lent to universal borrowers | 24 | 18 | 30 | 23 |
| Number patrons enter building daily | 23 | 35 | 21 | 15 |
| Budgeted amount for (unspecified) other | 23 | 21 | 26 | 23 |
| Total number of titles lost yearly | 23 | 18 | 35 | 17 |
| Number ref. questions referred/not ans. | 22 | 12 | 21 | 30 |
| Budgeted amount for system membership | 17 | 12 | 26 | 13 |

CONT.

| (Bases) | Total (124) | Large (34) | Medium (43) | Small (47) |
|---|---|---|---|---|
| Number requests rec'd via WATS line | 10% | 9% | 12% | 9% |
| Number requests sent via WATS line | 8 | 3 | 12 | 9 |
| Budgeted amount for other (unspecified)area | 7 | 9 | 7 | 6 |
| Circulation of government documents | 6 | 18 | 2 | 2 |
| Number requests sent via tielines | 5 | 0 | 9 | 4 |
| Number requests received via leaselines | 4 | 0 | 9 | 2 |
| Number requests sent via leaselines | 4 | 0 | 7 | 4 |
| Number requests received via tielines | 3 | 0 | 7 | 2 |

## The Usefulness of Public Library Statistics

Librarians in the national sample were asked what measures of quality, which could be statistically determined, would they like to have available for use in evaluating their services. As one might expect, a variety of responses were reported by the librarians. However, the responses, once categorized, depicted a visible trend--more information directly related to the user.

Basically, the suggestions centered around user satisfaction and user activity. Thus, for example, one librarian suggested the following: "A record of individual patron satisfaction and dissatisfaction for every service transaction between him and the library. A rating scale for numbers of people in the service area reached in some way be library service compared to other agency ratings. (This comparison could also be made with other libraries using the same criteria.)" Another librarian noted: "Judgment of each person who uses the library during the year as to how well he was served by it and a report from him on areas where he was not served well." Another librarian said: "Mainly, some measure of patrons' reaction or a statement as to their satisfaction with the library's response or service."

Intuitively, the librarians were saying that the data currently collected is not people or user oriented. The decision to simulate the user through the methodology of probability statistics as key elements in the measurement criteria developed was reinforced by these responses. The data collection approach, as illustrated in the Instructional Manual for the Collection of Selected Public Library Information, sharply demonstrates the efforts of the research team to fill the user-oriented information gap.

The same librarians were asked to indicate which statistics could be reported which would accurately reflect their library's effectiveness. Again, the responses centered around the user, as contrasted to "things". The following observations made by these librarians illustrate this point:

"Written or verbal testimonies of people--numbers do not show effectiveness."

"None, unless we place a counter on the door to count the number of patrons each day."

"Number of people who went away dissatisfied (or unsatisfied)".

"Number of people using the library--not just circulation--especially in special collections. Requests not filled. What percentage of patrons are not finding what they want."

"Gallop-type polling of representative samples of the public at different times might do it. Certainly circulation figures and borrowers registered don't."

Of course, some librarians responded by noting that they "doubt that such statistics exist" and "you tell me."

These librarians were also asked to comment on the use of statistics to measure effectiveness. From the responses received, it is not difficult to see how doubtful they are that one can measure effectiveness statistically. Refresentative comments were:

"Statistics do not evaluate quality of service or degree of satisfaction of community and/or patron needs. I know no way this can be measured statistically."

"Statistics as kept do not describe the quality/nature of individual service--only the volume of it. I don't think statistics--numbers--or non-verbal written data can describe the humanistic situation in the subjective atmosphere in which it takes place."

"Statistics can be misleading and none can give a complete picture of library service. I abhor the time involved in too many "statistical reports' and do wish a uniform system could be devised that would satisfy all types of libraries--don't you."

"Statistics do not and I don't believe could ever include the human factor in giving service which I believe to be the key. I do not think that it is possible to reflect statistically the effectiveness of a devoted reference librarian or a children's librarian unless a

person was asked to fill out a brief questionnaire each time he used the library. Businessmen often do not need help and know how to use the services and directories. It would be difficult to measure the library's effectiveness to this extent without invading privacy."

The above observations fairly accurately depict the general kinds of reservations or doubts which public librarians possess when the question of statistically measuring effectiveness of service is raised. However, when all of their responses are viewed together, it is also clear that public librarians need and want better and more appropriate ways of "measuring" the services they offer through some kind of user orientation rather than the current "thing-oriented" approach. Phases I and II of this study are clearly consistent with this view and expressed need.

## Pretest, Pilot Libraries and Instructional Manual

The methodology for the study was developed and pre-tested in four pilot libraries during Phase I. Following innumerable staff sessions, dialogue with library educators and practicing librarians, and preliminary analysis of the results of the literature search, the decision was made to select three public libraries of "like character", i.e., similar in terms of budget, size of collection, number of branches, number of employees, and so forth. The results of the pilot would provide a basis to make initial judgments on both the forms used to collect the date as well as with the sufficiency of the data itself. In order to insure exposure to as great a variety of variables as possible, it was decided that medium to large sized libraries should be selected.

The project staff proceeded to develop the method and forms for data collection and then to the actual collection of the data in the pilot libraries. In this way the research team could test the forms developed, including the likely problems which any data gathering approach might present to the local librarian, as well as to determine the time required to collect the information. One of the three pilot libraries was generous enough to provide a member of its staff as an ongoing resource to the study and to work as a member of the research team. Consequently, we were able to have a very effective link for feedback on the methodology as an integral part of the research operation.

With the completion of the data gathering in the three pilot libraries, the Instructional Manual was drafted. We then decided to select one more library to test the Manual, that is, to see if the local librarian could collect the information within the limits established. It was assumed that a key element in the data collection is the existence of sufficient staff. Consequently, the greatest problem might very well be with the "small" public library. As a result, the director of a small library was asked to participate in the study. A special one day workshop on data collection procedures, following the instructions proveded in the Manual, was conducted for the director by the research team.

The major goals of the pretest, then, were to see if (1) data could be collected on each criterion or item, (2) could an average library collect the data on its own with minimum supervision, and (3) was each item discriminatory, i.e., did it show individually or in combination with other items differences in the four libraries which professionally trained librarians could observe in a gross sense or surmise from interviewing employees. It was assumed that most significant criteria or items had an outward manifestation in the form of some kind of quantifiable action or statistics. This assumption was made for research purposes and does not mean that the project personnel believe that all aspects of library programs can be or should be translated into statistics.

## Techniques

The following is the list of items selected as the measurement indicators. Analysis of the pilot library data indicate that all but one, outside library circulation, significantly discriminated among libraries. The items are:

Title Availability
"BPR" Availability
Periodical Availability
In-Library Circulation
Building Usage
Patterns of Reference Usage
Public Service Analysis
User Facilities and Equipment
Outside Library Circulation

All items are either based on probability statistics (utilizing random sampling) in which a user simulation covering a variety of library service exchanges is employed, e.g., estimating the probability of any user obtaining a book published in the last five years from the library, or on total factors, e.g., extensive information on all the users entering the library at selected time intervals.

For the latter consideration, the research team was concerned with testing such relationships as (1) the time the user spent in the library with the number of items checked out, (2) the time spent in the library with the extent of staff assistance, (3) the time spent in the library with user satisfaction, (4) the ratio of in-library use with outside circulation, particularly as that ratio might be related to physical plant, collection and staff.

## Summary of Pilot Library Data

The complete data distribution (less those factors inappropriate for Phases I and II, e.g., community outreach) are included in the appendix of this report. It was assumed that the four test libraries were, in fact, sufficiently different from one another that the measurement data should reveal some of the differences. Preliminary analysis of the pilot data (see appendix to the narrative) clearly reveals some of the differences and reinforced the conclusion that the criteria would

indeed discriminate from library to library as well as from size to size.

The data from the pilot libraries have been processed and analyzed extensively, although not completely. On the basis of this analysis, the following appear to be effective discriminators among libraries:

1. Building Use -- The pilot libraries varied significantly on such factors as occupation of patrons, grade level of student patrons, proportion of student patrons, length of stay, and time of day when use is highest.

2. Title Availability -- The pretest libraries vary significantly on the availability of titles listed in their shelf list. There is also considerable variability in the age of collections.

3. Periodical Availability -- The availability of periodical articles varied systematically among pilot libraries.

4. Reference Activity -- The pretest libraries varied considerably on the proportion of actual reference questions to directional questions. Also, there was variation in the proportion of questions received by phone as opposed to in person.

