# COST, VALUE AND EFFECTIVENESS OF
# LIBRARY AND INFORMATION SERVICE

by

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## C O N T E N T S

# INTRODUCTION

Several things conspired to encourage me to attempt this thesis:

- My job as a library manager during an economic recession forced me to take an interest in the costing and valuation of library services. I attended courses, seminars and workshops on the subject; but although I learned a great deal I found that I could not progress beyond a certain point. The work done in the area seemed a confused jumble of theoretical ideas from librarians and information scientists, contributions from economists which seemed to illuminate parts of the area, and the occasional intrusion of very down to earth but apparently effective ideas from practising librarians. I needed a bird's eye view of evaluation to understand it.

- The realisation that the business of cost, value and effectiveness is becoming a theoretical sub-discipline of library and information studies, and will be treated as such by educators and practitioners unless it can be seen as part of the very practical business of resource management.

- A point made by Oldman (1976) about there being two approaches to the management of library resources : listening to the users and trying to fulfil their needs, and investing the resources available in a responsible manner. What is needed is an amalgam of the two approaches, she maintains.

- A question from a student : "How can the library user influence the effectiveness of library services?"

In the first chapter I have tried to describe the various influences that have led to our present confused ideas on cost, value and effectiveness of library and information service. The purpose of this chapter is to display different sorts of contribution so that the theoretical framework presented in chapter two can be seen as useful and necessary. The framework is based on Orr's 1974 model, but goes far beyond it in the detailed interpretation of value and quality in terms of final output. In particular, quality of service is related to final output, not to satisfied demand, as in Orr's model. In chapters three to six I have discussed the available techniques for resource management in relation to the managers need for help with decisions associated with allocation, justification, quality control and choice between alternative ways of giving a service. I have returned constantly to the question of how the user can be involved in the planning and evaluation of services. In the final chapters I have reported two evaluations which I carried out myself to apply some of the techniques described in chapters three to six, with a view to explaining what advises choice between methods and to investigate the problems of use of method.

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CHAPTER    1

Approaches to cost, value and effectiveness

The web of ideas and methods to do with cost, value and effectiveness of library and information services is a complex one, but it is possible to tease out some of the threads that go to make up the rather confused pattern we have today.   When this is done three things become evident : different librarians from different types of library have focussed on topics which have become for them the universe of resource management, there has been little interaction between the ideas of participants from different areas of librarianship, and a large contribution in terms of understanding has been made by people whose main interest is not in librarianship at all.

A great deal of work has been done in the area of cost, value and effectiveness by librarians themselves.  However, librarians in public, academic and industrial libraries have made quite different contributions.  This could be because of the different emphasis their work gives to the different aspects of library provision.

Academic libraries are above all seen to be necessary - students cannot work without texts and researchers need the support of what others have done in their subject.  However, the idea that an academic library should contain everything that its clients might need is no longer tenable, and this means that it has to allocate a great deal of time and money to borrowing needed material from outside. For many students an academic library is primarily a place to work - with their own books and papers even, and this leads to allocation

problems of cash and space. Perhaps the greatest need of the academic library is a system of stock control which enables adequate availability of course books. University librarians have attempted with much success to analyse the factors involved - duplication of standard texts, loan period, weeding and so on.

Public libraries now have to compete with other social services for the limited funds available. The situation comes at a time when the social responsibilities of public libraries are becoming clear again ("to satisfy the universal need to know" Churchman 1972). Their problem is how to keep funding at a reasonable level compared with other social services like health, education, refuse collection. However, I suspect that justification of funding is not the only reason for public librarians' interest in performance measures. They need some tangible proof of output to build up their own confidence as well. What is unfortunate is that they and others see performance in terms of comparative costs of library operations, and in terms of measures like number of loans. These measurements tell us nothing about the quality of library services, however.

Industrial libraries arose in the first place out of the need to control the volume of published material to which their clients needed regular access. Basically their problem is to show how much more useful they can be. For instance, they try to integrate themselves into the information-handling systems of their company, as well as performing the role of document access centres. Industrial libraries have large input

costs but no obviously valuable output, when compared with the production or sales departments of their company. In this they resemble basic research. Since 1970 both departments of industrial companies have been chosen for cut-backs or extinction. A consequence is that industrial librarians have become involved with attempts to show the value of what they do. Another problem for industrial libraries is the availability from outside of current awareness and search services which can be used directly by their clients. This has meant that they have had to become interested in the cost and relative effectiveness of alternative approaches to services.