5. In-Library Circulation -- The volume and variety of materials used within the library by patrons varied significantly among the pilot libraries.

The research team is convinced that with the analysis of the full data base, the following two discriminators will further differentiate public library services.

1. Characteristics of Reference Personnel -- At this point the sample is too small to draw any conclusions.

2. Organizational Health (Likert Scales) -- Although the pretest libraries vary on this dimension, more extensive and sophisticated analysis will have to be carried out in order to determine the exact nature of this variation.

3. "BPR" Availability -- More data is needed in this area.

The following areas have proved to be problematic [illegible]:

1. Comp[illegible]each and Library Sponsored programs; and,

2. Library Information Questionnaire -- This instrument, designed to collect traditional statistical information about the participant libraries over the last five years, has produced random as well as, in many cases, incomplete and incomparable data. Before this aspect of library service can be measured adequately and compared to other measures, some form of systematic reporting, and also cost accounting, will have to be developed. The LIBGIS system might be a complementary and viable alternative to this aspect of the study.

## PHASE II DATA COLLECTION

The data collected in the four pilot libraries was refined and analyzed before any major decisions were made in Phase II. The results of the pilot data analysis were such that the project personnel were satisfied that the Phase II undertaking would be viable. Naturally, the critical factor was whether or not the measurement indicators selected did in fact discriminate among the services offered by different libraries.

The selection of Phase II libraries, which finally totaled twenty was influenced by a number of factors. The most important were: (1) geographical spread, (2) inclusion of public libraries to fall within out small, medium and large size categories, and (3) a commitment to the overall objectives of the project by the library director. Data collection was planned to cover a two week period. Roughly fifty-five hours of time was required to collect the desired information during week of the study. A commitment of three full days were required in week two. In addition, each participating library was asked to appoint a project coordinator to supervise the data collection and forward the results to the Research Bureau at Rutgers. In order to approximate "normal" conditions, the libraries participating in the study were asked to give no prior publicity to the project.

Three regional workshops were provided for the project coordinators appointed by the libraries participating in Phase II. The first workshop was given in New Brunswick, New Jersey; the second in Atlanta, Georgia and the third in San Francisco, California. No particular

problems developed during any of the workshops. The librarians were able to readily grasp the data gathering instructions.

The data collected in Phase II have been submitted to preliminary analysis and profiles have been developed for each of the participating libraries.

## LIMITATIONS OF PHASES I AND II

Since interpretation and data analysis leading toward data refinement and specification of the theoretical model are the prime activities for Phases III and IV of the study, only descriptive information is provided in this interim report on Phases I and II. Consequently, important areas in which data have been collected could not be covered in this report. The following data areas represent the most significant factors which must await analysis:

### Community Outreach and Library Sponsored Programs

All Phase II libraries supplied extensive data on their community outreach activities and other library sponsored programs. This information does not lend itself to any convenient typology and therefore cannot be simply described. Our analysis will aim to discover to what extent, if any, a relationship exists between the measurement indicators for the library and the kind of outreach and/or library sponsored program activity which take place.

### Library Information Questionnaire

Each Phase II library was requested to supply extensive library statistics covering the following areas: book holdings, documents, periodicals, A-V materials, users, circulation, allocation of staff time, allocation of budget, physical plant, and system activities. Information on all these areas was asked for a five year period (1965-1970) to give a basis for comparison. It was not expected that the libraries would be able to supply all of the information requested. They were asked to supply the information from the library statistics that they were already collecting. The data from this questionnaire will be analyzed in Phase III to see what relationship, if any, exists with the other measurement indicators.

### Staff Questionnaire: Likert Scale on "Organizational Health"

This questionnaire was adapted from The Human Organization by Rensis Likert and used with the permission of the McGraw-Hill Book Company. The purpose of the questionnaire is to see how the library operates organizationally. Every employee in the library, excluding volunteers, were asked to fill out the questionnaire. It is hypothesized that the way in which the librarian views the organization will influence the services provided. Obviously, the kind of data supplied is non-descriptive and must be analyzed in conjunction with the measurement indicators developed.

Finally, various data areas in which great detail is provided, e.g., breakdown and use of collections, are not included as part of Phases I and II. Again, only detailed analysis will allow the research team to decide which data is essential.

## CONCLUSION

As a result of the first two phases of the study, the following considerations are clear. First, the methodology developed is appropriate to the overall objective of the study, i.e., selected data which measures various aspects of the public library program can be collected, with minimal assistance, at the local library level. Second, the data itself does discriminate the performance of one public library from that of another. Thirdly, the data comes much closer than present library statistics to meeting the demands of both the librarian and the patron for "user-oriented" indicators which are necessary if the public library is going to reflect accurately the variety of activities that it is undertaking.

Each of the twenty libraries which have participated in this study will receive a "mini-management report" which will tell them where they stand on each measurement item selected at this point in the study. In addition, they will be able to compare their performance against each of the other nineteen libraries. However, until the study is completed, direct follow-up with each library for purposes of explanation and refinement will not be possible. Also, there will be no opportunity for these professional librarians to meet as a group and express their overall judgments on each measurement item, an input which is clearly mandatory if the approach selected as a result of this study is to find general acceptance in the profession.

The data to be tested as a result of the study do far (which the U.S.O.E. has already received) offers several advantages over the various measurement systems used by the states:

1. The data is comparable on a regional, state, or national basis as to (a) type of major services, (b) quality factors which modify quantitative items, and (c) personnel and management quality;

2. Not all items need to be collected each year in order to maintain the integrity of the total system;

3. A profile can be set for each library. At the same time, special local factors can be added for local decision-making;

4. The data is in a form to facilitate setting up a national data bank;

5. The data can be collected locally with a minimum of time and supervision from a state or federal agency.

6. Sampling techniques are used to measure activities otherwise not considered as subject to measurement.

7. Longitudinal reviews over a period of time, e.g., half a decade to a decade, are facilitated.

8. A factor for evaluation of library management is included.

# MEASURING THE EFFECTIVENESS OF PUBLIC LIBRARIES

## GENERAL COMMENTS ON THE LITERATURE

By

Ellen Altman, Ernest DeProspo, Kenneth E. Beasley

# MEASURING THE EFFECTIVENESS OF PUBLIC LIBRARIES:

# GENERAL COMMENTS ON THE LITERATURE

## INTRODUCTION

Libraries are a major public service whose total impact and cost are hidden from direct public view because of their diversity as school, public, university, private research, institutional, and special libraries. Public libraries alone had a total income in 1970 in excess of $700,000,000.[1] Since the growth in income for nearly two decades has been steady and has come almost entirely from tax appropriations, and since the total social and physical demands of modern American society require more resources than are available, there has been an increasing public concern about the benefits accruing from public library service. The point has now been reached where traditional arguments for public support of expanded service are not as meaningful as in the past, and do not evoke as strong an emotional response. Indeed, a negative reaction could develop rapidly if, by accident, improper or poor use of funds occurred in several localities or if strong popular pressures demanded a higher priority for certain other social services. This position is well stated as a general theme by Suchman in Evaluative Research.[2]

"A better educated and more sophisticated public is less willing than ever to accept the need for a community service on faith alone. Increasingly the public is demanding proof of the effectiveness of various programs. The current desire to judge the value of social institutions is only one aspect of society's belief that many social problems can be met most effectively through planned action based upon existing knowledge including the design of better solutions in step with advancing knowledge. The public expects bigger and better services. Such services are becoming defined more as public rights than individual privileges."

The difficulty is that without exception measures of effectiveness of social programs have not been formulated as rapidly or in the degree of sophistication requested by the public. The fault is not with general intellectual capability or with inadequate analytical tools, but rather with a paradox faced by the average citizen. As an individual, effective and efficient use of public funds is an abstract concept which he supports in such areas as general voting and public discussions. However, when a determination of effectiveness in a specific program requires a significant reallocation of resources, he often responds negatively because it may necessitate a shift in his personal values which are not a function of either effectiveness of efficiency. For example, his personal association with mental health may preclude him from accepting an argument that benefits from added public dollars in 1973 for libraries exceed those for a preventive high school drug program.