Of course it is not only librarians who have contributed to the present state of the art in the area of cost, value and effectiveness. Operations researchers, for instance, and economists have used libraries as examples for the application of their disciplines. These people have also worked in libraries by invitation on some aspects of library management. Several <u>external</u> factors can be seen to have affected the progress of knowledge and practice in the area as well. Management techniques introduced into government have been adopted - programme budgeting, management by objectives, organisation and methods, the systems approach to planning and control , for instance.

Below I have written in some detail about these contributions, and about some others that I feel are relevant, in order to be able to explain a coherent framework which relates ideas about value and quality of service to library management.

## 1. Scientific Management

The scientific management movement has been responsible for popularising the use of two techniques in libraries which, under the name of "administrative effectiveness", have survived into the eighties. Systems design or analysis involves the examination of what is done or needs to be done, so that it can be seen as a series of steps - sometimes

by operations researchers as a preliminary to mathematical modelling, but mainly by Organisation and Methods practitioners. Listing the tasks involved and constructing a process flow chart is a system design technique appropriate to routine operations. A more complex system can be described by means of a decision flow chart, and the best order of operations and their timing can be worked out in this way. Systems analysis also concerns itself with the information flow associated with a complex operation, and often involves the design of forms or computerised records which capture and transfer the required data around a working system. Essential to the idea of systems design is the ability to see a process or function as part of a larger system which extends beyond the place and time in which the process occurs.

The second technique, called variously analytical costing, cost accounting, or management accounting, consists of calculating the costs of products, procedures and services in terms of the labour and material costs which appear on the annual statement of expenditure.

The efficient consumption of resources is a common application of these techniques. Jobs which are performed frequently, or that are very costly, or that show problems like bottlenecks, or the frequent movement of materials or people, often yield to systems analysis and costing. Table 1 shows a list of problems arising in a university library, and how systems analysis was used to investigate them. Systems analysts get their results by eliminating, shortening, combining or redesigning work that is being done in a manner wasteful of time or money.

Computerisation of manually-performed operations calls for

Table 1.   Examples of systems work in a university library (Burkhalter 1968)

| Problem, and functions investigated | Techniques used |
|---|---|
| 1. Best loan period<br><br>Number and cost of renewals, effect of successive renewal notices vs.their cost.<br><br>How long do patrons retain a book on loan after finishing it? | Work timing<br>Work costing<br>Questionnaire<br>Consult loan records |
| 2. To standardise on a loan procedure for divisional libraries to make vacation replacements easier.<br><br>Complexity and timing of operations involved | Work timing |
| 3. Best procedure for a stock-taking .<br><br>What needs to be done?  In what order should procedures be carried out?  What information needs to be passed from procedure to procedure?  Estimation of how many items will fall into various problem categories.  Estimation of length of stocktaking. | List of flow-chart procedures<br>Form design<br>Sample stock-take, with timing of procedures and a count of items. |
| 4. Reduce time and cost of book reshelving.<br><br>Procedure for returned books.  Procedure for books used in library.<br>Reasons for delay | Give responsibility and authority to same department.<br>Redesign book-sorting area.<br>Write job descriptions<br>Lengthen.work shifts. |

5

Table 1 continued.

| Problem, and functions investigated | Techniques used |
|---|---|
| 5.  Best system for return of books from outside<br><br>    Cost of present system - walking time, trucking, etc.<br>    Convenience to patrons vs. cost to library<br>    Test new system with boxes before installing conveyors. | Timing<br>Costing<br>Work flow in building<br>Opportunity cost of equipment |
| 6.  Should book relabelling be centralised?<br><br>    Work involved, cost of relabelling, quality of relabelling, cost of labels. | Timing<br>Costing<br>Sampling |
| 7.  Reduce waiting time at library check-out<br><br>    Functions of checkout.  Proportion of leavers using each function.  Average time to checkout one person. | Sampling |
| 8.  Should closed stack be introduced in periodical reading room to reduce cost of replacing missing items?<br><br>    Cost of replacements, including ordering and reprocessing.  Cost of operating closed stack. | Flow-charting<br>Timing and costing |
| 9.  Streamline accounting system for photoduplication<br><br>    What records are made?  By whom? | Flow-chart<br>Form design |

systems analysis because of the need to see what is being done as part
of the whole library system, so that computerisation of part of this
system does not lead to extra work elsewhere.

A major use of analytical costing is to compare alternative
methods for performing a library operation in terms of the labour
and materials costs involved - some of the examples in Table 1 are of
this type. However, costs of library operations have also been made
between different libraries and Smith and Schofield (1971) proposed a
standard costing technique for this purpose. Figure 1 shows the costs
of obtaining, cataloguing and processing books in eleven of the
Washington public libraries for 1969. Such comparisons appear to be
popular with librarians, because they represent the only way in which
most librarians can obtain information on the effectiveness of their
libraries. However, it has been realised how uncertain such comparisons
can be. Whereas a library whose costs per loan or cost per purchase
is excessive must see this as an opportunity to improve efficiency, it
is not useful to compare cataloguing or enquiry service costs in this
way without some indication of the quality of the output to explain
the cost figure.

Interest in comparing costs between libraries has recently
resulted in a pilot comparison by Interfirm Comparisons Ltd., of
twenty-six library authorities in the United Kingdom. Costs of library
functions or services per unit of output, and also the percentage
allocation of staff costs across library activities were compared. The
pilot test was sponsored by the British Library, and there are plans to
design and test comparisons for university libraries. Interfirm com-
arison has been used, over the years, first of all in manufacturing

## Figure 1.   (Reynolds et al.   1971)

COST ESTIMATES OF TECHNICAL SERVICES ACTIVITIES IN WASHINGTON PUBLIC LIBRARIES, 1969

| Library | Titles Acquired | Volumes Acquired | Acquisi- tion Costs | Catalog- ing Costs | Process- ing Costs | Acquisi- tion Costs Per Title | Catalog- ing Costs Per Title | Process- ing Costs Per Volume |
|---|---|---|---|---|---|---|---|---|
| 1 | 179 | 198 | $ 313 | $ 1,223 | $ 428 | $1.746 | $6.832 | $2.162 |
| 2 | 394 | 394 | 148 | 531 | 388 | 0.375 | 1.348 | 0.985 |
| 3 | 3,000 | 3,144 | 1,536 | ₹ 510 | 2,607 | 0.512 | 1.170 | 0.829 |
| 4 | 3,676 | 6,769 | 4,800 | 7,490 | 3,233 | 1.306 | 2.038 | 0.478 |
| 5 | 3,918 | 5,82. | 3,041 | 4,013 | 1,956 | 0.776 | 1.024 | 0.336 |
| 6 | 4,207 | 13,491 | 2,174 | 7,567 | 10,051 | 0.512 | 1.799 | 0.745 |
| 7 | 5,100 | 5,400 | 2,022 | 6,534 | 3,019 | 0.396 | 1.281 | 0.559 |
| 8 | 5,652 | 11,413 | 2,688 | 7,809 | 6,966 | 0.476 | 1.382 | 0.610 |
| 9 | 6,009 | 21,134 | 19,526 | 16,984 | 13,769 | 3.249 | 2.826 | 0.652 |
| 10 | 6,200 | 7,219 | 5,480 | 15,971 | 5,920 | 0.884 | 2.576 | 0.820 |
| 11 | 11,305 | 77,100 | 48,147 | 57,961 | 25,703 | 4.259 | 5.127 | 0.333 |
| Average | 4,513 | 13,826 | $ 8,170 | $11,781 | $ 6,731 | $1.810 | $2.611 | $0.487 |
| Median | 4,207 | 6,769 | $ 2,688 | $ 7,490 | $ 3,233 | $0.884 | $2.038 | $0.745 |

Source:   Table 3.2 in Reynolds et al. (1971).

8

industry, then applied to service industries and charitable trusts.
The basis of the analysis is to provide indicators of efficient
conversion of inputs into products or services and to show patterns
of allocation.  A strength of the method is that the same things are
costed for different libraries, using the same costing technique.
Whenever such comparisons are made, they can be justified because
some rogue results are thrown up, which, in the explanation, do some
good.  However, the continuing value of the tests to the participants
can be shown only by their willingness to pay for them!

To know that one is spending funds on the same sort of
things as similar enterprises, and to know that the money is being spent
in an efficient manner is important to any organisation. However,
a service industry like libraries should be looking at the quality
of its outputs as well as their efficient production.  The first issue
for libraries is their effectiveness in the marketplace, now that
people have so many alternative sources for the things they supply.