Theoreticians of organizational behavior have recognized this conflict

and have been interested in defining effectiveness for at least two decades. For the most part, they have worked from a premise that effectiveness is synonomous with the attainment of an organization's objective and the continued legitimacy and viability of the organization itself. Although there is a certain value in this kind of definition, Etzioni pointed out a decade ago that while the stated goals of an agency serve as clues to actual goals they cannot be accepted always at face value. Goals are symbols or ideals which are more attractive than the reality which the organization attains. Thus, he argues, organizations can almost always be judged ineffective (and hence in need of more support). He favors examining how the organization allocates its resources and directs its efforts to ascertain real goals.[3]

In later organizational theory, a wide variety of ideas have been advanced about ways to measure quality, efficiency, responsiveness, or effectiveness, these being illustrative terms used by different authors. Some techniques of measurement have been adopted under the pressure to make public decisions in an objective (non-political) manner. Nearly every proposal or technique has been subjected to severe theoretical criticisms, particularly by social service oriented people as contrasted with the mathematical economist and statistician. For example, Werner Hirsch concludes in a well known article on the quality of government service that ". . . it is apparent that efforts to measure the quality of urban government services offer exciting challenges and prospects. Much more work is needed along three lines of inquiry--defining service units in real terms, identifying their major quality characteristics, and estimating the money value and money-cost of these characteristics."[4] Aaron Wildavsky commented in 1966 about cost benefit and system analysis:

> Studies based on efficiency criteria are much needed . . . . My quarrel is not with them as such, at all. I have been concerned that a single value, however important, could triumph over other values without explicit consideration being given to these others. I would feel much better if political rationality were being pursued with the same vigor and capability as economic efficiency. In that case, I would have fewer qualms about extending efficiency studies into the decision making apparatus.[5]

In an earlier paragraph, he quotes one economist as saying: "One can view cost-benefit analysis as any thing from an infallible means of reaching the new Utopia to a waste of resources in attempting to measure the unmeasurable."

The problem of measuring effectiveness in the modern corporation is no less easy in fact than in the public service. The literature in this field recognizes that there are no simple techniques or agreed on objectives. The amount of profits are recognized in this era of social responsibility of business as not necessarily the only or best guide of effectiveness; and cutting costs is admitted as not desirable in all cases in either the short or long run. Research and development, staff, public relations, and planning are units which are particularly difficult

to evaluate. Wessel and Cohen show this new thinking in part in their 1967 note about 62 techniques used in business to study performance.[6]

In the literature on social services in general, the same diversity in ideas and hopes exists. In fact the body of literature is so large that several universities offer new specialized degrees in planning and evaluation. As a prelude to the next sections on library measurements, it can be noted here that for social services in general, a wide variety of tools are used ranging from standardized tests of achievement to preset standards of operation based on a norm of current practices. In addition, at all levels of government a large body of statistical data is collected. Although the data have been refined in recent years, for the most part, though they are still descriptive, are not precise, and measure the intangibles of human development only indirectly by assuming certain relationships, e.g., equating average size of classroom or average number of beds or minimum educational attainment for employees with a set quality or level of achievement. Resources, consequently, tend to be added to reach these averages, and by definition, the achievement is reached. Obvious defects or deficiencies are then usually ascribed to other external social factors or as acceptable variations in an imperfect system.

The theoretical statements of effectiveness of social services tend to stress a) what is hoped for, b) models for which it is admitted there is insufficient data to make them operable, and c) conflicts of personal values. Moreover, the complexity of life, i.e., added determinants of social and intellectual behavior, has increased faster than our ability to isolate the determinants and measure them as discrete units. The apparent lack of success to develop measures of effectiveness, therefore, is not the fault of any of the professions. It is in this broad social effort that the library profession has attempted consistently for three decades to perfect a system which would inform the public and profession about the nature and quality of service being returned for the social investment in public libraries.

## Objectives of Public Libraries

The notion that a library's effectiveness can be judged only in relation to the objectives which it pursues recurs so often in the literature that it has become a cliche. However, there are serious problems in using stated objectives as a yardstick to measure effectiveness. Many libraries have not adopted specific objectives. In fact, failure to formulate objectives was cited by Martin as the sixth most critical problem facing public libraries.[7]

All too often, the objectives of the library as they have been stated in the professional literature are so vague that they are meaningless. Examples are: human understanding, civic enlightenment, personal development, community development, creative and spiritual development, and the old standbys of information, recreation, and education.

Are all of these objectives of equal importance? Should they only

apply to the self-selected user of the community at large, or both? More importantly, how can one identify the library's impact on "civic enlightenment," or "personal development" from the impact of other social institutions in the community? None of these objectives is operational in terms of indicating the desired outcome because there are no criteria to assess performance.

Perhaps the profession has been unable to agree on objectives because:

1. There is no well accepted theoretical base of philosophy of service accepted by the library profession.

2. The components of good library service have never been defined except in very general terms.

3. The question of who should set objectives for public institutions has never been settled.

4. The "library's public" is assumed to be composed of many different and conflicting interest groups. Whose interests shall have priority?[8]

## Standards and Statistics

Even though it is frequently argued that measurement of performance is impossible in the absence of clearly defined goals, the profession has nevertheless promulgated a series of standards expressly designed to set a priori the adequacy of public library programs. The intent is clearly reflected in the following statements taken from the 1943, 1956, and 1966 public library standards.

1943 Standards: The major purpose of this study is the formulation of working standards for public library service which may be used as a measuring instrument of the adequacy and efficiency of present library service . . . .[9]

Standards should be used as a national measuring stick . . . .[10]

It is expected that the standards will also be used by state and city planning and other officials, by library surveyors, library boards, and other interested groups in evaluating the library service of individual cities, counties, and states . . . .[11]

1956 Standards: This document provides a guide for the evaluation of public library service. It is intended for the use of librarians, library boards, government officials, and interested citizens in assessing the adequacy of their present library services and in formulating plans for improvement . . . . .[12]

The present statement must be understood as a guide to total evaluation of public library service . . . . .[13]

1966 Standards: This publication used phraseology almost identical to the two statements quoted above from the 1956 publication.[14] In addition the document stated:

"Only such standards have been included as have a direct and positive relationship to quality of library facilities and service."[15]

All three publications define the word standard as a specific criterion against which adequacy and quality can be tested and measured.

Standards have traditionally been adopted to set a "base line of modern public library service"[16] and to "define minimum adequacy of library facilities"[17] in quantitative terms of book stock, finance, buildings and staff.

Initially, Minimum Standards for Public Library Systems, 1966, deemphasized quantitative factors and stressed what were called "guiding principals."

> In response to a feeling on the part of some librarians that Minimum Standards for Public Library Systems, 1966, is sometimes too general to be useful, the Standards Committee of the Public Library Association devised certain Statistical Standards, which were approved by the membership in June 1967. These are interpretations in mathematical terms of specific standards, intended for use with the more general standards, and are now included as a measure of document."[18]

The profession's acceptance of quantitative standards as a measure of library performance implies that quality is inextricably bound to quantity. Therefore, the descriptive statistics reported by individual libraries for such items as expenditures, staff and holdings, etc., are by implication meaningful indices for evaluating overall activities of libraries.

On the other hand, there has been considerable discussion in the literature that recorded statistics cannot be used as indicators of library effectiveness. The main arguments advanced by most of those who have taken up the pen in this fray are: 1) that the statistics are inherently unreliable, 2) that quantity cannot always be equated with quality and 3) that present statistical categories measure resources, not actual service.

The charge that reported statistics are unreliable has considerable merit. The problem is that not all libraries count the same items in the same way. For example, how are volumes counted--by physical or bibliographical unit? Are serials included in the volume totals? Are government documents counted as volumes? Are microfilms counted by the reel or by the bibliographical volume? Are bound pamphlets counted as volumes? What makes a librarian a professional--a degree, experience only or simply a job title? The counting problem is compounded by the fact that state library agencies officially define the terms differently.

This lack of a uniform statistical reporting system has hindered comparisons of library statistics and given ammunition to the anti-numerical faction. In 1966, the American Library Association attempted to clarify counting procedures by publishing a handbook outlining how library items should be counted or defined.[19] In the six intervening years no follow-up studies have been reported in Library Literature as to the acceptance of the concepts presented in this manual or its effect on present reporting.

That quantity does not always equal quality has been the classic argument in disparaging the validity of statistical data. Krikelas, the most articulate spokesman for this point of view writes,

> No obvious measurements can be made to determine how effective the library is in providing the services necessary to meet its objectives. It is important, therefore, to avoid complacency because standard meanings for current measures may soon be agreed upon, when in reality such measures have no real meaning in relation to our objectives . . . . It is . . the responsibility of each individual to recognize that qualitative inference cannot be made from such data. Descriptive statistics offer no easy road--in fact, no road at all--to evaluation of the quality of library service offered by a given library . . . . The very nature of library administration demands that the librarian engage in resourceful and meaningful investigation of the services needed by individuals in his community and the efficiency and effectiveness of his library in meeting these needs.[20]

The problem is to enunciate this "resourceful and meaningful investigation." As Wright points out, qualitative measures as currently used and discussed are primarily value judgments unsupported by empirical data.[21]

To bridge the quality-quantity gap, librarians have come up with various schemes. One favorite is the checklist method of analyzing collections. If the library owns most of the titles on the list, it is presumed to have a quality collection.

Over 30 years ago, Waples suggested that all books published the previous year be divided into three levels of excellence based on group judgment. The titles acquired by the library would be compared with those at each level to determine the quality of the collection, and then the circulation of titles at each level would be checked. "The results will show the level of excellence which the circulation attains in each class of publication and each distinguishable group of readers."[22]

He goes on to say that the values of reading change according to what is read and who is reading it. This idea is not unique to Waples; a number of others have made similar statements in the literature. Those who propose "quality" evaluations of this sort hold that reading per se is good--but that certain kinds of reading are better for society as a whole as distinguished from an individual preference.

Also, as a result of limited resources in nearly every locality forcing choices in the clientele to be served, the profession has gradually developed a concept that the reading of some persons has more value socially (politically) than the reading of other persons. Therefore, circulation to the elite group or circulation of quality titles should be weighted higher than other items. These same kinds of arguments are used in discussions of reference services, i.e., that some questions are more important than others because of the status of the information seeker or the use to which the information will be put.[23]

From a practical point of view, it would be virtually impossible to devise and implement an accurate methodology to weight circulation or reference service according to the status of the patron, the quality of the items read, or the utility of the information provided.

The third argument, that currently reported statistics are not meaningful measures is relatively recent and may or may not be valid. Wright holds that most of our measures are of resources not services.[24]

Analyses of the kinds of data requested on library reporting forms and subsequently published by individual libraries, state library agencies, and the federal government support Wright's contention. Almost all published statistical data are measures of input, i.e., capacity to provide service. Included here would be total holdings, number of staff, volumes added, operating budgets and capital expenditures. Population served is simply an uncontrolled variable. "Circulation" is the single measure of output or service regularly given.

Using circulation as the sole statistical measure of library output implies that it is either the most important service offered by libraries or the only service that can be measured. This assumption may not be valid. Also, traditionally, circulation figures have been subject to easy manipulation by shortening the loan period or supplying titles which stimulate mass use. Circulation figures tell only how many items were checked out of the building; they give no indication of the actual use of these items.

Most of these arguments stem from the fact that librarians are unfamiliar with the nature and purpose of statistical analysis. It is conceded that 100 percent accuracy in reporting figures is almost impossible to obtain, even if everyone agrees to count in a uniform manner. This is really not an insurmountable problem. As Beasley points out,

> Librarians' work by its very nature deals in large numbers. From such large numbers, trends or general emphasis can be determined accurately since minor deviations are either absorbed without causing a significant change in final results or they cancel each other out.[25]

Hughes sums up the accuracy controversy by saying,

> Most librarians who have been concerned with library statistics seem to overemphasize the detailed accuracy that they feel is essential if valid use is to be made of the comparisons. If in other sciences the

> world were wait ng for absolute accuracy in sampling, as library science waits, man would not be circling the moon . . . The handling of normal "error" is normal for competent statistical study. As a matter of fact, statistics were developed because it is impossible to be entirely uniform and consistent, to count and record every item neatly and precisely. Statistics amount to the best guess we can get, on the best information we can get. And that is considerabley better than an opinion based on nothing . . . While correcting the flaws in our gathering of library statistics, it is advisable to remember that a three percent margin of error is allowed in matter of life and death and organizations risk capital regularly and successfully on a five percent chance of error.[26]

## Inferential Statistics

Semantic confusion exists over the term statistics. The profession collects numerical data on collections, staff, budget, etc. The data usually are merely listed in a report. These numbers are descriptive statistics. But the method of drawing conclusions from these data is inferential statistics. Here is the nub of the statistics controversy. Librarians have not yet developed any accepted methods to ascertain the validity of a statistical reporting system because they have generally not gone beyond simply describing the quantities.

This search of the literature uncovered only two studies which applied inferential analysis to traditionally reported library statistics. Charles and Ruth Rockwood did a multiple correlation study using population and budget as dependent variables and staff, volumes and circulation as independent variables. The purpose was to find the "best variable to classify libraries by size. Budget was deemed the best indicator of library size.

The correlation test which they used has two inherent problems. First, linear regression tests only the strength of linear relationships. This method essentially measures only the difference in the extreme ends of the data, i.e., the low and high points. Including in the sample both very small libraries having budgets under $100,000 and very large libraries having budgets ranging from $3,500,000 to $9,000,000 lengthened the slope of the line. Linear regression also assumes that the budget correlates all relate to the first power of the variables. The other serious problem is that standard errors for this study were ±110,000 for population, ±15 for staff, ±290,000 for volumes and ±426,000 for circulation.

Their findings might have been different if they had initially segregated the libraries by some size factor and applied step-wise linear regression to change the functional form of the dependent variable.[27]

Pings, Olson and Orr, applied multiple regression and factor analysis to the statistics reported by academic medical libraries. They concluded that there were few significant relationships between demand variables (student and faculty) and size of library variables (staff, collection and budget). Nor could size of library variables be closely correlated with service output variables (circulation, ILL and reference statistics).[28]

An analysis of public library statistical data prepared for this study essentially revealed similar findings: that population has little effect on resources and that resources and output are not necessarily related.

## Research on Library Effectiveness

The literature is replete with articles entitled: "Evaluation of Library Services", "Measurements in Library Service", "Quality Values of Library Service", "Indices of Effectiveness of Public Library Services in Depth." Unfortunately, none of the authors fulfilled the promise offered by their titles. They offered no formula but simply exhortations to strive for effectiveness or to use techniques which have been proven unsatisfactory from past experience. All of these titles refer to public libraries. Publications aimed at special and university librarians have their share of these types of articles too. However, some meaningful work has been done in special and university libraries, much of it by persons outside librarianship.

The most important studies have utilized two techniques borrowed from industry and military organizations. These are 1) systems analysis and 2) operations research which rely heavily on statistical methods. Systems analysis is a functional process which segregates and delineates the individual functions of an organization. It shows the interfaces between functions and their relationship to overall objectives. Operations research uses a systems orientation based on the idea that the activity of any part of an organization has some effect on the activity of every other part. Therefore, it is necessary to identify all significant interactions and to evaluate their combined impact on organizational performance as a whole. This involves the development of mathematical models and simulations of various sub-systems.

Because some areas of library operations lend themselves more readily to quantification and hence are amenable to the construction of models, these areas have been prime targets for investigation by researchers.

Table I indicates the major areas in which researchers have attempted to build models in order to optimize performance and thus influence effectiveness. Table II shows the type of library funding agency and background of the researcher. The major strengths and weaknesses of the most important studies are outlined below.

Philip M. Morse wrote a book in 1968 based on projects done by students in his operations research classes at M.I.T. Morse's criteria of performance was "unsatisfied document demand." As a result, the book focused primarily on book use and its implications for satisfying both current and future demands for material. He showed the interaction of demand to circulation, weeding, and duplication.[28a]

The models presented can be used as a data base for policy decisions at the M.I.T. science library. The formulas could probably be adapted

to other libraries once preliminary data had been collected. A major advantage of Morse's method is that the models can be updated without gathering a lot of additional data because they are based on probabilistic occurences. In fact, it would be possible to re-study only selected areas of a library's operation once the initial data had been collected. However, it should be noted that Morse assumes that the demand rate will remain constant. Thus, the expectation of future demand in the models is predicated on past demand.