An obvious use for analytical costing is to obtain standard
costs for operations, which can then be used to estimate the cost of,
or labour needed for, procedures which are newly introduced into a
library system.  Attempts to do this have thrown up a number of quite
difficult problems (Vickery 1972).  Take for instance, the statement
that "an average abstract costs £1.25." (A unit cost of this sort has
a component which varies with the volume of work done, and another
component which is independent of the output volume.  The statement
also begs the following questions:  What work is included in the cost?
How were the productive hours of the abstractor calculated and what
was the salary?  What overheads were included?

These difficulties have prompted those involved in costing to use standard times instead of costs, and to attempt to analyse work into elements or tasks to which standard times could be assigned. A formula to give the standard time for a task ("sort" for instance) would involve variable factors relating to the kind of material sorted, (cards, books),the desired order (alphabetical, chronological), and the number of items. Aslib has reported work in this area (Wilkin 1972, Robertson 1970). Nevertheless reports of standard times are available from various sources. Revill has tabulated some of these, and has discussed the problem of confidence in these potentially very useful units. Revill (1977) ignores the Aslib work in his review, and also data on standard times presented as early as 1963 by Hanson and Slater. This is a good example of the lack of interaction mentioned above.

## 2. Performance measures

Measures abound in the library literature. It would be convenient for purposes of discussion to be able to categorise measures (into measures of performance, effectiveness and value, say). However, this systematisation would not reflect the true state of affairs, since it ignores the fact that measures are also created out of air, apparently just to satisfy a need for some numerical quantity to present to the funder or the world, or to supply a convenient variable in an equation. One suspects that many measures are used because they are easy to collect. For example: number of registered borrowers, number of books on loan, number of photocopies requested. It would be wrong to suggest that library measures are the result of careful analysis of different aspects of library services, or that librarians agree as to what purposes are served by what measures.

Table 2 shows 37 measures, with an indication of whether they were used ·in, or proposed for, an academic, public or industrial library. Some sorts of measure have been applied to all three types of library - for example use of the service, satisfied requests, or response time. What is surprising is the small number of measures shared between libraries - as if librarians worked in soundproof boxes.

a)  Measures of use.

Librarians are concerned with the effectiveness of their services although many have no idea what effectiveness is (Bird,1981), and part of the·popularity of measures of use and satisfied use must be due to librarians' instinctive reduction of the human element in the system to a simple measurable quantity. One problem here is that to accept use as a measure of effectiveness assumes that the client agrees with the librarian's values and hence with his system. Use of a library may be high, but may consist of successive batches of people who are users for as long as it takes them to become discouraged enough with the bad service. Use cannot be used alone as a measure of value, since a transaction may have given no benefit to the client - quite the opposite perhaps.

However, measurements of use have been put to good use by librarians. The number of times a document is borrowed can be related to acquisitions and weeding policy (Kent 1979). The number of documents loaned can be used to predict average traffic in the·future (Morse 1968, 1972). A record of the use of specific reference materials can advise the decision whether to acquire new editions (Weech, 1974, Blick 1977).

Table 2  Library performance measures                                12

| Measure | Public | Acad. | Industrial |
|---|:---:|:---:|:---:|
| Numbers using service | x | x | x |
| Satisfied requests | x | x | x |
| Time spent in library or using service √ | x | x | x |
| Response time of service | x | x | x |
| Number of books or periodicals used | x | x | x |
| Awareness of services provided by library | x | x | x |
| Number of registered users | x | x | |
| Use of study accommodation | x | x | |
| Visits made to the library | x | x | |
| Availability of books etc. | x | x | |
| Awareness that library is there | x | x | |
| Number of telephoned enquiries | x | | x |
| Number of items supplied which were new to client | | x | x |
| What the client would pay for the service | | x | x |
| Unit times for processing | | x | x |
| Up-to-dateness of books | x | | |
| Proportion of potential users served | x | | |
| Use of library equipment | x | | |
| Reliance on interlibrary loan | | x | |
| Clients' expectation of finding required item | | x | |
| Ability to answer pre-researched enquiries | | x | |
| Ability to check citations for accuracy | | x | |
| Time saved the client | | | x |
| Recovery of costs from client to show value | | | x |
| Cost of client DIY vs. cost to library | | | x |
| Cost of a similar service from elsewhere vs lib.cost | | | x |
| Advantage gained by client by use of service | | | x |
| Example of the cost to client of lack of information | | | x |
| Items missed by current awareness service | | | x |
| Proportion of documents provided that led to action | | | x |
| Evidence of increased reliance on library by client | | | x |
| Frustration of client because of library system | | | x |
| Growth in number of frequent users | | | x |
| Number of users who return after first use | | | x |
| Report from client on use made of item supplied | | | x |
| Evidence of duplication of client's work | | | x |
| Extra salary required if no service available to client | | | x |