Pings, Orr, Pizer and Olson attempted to measure the effectiveness of academic medical libraries. User satisfaction was chosen as the ultimate test of library effectiveness. The following criteria were selected to reflect user needs:

1. Obtaining documents
2. Locating citations
3. Receiving answers for specific needs
4. Having access to work space and facilities
5. Obtaining instruction and consultation

Librarians who simulated the user population were to obtain documents from a prepared list. The physical availability of the documents was scored on a capability index. The limitation inherent in the index is that the "score" represents a library's ability to deliver documents if its collection was not being used, i.e., whether a title is owned regardless of its actual accessibility to a patron.

Information services were tested by giving reference librarians 50 incomplete or incorrect citations to verify within a four hour period. Random alarm mechanisms (RAM) were used to sample staff activities.

The 1968 progress report describes checklists of library policies which may be important to users. These services are weighted to give a quantitative score. The checklist was used only with pre-test groups.[29] No further reports of this study have been found in the literature.

However, Olson modified the checklist in his study of service policies in public, academic, special and school libraries in Indiana. This is the only study located which included a cross-section of types of libraries and also a large sample--over 1,000 libraries, half of which were school libraries.

There are serious questions about using this checklist to measure services. The librarians weight the importance of each service. Their opinions may or may not coincide with that of their users. This method relies solely on the veracity of the person checking the form. A service that is infrequently provided may be checked for maximum service, yet if the service were more frequently requested it might be curtailed or deleted.[30]

Morris Hamburg of the Wharton School of Finance developed "an allocation model" to determine funding for the 49 outlets which comprise the Free Library of Philadelphia. The model is based on "document exposure time"--i.e., the time spend reading both inside and outside the library. This model also includes such variables as population served, registered borrowers, circulation, in-library use, telephone queries, attendance, physical facilities, document resources, and educational level of the population. Reference service is considered only in terms of time and money.[31]

All of these factors are related to costs. Hamburg concluded that each exposure hour has a value of 72¢ or 46¢ per person. The methodology is based on the questionable assumption that people who return books can accurately remember how long they spent reading each title. Hamburg claims this was 2.25 hours per title. If one analyzes this claim, the naievete of this method is readily apparent. If a person read at the rate of 500 words per minute--a good rate, he could read 3,000 words per hour. If the average book contains 350 words per page that would mean the average number of pages read was 19.2

Hamburg made no attempt to find out whether circulated books were read completely, partially or not at all.

The University of Lancaster studies have been primarily concerned with modelling the university library's ability to satisfy users's needs for materials in terms of circulation policies, availability of documents, duplication and time required to process in-coming materials, weeding, journal purchasing and inter-library loan. A "frustration survey" similar to the Capability Index was conducted among actual users.[32]

The Lancaster study is particularly interesting for two reasons. The researchers are librarians who have an advanced knowledge of statistics. Secondly, the models were actually implemented and library operations were changed as a result. This project demonstrates that research can have a practical and beneficial payoff.

Two university library cost benefit studies are Raffel's and Shishko's at M.I.T. and Durham's and Newcastle's in England conducted by the Durham Computer Unit. The M.I.T. researchers calculated costs for:

1. open and closed access book storage
2. book versus microform storage or xerox
3. various types of reserve systems including cheap xerox, free xerox or microforms
4. seating
5. temporary cataloging
6. rapid interlibrary loan

7. weeding

After present operational costs had been determined along with costs of changing the existing system, a questionnaire was sent to a random sample of faculty, graduate students and undergraduates. They were asked to rank which services they would prefer to keep or change within the limits of a $200,000 budget increase, a $100,000 increase and no increase.

Although answers are not really applicable to public library operation, the findings illustrate the variegated nature of user preferences. The undergrads wanted centralized reserve, the graduate students wanted more books to check out while the faculty prefered departmental libraries. Obviously satisfying any one group would be at the expense of the other two.[33]

The title of the Furham study, "Projects for Evaluating the Benefits from University Libraries", promised more than it delivered.[34] Benefits are cast in terms of unit costs and the relationship between the cost of one service vs. the cost of another. For example, the cost of adding one book is equivalent to obtaining 4.5 items on ILL or circulating 90 books on long term loan.

The premise is that once the library administrator has detailed cost and volume of activity data, he can better decide which services he wants to expand and which he wants to curtail to provide an optimum balance. He may or may not take needs or even demands into consideration. By this method the library administrator evaluates the benefits offered by the library on the supposition that he is the best judge of "good" service for his institution.

Weeding, storage and duplication have been analyzed by Trueswell, Fussler and Simon, Jain, and Leffler. They essentially view the library as an inventory supply problem and try to assess which materials will be called for most frequently and which will languish on the shelves. All have found that the probability of a book's being used declines with the age. This finding, in turn, relates to Trueswell's 80/20 rule which says that 20 percent of a university library's collection accounts for 80 percent of its circulation. The 80/20 rule may not apply to public libraries because of the large percentage of fiction in their collections.

All of these studies relate to effectiveness in the broad sense in that they attempt to analyze some aspect of library service and devise ways to improve that service. The similarity among all of them is that they focus on availability and use of documents and budget allocation.

Availability of documents was measured by the number of unfilled requests and the resulting implications for providing duplicate copies or changing circulation policies for a more rapid turn over in book stock. Document use was studied not only in the context of availability but also in terms of browsing and selection of materials for weeding and storage.

The research on budget allocation reflects current management interest

in accountability and cost benefit analysis. These studies polled users and/or library staff to select alternatives to present services within the confines of a limited amount of money.

An analysis of the empirical studies completed to date prompts the following conclusions:

1. Most studies were done on individual libraries--primarily academic institutions which may or may not be typical of this group.

2. The research has not been cumulative. Some aspects of library operations like weeding, storage, duplication and unsatisfied demand have been done over and over again by different researchers. Yet other critical areas have virtually been ignored--reference service, the library's impact on its community, optimum utilization of staff.

3. The principal researchers involved in most of the mathematically-oriented studies have no library training or experience. As a result some of the concepts presented and the approaches tried show a naivete of the complex nature of the activities of the library.

4. These studies, also, have limited use at this time in decision making because they involve a level of mathematical application which is far greater than the accuracy or availability of data.

5. Most of these reports describe the library as though the library staff did not exist. One wonders just what level of involvement the staff had while the studies were going on. If staff involvement was minimal, it might be hypothesized that the studies had little impact on subsequent operations or services. Only the University of Lancaster has written on the actual implementation of the models prepared for that library.

6. Also, no follow-up reports have appeared in the literature showing that these models have been adopted and/or adapted by other libraries.

## CONCLUSION

The results of the literature search are clear. There exists few antecedent approaches which the public library can utilize fruitfully in developing innovative approaches to measuring the performance of the services it offers its public. For the most part, most earlier efforts, library and non-library, must be characterized as incomplete or "half-way" measures. Further, few of the approaches cited lend themselves to implementation and interpretation by the librarian because of their reliance on highly sophisticated and complex methodologies.

The few exceptions to the above oberservation are also limited in their

usefulness to the public librarian who wants to utilize a fairly broad-based program for evaluating and therefore measuring library services. The approaches advocated so far have been seen as too esoteric or too complicated or too remote from reality or too simplistic or too narrow or too broad or too . . . .

Too often, also, the researchers in this area have worked in a vacuum, not sufficiently sensitized to the world of library operations to make the crucial connection between methodology and meaning of importance. Or, too often, the marriage between researcher and practitioner has been so close that objectivity of what and why this or that is being measured never surfaced. In general, there has been an absence of adequate transmittal of knowledge from the techniques used to the individuals responsible for their final interpretation and operation.

Clearly, if the researcher's interest goes beyond additional insight into the problem of "how to measure" and includes the concern of acceptance and utilization of the given scheme developed, then an understanding of the politics of measurement is essential. Foremost here is the general skepticism about any statistical approach which purports to measure quality. Secondly, there are the pressures from outside agents to conform to devices which they, the agents, have devised as reliable indicators of performance. The ambivalence towards statistics, despite or because of its historical antecedents, has helped to create a vacuum today which explains the dilemma in which most library decision makers find themselves. For the most part, the profession is clearly in no stronger power position as a result.

In short, those researchers who have dealt with the problem of statistical measurement have not been successful in communicating their schemes to those under operational fire. They have not proved the case for either the relevance or operational meaning of the approaches devised, but have tended to act as if the world of statistical measurement is crystal clear to everyone and its meaning instantly obvious. They have assumed erroneously that the adoption automatically comes from explication.

Perhaps C. West Churchman is correct when he concludes in his book that "ultimate meaning of the systems approach, (measurement approach?)... lies in the creation of a theory of deciption and in a fuller understanding of the ways in which the human being can be deceived about his world and in an interaction between these different viewpoints."