b) Satisfied demand

(Proof of a high degree of satisfaction of user demands might
be a good measure of a library)if we accept that demand itself may
be depressed for reasons unconnected with the goodness of a library -
failure to produce a specific document on a previous visit of the
client, distance a client has to travel to the library, a client's
wrong impression of what it can provide. Maizell (1960) suggested a
performance index of percentage requests filled, and wondered whether
a more useful measure might not be percentage filled within twenty-
four hours. Maizell's suggestion was in the context of industrial
research. For undergraduates using a university library, Urquhart (1967)
suggests that of items not held by their library, 80% should be made
available within one week. Buckland's (1975) measure of satisfied
demand is "satisfaction level" - the proportion of demands that can be
satisfied immediately because the book is on the shelf.

Number of questions satisfactorily answered is commonly
advocated as a measure of reference (enquiry) service (Weech 1974).
However, librarians' estimates of clients' satisfaction are found to
be about thirty percent higher than those of clients as evidenced in
many tests by an independent enquirer, using questions to which answers
are known (Childers 1972). Stradling is of the opinion that clients
are not critical enough of library service, but even so this would
hardly account for such a large discrepancy. Perhaps clients' satis-
faction involves more than a "correct" answer to their enquiry?

Wills and Oldman (1977) propose a measure of library service
related to satisfied demand which they call derived value:

$$DV = 1 - \frac{\text{expectations - perceived actualisation}}{\text{expectations}}$$

If DV is unity, then the library has a service which is satisfying its clients. Students were asked to keep a diary of their library use during one week. They recorded the intention of each visit, and later whether their intention was realised. To help interpretation of the student's yes/no answers, a space was provided for comments on the result of the library visit. Examples of intentions recorded were to obtain an article or book, to browse, to study textbooks, to obtain material on a reading list, to make an "unstructured search" in connection with a PhD topic.

c)  Availability ·

Availability as described here is a measure of the ability of a library to provide material which it has in its shelf list or catalogue. For example, a measure proposed by De Prospo (1973) is the "availability of books owned probability". From time to time a sample of 200 books is taken from the shelf-list, and the number available on the shelves is counted. A more useful measure of availability is Kaske's "collection status", because it involves a failure analysis in addition to a simple count. A sample from the shelf-list is taken, and a search made to find the proportion which are correctly shelved, awaiting shelving, on loan, mis-shelved or missing (Kaske 1973). The non-availability of items at the time they are wanted by readers can be investigated (Schofield 1975) by asking people leaving the library about failure to find what they wanted. The interviewer notes the details, then later checks them against the catalogue and shelf list if the client's requirement was for a specific item.

Buckland defines a measure of availability, which he calls "collection bias", associated with the popular books being absent from the shelves. Since purposeful browsing is a common approach in libraries, collection bias is a good measure of a library's disservice to users. Buckland, a university librarian, sees document availability as "clearly central to library provision". His idea is to optimise availability of the library collection by adjusting the relative proportion of library resources applied to acquisition of duplicate copies, discarding, binding, and a short loan period for the more popular books. His measure of availability is the ratio of requests satisfied at once from stock to the total number of requests. (Buckland 1975). If we take availability to mean the ability to supply documents that the clients demand (not just documents that are on the library's shelf-list), and if it is measured on the basis of these demands, then the library may be judged better than it is. This is because of the way a library's stock tends to condition the demands made upon it. (This sort of availability is about the goodness of coverage of library stock, not about the effectiveness of the arrangements to ensure its accessibility, however).

d) Time it takes to provide a requested service

Response time is a convenient currency for library performance measures. It can be used in connection with material in stock, or items which have to be obtained from elsewhere for a client. It is used in connection with the provision of materials, or references or facts. Maizell's measure of the percentage of enquiries filled on the same day comes into this category. Response time is used in evaluation of reference retrieval systems - to compare manual and machine systems for instance, or to compare one computerised system with another (serial versus

inverted file search, for instance). The average time necessary to receive a service is used by Rouse (1975) as a performance measure in a resource allocation model. (His paper points up nicely the main objection to such models : that an equation which enables one to calculate what resources to apply to, say, reference service can only work in terms of quantity of service - unless we understand, and can express in numerical terms, the connection between cost and quality of service).

A well-known measure of a library's capability for providing documents on demand is Orr's Document Delivery Test (Orr 1968b). Orr's original tests involved estimating the time taken to find items on lists prepared from material cited by medical researchers in their recent articles. Material found on the shelves was coded category 1 ( 10 mins) and that awaiting shelving category 2 ( 2 hrs). Other categories were 1 day, 1 week, 1 week. The time to obtain a document from outside the library was estimated as the average of the last fifty loans from another library.

$$\text{Capability index} = \frac{5 - \text{speed category}}{4} \times 100$$

This means that if the item is on the shelf, Capability Index is 100.

Penner (1972), Piternick (1972) and Wilson (1973) describe applications of the DDT. The attraction of Orr's test no doubt lies in its simplicity of application. Also, as can be seen from the data sheet used for a DDT (Fig.2) a certain amount of failure analysis is done in putting the test to work. On the other hand, the usefulness of the DDT as a control agent is diminished by categorisation - for instance, the goodness of finding aids is not tested.

e) Proportion of potential users served

The percentage of the population served by a public library is proposed as a measure by Bow (1971). White (1977) describes this as "a measure which sets public libraries apart from other types of libraries".

Figure 2.  Score sheet used in document delivery test (Pizer 1968)

DOCUMENT DELIVERY DATA SHEET

/

Author(s) or Editor(s) (Books only)                    Journal or book title

/                    /

Volume                Pages                    Date

Institutional source                          Sample number          Case number
of citation:

1.                                        (CIRCLE ONE)
   In medical library's               No 1                              Yes 2
   collection?                          ↓
                                       STOP

2.                                        (CIRCLE ONE)
   On immediate premises?            No 1   (SPECIFY)                    Yes 2
   Storage site _____          (E. D. T. _____ )
                                       ↓
                                       STOP

3.                                        (CIRCLE ONE)
   On shelves?                        No 1                              Yes 2
                                                                         ↓
                                                                        STOP

4.                                        (CIRCLE ONE)
   Off-shelf status              E. D. T.              Circulation 4      Can't locate in
     Bindery              1    ( _____ )                             1st search X
     In process           2    (available?  Y  N)
     In storage           3    ( _____ )
     Special location     5    (mediated?  Y  N____ )
     To be shelved        6
     Recorded as missing  7
     Other known status   8    ( _____ )

     (SPECIFY _____ )
                          ↓
                        STOP

5.                              (CIRCLE ONE)        | 6.    (CIRCLE ONE)
   Circulation status           Loan period         |    Result of second search
     Reserve            1        ( ____ )           |      On shelf          1
     Inter-library loan 2                           |      Can't locate      2
     Faculty            3   (Recall?  Y  N) ( ____ )|      Other             3
     Students           4   (Recall?  Y  N) [ ____ ]|
     Other              5   (Recall?  Y  N) [ ____ ]|      (SPECIFY) _____
                                                    |
     (SPECIFY) _____                           |      _____
                    ↓                               |                    ↓
                  STOP                              |                  STOP

COMMENTS:  (e.g. location tool problems)

10-66

This is nonsense, of course, because academic libraries have shown
interest in the relative proportion of student use from different
departments. It is also one of the major sources of concern for
industrial librarians who find themselves working in a situation
where the actual use is small but the potential is quite large - the
head office of a private company, for instance. If a high proportion
of potential users can be shown to be active clients of the library,
this may say something about the value of the library to a funder. The
measure is also useful in that a librarian might be persuaded to seek
reasons why only a proportion of potential clients use the service..The
proportion of potential users that a library serves is regarded by
Totterdell (1976) as an aspect of its effectiveness - in the sense that,
having decided what business he is in, the librarian ought to reach as
many people who can profit from his services as possible. Blagden (1980)
has described penetration studies for the library + information services
at the British Institute of Management, and the GLC, and has shown that
measuring penetration is not simply a question of comparing numbers of
actual users with numbers of potential users.

f) Portmanteau measures

Bow (1971) has suggested a measure of performance into which
is packed various ratios as follows:   registered borrowers/population,
librarian/registered borrowers, all use/registered borrowers, volumes/
population. He advocated using the product of all these ratios for
comparison purposes. Evans (1972) proposed a total performance measure
based on measures of various aspects of the library system like access-
ibility, cost, user satisfaction, response time and use. Measures of
the various criteria would be aggregated, but they would be weighted in
proportion to their importance in a particular library.