The thrust of Churchman's argument is that the planner or researcher has not really faced up to the multiple factors, rational or irrational, which significantly undermine their schemes. ". . . among the anti-planners there is the completely non-intellectual approach, the approach that does not believe that thinking in any of its senses is important in the development of human life. It is the approach that finds the essence of value in the song, the painting, the vision, the myth, the feminine, and ultimately the unspoken. What is not said at all is the most important thing of all. Since the management scientist, the planner, and the behavioral scientist spend all their time speaking, then it must be the case that what they spend

their time on is the least important part of human life."

We suppose one would encounter a more receptive group if a total condemnation of statistics and the prospect of relating quality with quantity prefaced all ensuing comments. We could then conclude that despite its inherent weakness, our statistical approach would clearly be the lesser evil and should be given a try. At the very least, we guess, we would have made our contribution towards the art of deception. The unfortunate case is the prevalent confusion between the abuses of the technique with the logical foundation of its existence. Rationally we know that quantity infers something about quality--a reading room with one seat or a library with one book suggests certain limitations on the quality of those operations!--Emotionally, of course, we resist any such connection. And too often it is just that emotion which determines our behavior in the final analysis.

FOOTNOTES

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[9]ALA. Committee on Post-war Planning. Post-War Standards for Public Libraries. Chicago, ALA, 1943, p. 10.

[10]Ibid., p. 15.

[11]Ibid., p. 6.

[12]ALA. Public Libraries Division. Co-ordinating Committee on Revision of Public Library Standards. Public Library Service: A Guide to Evaluation with Minimum Standards. Chicago, ALA, 1956, p. xv.

[13]Ibid., p. xvi.

[14]ALA. Public Library Association. Standards Committee. Minimum Standards for Public Library Systems, 1966. Chicago, ALA, 1967, pp. v, 12.

[15]Ibid., p. 13.

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[22]Douglas Waples. Investigating Library Problems. Chicago, University of Chicago, 1939. P. 95.

[23]In all probability, if causal factors could be determined, the pressure to show numerical production (number of readers, circulation, etc.) also forced the profession to define certain users as being preferred.

[24]Wright, Edward A. Op. cit.

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[36]Ibid., p. 225.

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# An Analysis of U.S. Office of Education's Statistical Reports for Public Libraries

by

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# INTRODUCTION

The United States Office of Education has been publishing a series of selected statistical data for public libraries since 1944.[1] These statistics are used ostensibly for several purposes:[2]

1. To provide an internal statistical record for individual libraries and as an easy way to compare similar libraries
2. To assist the federal government in decision making
3. To assist the public in evaluating the overall development of public libraries

In practice, the comparison of libraries has been used extensively to show deficiencies in library service individually or collectively and consequently to justify a need for greater financial support. Implicit in this use, also, is that numerical quantities bear some relationship to actual performance or affectiveness. Larger quantities in almost all areas of service have commonly been presumed to mean better service. Although the validity of this relationship has been discussed widely in the literature for many years, the criticisms have generally focused on the need for so-called qualitative measures of performance rather than with substantive critiques and development of the quantitative measures themselves.

In 1971, the U. S. Office of Education authorized a study to develop measures of or criteria for public library

effectiveness. This project was sponsored by the American Library Association and conducted by the Bureau of Library and Information Science Research at Rutgers University. In this study, current statistical reporting systems were reviewed to determine their utility and to make preliminary judgments about the need for new measures. Since nearly all state reporting systems are modeled after the U.S.O.E. statistical reports, the latter were analyzed in detail.

U.S.O.E. statistical reports for public libraries are totally descriptive. Numerical quantities are listed in each category with no attempt to analyze what these quantities mean or how they may be related to each other. In essence, the U.S.O.E. statistical report is a census of public libraries. Although modifications have been made in the data base in each publication, certain traditional categories have remained constant: (a) population served, (b) size of collection, (c) total operating expenditure, (d) number of professional and clerical employees, (e) number of volumes added the previous year, (f) salary expenditures, (g) library material expenditures, and (h) circulation.[3] Of these items, all except circulation and population are measures of input. Population is neither an input or an output. It is an uncontrolled variable. Circulation as traditionally defined reflects the only attempt to determine output. For all of these items, accurate counting is essential if comparisons are to be useful or if totals are

to be indicative of overall regional, state or national development. However, all parties concerned have not been able to agree on what constitutes the data categories or how they should be counted. In the absence of general agreement comprimises have been made which reflect the lowest common denominator.

While U.S.O.E. has always recognized this fact, it has of practical necessity been required to publish the data essentially as submitted by the individual libraries and has admitted that much greater uniformity would be desirable. This same problem was encountered in this analysis and could only be handled by assuming accuracy in reporting; any deficiencies found in using the statistics as measures of effectiveness would therefore be accentuated if the data itself were defective.[4]

## II

The library profession has traditionally operated on a basic premise that "more equals better." One can find hundreds of examples in the literature stressing the need for increased funds to provide "better" service. Implicitly and explicitly, the assumptions are that money buys larger collections, more professional and clerical staff, more service units; and from this there is increased circulation and generally a better quality service. To test

these assumptions, the U.S.O.E. statistics were analyzed by a stepwise multiple regression and factor analysis. The objective was to determine predictive variables--what inputs produced what outputs.[5]

Since the Rockwoods' study in 1967 had determined that budget was the best indicator of library size,[6] a sample of 180 public libraries stratified by budget and geography was drawn from Statistics of Public Libraries Serving Areas With at Least 25,000 Inhabitants. 1968.[7]

| Class of Library | Amount of Budget | Number of Libraries in Sample |
|---|---|---|
| I. Small Libraries | $100,000-$ 249,999 | 71 |
| II. Medium Libraries | $250,000-$ 749,999 | 61 |
| III. Large Libraries | $750,000-$3,499,999 | 48 |
| | | 180 |

Libraries with budgets less than $100,000 and more than $3,500,000 were omitted from this sample (and other phases of the total study) because the very large libraries are highly individualized and other studies have shown that the very small libraries appear to be almost a distinct kind of institution.

For each of the mple libraries for the year 1968, the following data were collected from Statistics of Public Libraries.[8]

Total Operating Expenditures

Population Served

F.T.E. Library Staff Positions, excluding maintenance staff

Staff holding M.L.S. degree

Total Salary Expenditures, excluding maintenance salaries

Expenditures for library materials

Number of branches

Total book and serial holdings

Total book and serial volumes added during fiscal year

Total circulation (transactions of all materials lent for use outside the library during fiscal year)

Factor analysis was applied separately to each of these classes of libraries with the following results:[9]

No consistent pattern could be discerned. A variable might fall under factor 1 for the large class (I), under factor 3 for the medium (II), and under factor 2 for the small class (III).

The next step, accordingly, was to use a stepwise multiple regression program (which constructs a prediction equation one independent variable at a time by selecting the independent variable which is the best predictor of the dependent variable). This program permits one to then add the other variables step-by-step in order of importance until no other variable will contribute significantly to the prediction equation.[10]

The program was run separately for each of the three classes of libraries and for the entire sample. Each of the 10 variables was dependent in each set. The results were:

1. The variables appear to be redundant in that they reflect different facets of the same measure--total operating expenditure. As a result the correlations among these variables tend to vary together in a consistent pattern.
2. Standard errors for all calculations were uniformly high indicating a great deal of "uncertainty" in the predictions.

The final step in this analysis was to determine whether significant differences exist between the different library size categories. To determine this, twenty-four ratios were computed for each individual library by dividing one variable by another.[11] The ratio categories are given in the appendix. The ratios were then ranked in each category for the entire sample and for the size-of-library sub-samples. An analysis of the ranked scores indicated that the data were not normally distributed. Also the ranges and standard deviations were large for many categories.

Therefore, on the advice of a statistician, it was decided to use the median test. This is an application of chi-square to ordinal data to determine whether a significant difference exists in the scores of two or more samples. The common median for the entire sample is determined. The number of libraries within each class scoring above and below the common median is counted. Then the chi-square statistic is calculated.[12] The chi-square statistic and the

significance level for each ratio category are shown in the appendix.