One could sum up by arguing that although librarians feel that they need to measure performance, there is no generally accepted view of the purposes to be served by measurement, and hence no clear indication of what measures would be desirable. It is not sufficient to say that all libraries are different, or that libraries are of different types, and so need different approaches to measurement. A study of Table 2 will show this to be true only in minor particulars - people do not need room to study in industrial libraries, public libraries do not generally have a captive audience for their information services, for instance. Most of the measures in the table are relevant to any sort of library. Librarians may be unable to see this in the absence of a reasoned basis for library evaluation however.

A performance measure used on its own tells only part of the story. For instance, "availability" simply judges a library on the ability to deliver known documents from stock. A library could score well on availability, but could be failing to satisfy the needs of its clients because its coverage of their interests was inadequate. What is missing from "performance measurement" is a theoretical framework which includes measures of performance and which at the same time makes clear their purpose and how they are related to specific library services and to each other.

## 3. Evaluation of information retrieval systems

When in the nineteen fifties and sixties industrial librarians, were faced with the control of articles in learned journals and of reports on specialised topics they developed more flexible indexing systems that were capable of greater specificity and of keeping up with rapidly changing terminology. Later the question was asked: how do these systems compare with classification and conventional subject indexing? Several evaluation projects were carried out. Cleverdon (1962, 1966) for instance, compared first of all indexing systems and later features of indexing systems, using the criteria proposed by Kent (1955) - recall and precision ratios.

In the nineteen sixties, when computerised abstracting and indexing services became available, evaluations of these were carried out, and this sort of testing is still being done. Basic to these evaluations was the ability of the system to produce references to documents which were relevant to the test enquiries, and the evaluators had a problem with recall ratio, which can be measured only when it is possible to examine all documents in the system for their relevance to each test question. With abstracting and indexing services this could be a very long task. Nevertheless investigators managed to include this systems measure, by making some sort of approximation to it.

However, the evaluations of working abstracting and indexing services were different in another way to the *in vitro* experiments exemplified by Cranfield I and Cranfield II. The aims of an evaluation were broader, and hence methods other than the conventional systems measures were used. For instance the evaluation of the computerised Index Medicus data base (Lancaster 1969) was intended to see how the system provided for user requirements in response time, ease of use and coverage, as well as recall and precision. Kiewitt's evaluation of search techniques for the computerised ERIC database was partly to compare the cost and effect of making searches using descriptors from the ERIC thesaurus with "natural language" searching of the abstracts. She also needed to determine a pricing structure which would ensure self-sufficiency for the service (Kiewitt 1979). Users' degree of satisfaction with the service was probed with questions about the suitability of the response time, and the usefulness or value of the output to their work. Had they seen any of the material before?

Kiewitt also asked for an estimate of how much clients were willing

to pay for the alternatives of descriptor and abstract search, to

compare with her operating costs.

Lancaster's 1969 evaluation was ahead of its time in

several ways - one of which was the inclusion of a failure analysis.

Lancaster had arranged for searches on the database to be matched with

searches through NLM's library stock to provide an estimate of all

relevant documents, for use as a denominator in the recall ratio.

Where the computerised search failed to find documents which were never-

theless on the tapes, he inspected the document, its indexing and the

search strategy to find the reason for failure.  In this way useful

information about the approach adopted to indexing the database, about

suitable search strategies, and about coverage was obtained.  Lancaster

suggested this information could be used for quality control (his very

words) of the database.

Failure analysis has been used since, notably by industrial

users of data bases who were concerned to know how the results of com-

puterised searching differed from those of manual searching.   By

failure analysis Ashmole et al (1977) were able to see clearly the

place of computerised searching in scanning the current pharmaceutical

literature for new material of use, and Johnstone (1978) was able to

produce a checklist to help a searcher decide on whether to make a

search in the computerised or in the printed abstracting and indexing

service.   This was devised in terms of information about the structure

of the data base and about the type of search required.