Of the 28 ratios compared across the three classes, only 12 showed significant differences at the 0.05 level (See Table I). Nine of these 12 significant relationships dealt with some aspect of finance. Although large libraries spend almost $1.00 per capita more than the small libraries and 57¢ more than the medium libraries, there are no significant per capita differences in:

1. volumes added
2. service units
3. amount spent for library materials
4. circulation
5. holdings
6. library staff
7. M.L.S. staff

The logical question is where then does the money go? The answer is salaries. Large libraries on the average spend 62% of their budget for salaries, medium institutions 61% and small libraries 56%. The average annual salary in large libraries is $410 higher than in the medium libraries and $770 higher than in the small sized. Both the fraction of the budget spent for salaries and the amount of the median salary were significant at the 0.05 level.

One might logically hypothesize that the difference in salaries could be attributed to the presence of a higher proportion of professionals (M.L.S. staff) in the larger

ABLE I

Significance Levels for Median Test

| | Total Expenditures | Salaries | Print Material Expenditures | Circulation | Holdings | Volumes Added | Library Staff | Population Served | Service Units |
|---|---|---|---|---|---|---|---|---|---|
| Total Expenditures | | 0.01 | 0.01 | 0.001 | | 0.025 | | | |
| Salaries | | | 0.01 | | | | | | |
| Print Material Expenditures | | | | NS | | | | | |
| Circulation | | | | | | | | | |
| Holdings | 0.025 | | | 0.05 | | | | | |
| Volumes Added | | | NS | NS | NS | | | NS | |
| Library Staff | 0.02 | 0.01 | | 0.01 | NS | NS | | NS | |
| MLS Staff | | | | NS | 0.05 | NS | NS | NS | |
| Population Served | 0.05 | | NS | NS | NS | | | | |
| Service Units | | | | | | | | NS | |

libraries.[13] However, the difference in the number per professionals related to total staff was not significant. How then did the number of M.L.S. staff relate to other variables? In general, small and medium sized libraries had larger collections, added more volumes and circulated more materials per M.L.S. staff member. However, these statistics do not reflect specialized activities performed by professional staff in many libraries. In terms of total staff, only holdings per staff member proved significant--small libraries owned about 3,880 more volumes per employee than the large libraries while medium sized institutions owned 6,480 more than the large.

The relationship of holdings to circulation is significant in that large libraries had the lowest ratio of circulations per volume owned. Interestingly, there were no significant differences between circulation and the number of volumes added or circulation and the amount of money spent for library materials.

Thus, using only the implied assumptions noted above, a statistical comparison of libraries of different sizes based on the data categories used in the U.S.O.E. report suggests that small libraries give a greater return per dollar spent, and that the economy of scale normally expected in larger institutions is not evident. Although this finding appears to contradict current economic theory, it may be a result of limitations in the data categories in the U.S.O.E. report rather than in the fiscal management of

the libraries studied. However, the preliminary results of the Wharton School Report (Morris Hamburg) suggests a similar conclusion by using a completely different statistical concept.

Yet, such a conclusion would not be accepted by the most severe critics of library service, and it is here that the librarians have justifiably fallen back on the demand for qualitative criteria which reflect the intangibles of a reference service or the differences in legal or board articulated functions. The lack of significant differences among so many items could mean, among other possibilities, that libraries (a) have many more discrete developmental items than suspected in the past, or (b) libraries of different sizes or stated functions are much more similar than everyone believed, or (c) there are only a few true determinants of the form and quantity of library service. None of these conclusions is completely acceptable because actual inspection of libraries shows an almost unbelievable range of alternative developmental patterns.

Since this analysis is only a preliminary one using certain preset parameters, one can only say that U.S.O.E. statistics as now collected appear to have a very limited value (a) in making valid comparisons, (b) as a basis for setting standards of development or performance, or (c) to establish historical trend lines. Why they have limited usefulness can only be hypothesized. No one has ever made

a conscientious effort to develop a theoretical or empirically based justification for this set of data. This set of statistics however, does provide clues for formulating a more sophisticated system of statistics; and to this extent, plus the absence of other alternatives of measurement, they are an acceptable first generation tool. This project has the objective of developing a more sophisticated second generation model.

*A more detailed theoretical analysis of the U.S.O.E. statistics will be written as a later part of this study.

[1]Although the Bureau of the Census began collecting library statistics in 1850 the first major publication was issued by the Office of Education in 1876.

[2]See Salverson, C.A., "Relevance of Statistics to Library Evaluation." College and Research Libraries 30:352-361, 1969 for a discussion on this point.

[3]An initial plan to also chart trend data had to be abandoned because U.S.O.E. changed the data base each time a new report was issued.

[4]If the data is entirely wrong, then there is ipso facto no need to collect it.

[5]All calculations were done by computer using SPSS.

[6]Rockwood, Ruth and Charles Rockwood. Quantitative Guides to Public Library Operation. Illinois. University. Graduate School of Library Science. Occasional Paper. 1967.

[7]Complete citation: National Center for Educational Statistics. Statistics of Public Libraries Serving Areas with at Least 25,000 Inhabitants. 1968. Washington, GPO, May 1970.

[8]If possible, at least three libraries were selected from each state, except Hawaii, for each budget class.

[9]Nie, Norman. Dale H. Brent, and C. Hadlai Hull. SPSS: Statistical Package for the Social Sciences. New York, McGraw-Hill, 1970. pp. 209-210.

[10]For a fuller explanation see: Nie, et al, Ibid., pp. 180-181.

[11]Since data on 10 variables were available, there were 55 possible ratio categories. However, 21 of these ratios were meaningless.

[12]For further discussion of the median test see John T. Roscoe, Fundamental Research Statistics for the Behavioral Sciences. New York: Holt, Reinhart & Winston, 1969. pp. 201-202.

[13]It was previously stated that M.L.S. staff per capita was not significantly different among the three groups.

# APPENDIX

## CIRCULATION/VOLUMES ADDED

(For every volume added n books circulate)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (circulations) | 39,977 | 37,060 | 49,970 | 41,100 |
| Standard deviation | 17,853 | 17,720 | 16,700 | 18,900 |
| Range | 121,455 | 121,460 | 80,000 | 80,340 |
| Median | 37,054 | 35,750 | 37,160 | 39,000 |
| Significance level | chi square=2.0 | 2DF Not significant at 0.05. | | |

## HOLDINGS/VOLUMES ADDED

(Ratio of volumes owned to volumes added)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (volumes) | 13.381 | 12.97 | 14.28 | 12.88 |
| Standard deviation | 6.42 | 5.50 | 7.41 | 6.06 |
| Range | 54.00 | 34.00 | 50.50 | 32.26 |
| Median | 12.42 | 12.37 | 13.40 | 11.38 |
| Significance level | chi square=3.1 | 2DF Not significant at 0.05. | | |

## POPULATION/VOLUMES ADDED

(One volume added for every n persons)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (Persons) | 8,057 | 7,460 | 8,090 | 8,430 |
| Standard deviation | 4,680 | 3,930 | 5,660 | 4,220 |
| Range | 37,333 | 26,550 | 35,990 | 22,590 |
| Median | 7,023 | 7,180 | 7,320 | 6,840 |
| Significance level | chi square=2.0 | 2DF Not significant at 0.05. | | |

## POPULATION/SERVICE UNITS

(Average population per service unit)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (persons) | 34,070 | 32,100 | 35,010 | 34,600 |
| Standard deviation | 21,022 | 15,190 | 24,900 | 20,970 |
| Range | 113,545 | 64,730 | 110,000 | 96,550 |
| Median | 27,983 | 28,610 | 26,190 | 28,750 |
| Significance level | chi square=2.5 | 2DF Not significant at 0.05. | | |

## CIRCULATION/PRINT MATERIALS EXPENDITURES

(For every $ spent on print materials n books circulate)

| | Total-180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (circulations) | 11.62 | 8.62 | 8.96 | 15.94 |
| Standard deviation | 35.76 | 2.79 | 3.82 | 56.76 |
| Range | 483.81 | 12.04 | 18.45 | 483.81 |
| Median | 8.39 | 8.22 | 8.34 | 8.88 |
| Significance level | chi square=2.3 | 2DF Not significant. | | |

PRINT MATERIALS EXPENDITURES/VOLUMES ADDED

(Average cost per volume)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (cost) | $4.63 | $4.38 | $4.90 | $4.57 |
| Standard deviation | 1.76 | 1.88 | 1.94 | 1.48 |
| Range | 15.27 | 15.27 | 13.12 | 9.63 |
| Median | $4.43 | $4.33 | $4.77 | $4.36 |
| Significance level | chi square=1.1 | 2DF Not significant. | | |

SALARIES/TOTAL EXPENDITURES

(Fraction of the budget spent on salaries)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (percent) | 59% | 62% | 60% | 57% |
| Standard deviation | 0.08 | 0.07 | 0.08 | 0.08 |
| Range | 0.432 | 0.318 | 0.394 | 0.393 |
| Median | 0.591 | 0.617 | 0.611 | 0.564 |
| Significance level | chi square=9.6 | 2DF Significant at 0.01. | | |

PRINT MATERIAL EXPENDITURES/TOTAL EXPENDITURES

(Fraction of the budget spent on print materials)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (percent) | 18.6% | 16.1% | 18.7% | 20.3% |
| Standard deviation | 0.058 | 0.046 | 0.061 | 0.056 |
| Range | 0.420 | 0.198 | 0.353 | 0.384 |
| Median | 0.178 | 0.154 | 0.172 | 0.197 |
| Significance level | chi square=13.8 | 2DF Significant at 0.01. | | |

PRINT MATERIALS EXPENDITURES/SALARIES

(Ratio of print material expenditures to salaries)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (ratio) | 0.329 | 0.267 | 0.327 | 0.373 |
| Standard deviation | 0.136 | 0.097 | 0.144 | 0.135 |
| Range | 0.966 | 0.406 | 0.875 | 0.744 |
| Median | 0.311 | 0.245 | 0.287 | 0.344 |
| Significance level | chi square=10.9 | 2DF Significant at 0.01. | | |

TOTAL EXPENDITURES/POPULATION

(Expenditures per capita)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (dollars) | $3.96 | $4.33 | $4.50 | $3.25 |
| Standard deviation | 2.11 | 1.78 | 2.76 | 1.35 |
| Range | 15.15 | 7.47 | 14.99 | 5.86 |
| Median | 3.53 | 4.15 | 3.52 | 3.17 |
| Significance level | chi square=7.2 | 2DF Significant at 0.05. | | |

SALARIES/LIBRARY STAFF

(Average salary per staff member)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (dollars) | $4,912 | $5,410 | $5,000 | $4,500 |
| Standard deviation | 1.073 | 1.020 | 0.960 | 1.050 |
| Range | 6.566 | 4,880 | 5.530 | 6.570 |
| Median | 4.845 | 5.340 | 4.930 | 4.570 |
| Significance level | chi square=9.6 | 2DF Significant at 0.01. | | |

PRINT MATERIALS EXPENDITURES/POPULATION

(Print materials expenditures per capita)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (dollars) | $0.71 | $0.65 | $0.81 | $0.65 |
| Standard deviation | 0.40 | 0.23 | 0.55 | 0.30 |
| Range | 3.13 | 1.03 | 3.00 | 1.68 |
| Median | 0.62 | 0.61 | 0.65 | 0.63 |
| Significance level | chi square=1.3 | 2DF Not significant. | | |

CIRCULATION/POPULATION

(Circulation per capita)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (circulations) | 5.91 | 5.59 | 6.35 | 5.75 |
| Standard deviation | 3.10 | 2.66 | 3.33 | 3.18 |
| Range | 16.50 | 12.04 | 15.40 | 16.14 |
| Median | 5.24 | 5.03 | 5.35 | 5.20 |
| Significance level | chi square=4.0 | 2DF Not significant. | | |

HOLDINGS/POPULATION

(Books per capita)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (books) | 1.94 | 1.96 | 2.19 | 1.71 |
| Standard deviation | 1.10 | 0.94 | 1.64 | 0.73 |
| Range | 10.50 | 5.24 | 10.09 | 4.04 |
| Median | 1.76 | 1.74 | 1.93 | 1.67 |
| Significance level | chi square=3.8 | 2DF Not significant. | | |

POPULATION/LIBRARY STAFF

(Population per staff member)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (persons) | 2,642 | 2,390 | 2,390 | 3,030 |
| Standard deviation | 1,410 | 1,090 | 1,120 | 1,720 |
| Range | 8,693 | 4,450 | 6,040 | 8,440 |
| Median | 2,283 | 2,170 | 2,220 | 2,590 |
| Significance level | chi square=0.7 | 2DF Not significant at 0.05. | | |

CIRCULATION/LIBRARY STAFF

(Circulations per staff member)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (circulations) | 12,822 | 11,580 | 12,600 | 13,850 |
| Standard deviation | 4,492 | 4,090 | 3,630 | 5,190 |
| Range | 24,303 | 23,810 | 21,010 | 23,430 |
| Median | 12,298 | 11,140 | 12,160 | 13,410 |
| Significance level | chi square=9.4 | 2DF Significant at 0.01. | | |

HOLDINGS/LIBRARY STAFF

(Holdings per staff member)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (volumes) | 4,226 | 4,030 | 4,300 | 4,290 |
| Standard deviation | 1,359 | 1,210 | 1,480 | 1,350 |
| Range | 10,940 | 5,820 | 10,840 | 6,630 |
| Median | 4,059 | 3,820 | 4,180 | 4,140 |
| Significance level | chi square=4.0 | 2DF Not significant at 0.05. | | |

VOLUMES ADDED/LIBRARY STAFF

(Volumes added per staff member)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (volumes) | 349 | 330 | 340 | 400 |
| Standard deviation | 123 | 120 | 130 | 120 |
| Range | 755 | 630 | 670 | 580 |
| Median | 333 | 320 | 330 | 370 |
| Significance level | chi square=3.1 | 2DF Not significant at 0.05. | | |

LIBRARY STAFF/MLS STAFF

(Number of staff members per professional)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (persons) | 8.10 | 7.70 | 8.10 | 8.38 |
| Standard deviation | 8.06 | 10.26 | 6.17 | 7.91 |
| Range | 70.50 | 68.38 | 34.00 | 39.00 |
| Median | 5.99 | 5.30 | 6.38 | 6.47 |
| Significance level | chi square=4.2 | 2DF Not significant at 0.05. | | |

POPULATION/MLS STAFF

(Population per MLS staff member)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (persons) | 22,310 | 19,440 | 19,460 | 26,700 |
| Standard deviation | 26,968 | 27,950 | 19,570 | 31,230 |
| Range | 148,000 | 142,310 | 111,000 | 148,000 |
| Median | 13,266 | 11,810 | 13,720 | 16,080 |
| Significance level | chi square=2.9 | 2DF Not significant at 0.05. | | |

CIRCULATION/MLS STAFF

(Circulations per MLS staff member)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (circulations) | 101,189 | 89,420 | 100,090 | 110,090 |
| Standard deviation | 99,185 | 112,580 | 78,880 | 105,530 |
| Range | 668,000 | 651,550 | 360,000 | 464,000 |
| Median | 69,690 | 53,520 | 70,240 | 76,080 |
| Significance level | chi square=2.9 | 2DF Not significant | | |

HOLDINGS/MLS STAFF

(Holdings per MLS staff member)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (volumes) | 33,961 | 29,590 | 33,880 | 37,000 |
| Standard deviation | 31,407 | 31,250 | 25,610 | 35,800 |
| Range | 187,000 | 179,760 | 140,000 | 166,000 |
| Median | 24,047 | 20,810 | 27,290 | 24,690 |
| Significance level | chi square=7.0 | 2DF Significant at 0.05. | | |

VOLUMES ADDED/MLS STAFF

(Volumes added per MLS staff member)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (volumes) | 2,747 | 2,330 | 2,830 | 2,960 |
| Standard deviation | 2,676 | 2,550 | 2,620 | 2,810 |
| Range | 16,600 | 16,600 | 12,000 | 10,000 |
| Median | 2,010 | 1,670 | 2,190 | 2,190 |
| Significance level | chi square=3.9 | 2DF Not significant at 0.05. | | |

CIRCULATION/HOLDINGS

(Circulations per volume owned)

| | Total=180 | Large=48 | Medium=61 | Small=71 |
|---|---|---|---|---|
| Mean (circulations) | 3,189 | 3,020 | 3,080 | 3,390 |
| Standard deviation | 1,149 | 1,130 | 910 | 1,320 |
| Range | 6,927 | 5,380 | 4,510 | 6,930 |
| Median | 3,062 | 2,930 | 3,010 | 3,240 |
| Significance level | chi square=6.9 | 2DF Significant at 0.05. | | |