Another method of evaluation is to obtain the opinions of

clients who have used a system.  On the face of it this could produce

mountains of subjective information which reflects user ignorance
of the system or bigotry. This happens but, in among the weeds,
some very fragrant flowers can appear. Kiewitt asked her users to
name the good features of a search through the ERIC database and
what problems they experienced, and was able to see how important
were response time and an adequate description of the retrieved docu-
ment. As part of the Bath University Comparative Catalogue Study,
the reactions of clients and staff to various forms and orders of
catalogue were collected (Needham 1974). Reading through the comments
on the classified catalogue it is possible to see just what character-
istics turn people off: it is often too complicated for them to
master just for the occasional search, searching is laborious, the
arrangement of subjects is often alien to their way of seeing the sub-
ject, there is no way of telling when a search is over. Similarly
comments on the title catalogue indicate what material should be put
in it, and comments on a KWOC listing show how it could be adapted to
provide a substitute for subject index and classified catalogue - as
far as the clients' needs are concerned, anyway.

Thus it is interesting to see how evaluation has become
user-orientated in order that qualitative information about services
may be obtained to supplement the systems measures supplied by the
conventional approach. In the library and information literature there
lie many user  evaluations of different aspects of library service,
waiting to be made useful in management and planning.

4. Operations research

A proportion of the systems studies made in libraries has

been by people capable of and interested in applying mathematical techniques. When these are librarians as well, and when they have taken the trouble to write up their work in a manner intelligible to the average librarian, the result is a useful contribution to librarianship. Buckland (1975) and Chen (1976) have provided examples. Buckland's book is about stock control (acquisition, weeding, binding, the loan period and duplication) and he makes us see how policies for these things interact. Chen picks up the operations research work of Morse (1968, 1972) and tries to make it helpful by discussing it in the context of the problems of the book budget, duplication and weeding.

Operations research (OR) goes further than systems analysis in that in most applications a mathematical model is built, which represents the system under study. This means that the OR man must be able to recognise the important factors which are moving the problem system. An example of this is a wartime problem which an OR team was asked to tackle. German submarines on their way from the Biscay ports to the British Atlantic convoys were being attacked with explosive depth charges dropped from aircraft. Unfortunately for the British, the rate of submarine destruction was only one or two per week. The OR team's task was to improve this rate, without calling for any new equipment. They naturally assumed that the critical factors were connected with height and speed of the aircraft, or the relative positions of aircraft and submarine as it was sighted on the surface on the way to the battle zone. Pilots logs from successful and unsuccessful operations were compared for this sort of information. Then someone asked, where was the submarine when the depth charge went off? This proved

to be the turning point in the operation, since it was shown that
when the depth charge exploded at 100 feet, the submarine had seldom
managed even to submerge.    The detonators were reset for thirty feet,
with great improvement to the results.

What makes OR such interesting work is that an experienced
investigator can recognise in a complex problem a familiar structure
of cause and effect.    For instance, in a queueing situation people or
things arrive in sequence to receive a service or to be processed.
The time they have to wait and the resources put into dealing with
them have to be minimised.  Another common type of situation is the
inventory problem, when the supply of and demand for something are
not well matched, with resulting wastage.   In an allocation problem,
limited resources must be divided among a number of tasks.  Often the
tasks depend on each other in some way, and this complicates the prob-
lem.    Other problems which have become very familiar to OR specialists
are those involving putting tasks into a sequence, the problems assoc-
iated with searching - getting right the balance of time spent and area
covered, and replacement versus maintenance problems.

In all such situations there are factors which are under
the control of the manager of the system, and factors natural to the
environment which affect the system but which he does not control.   One
approach the OR man can take is to connect these factors - he calls
them variables - in the form of mathematical equations which show their
logical interdependence.   When this is done, two important advantages
are obtained.   The manager can use the model to answer a specific
question, or he can experiment with the system through the model, with-
out any of the inconvenience or loss associated with the same exper-
ment in real life.

For example, at the library loan counter a number of users can accumulate, waiting for service. A balance has to be sought between the number of assistants to be kept at the counter, and the inconvenience to clients of having to wait around for service. This can easily be recognised as a queueing situation. Operations research practitioners have developed equations to deal with queueing problems, because this sort of problem is fairly common. The basic equation of queueing theory is:

$$WT = \frac{AR}{SR \times (SR - AR)}$$

connecting expected waiting time, arrival time, and the available service rate. Other variables involved are the average queue length :

$$L = \frac{(AR)^2}{SR \times (SR - AR)}$$

and the probability that a client will get served right away - that expected waiting time will be zero:

$$P_o = 1 - \frac{AR}{SR}$$

The equations describe how the variables are related when there is one service point. Another set of three equations describe the system with two service points. By solving the equations for $P_o$ we can discover the effect of another assistant on the chance that a user will be served straight away.

The cause and effect structure of a problem is not always so clear. The problem may relate to a mixture of causes and effects, or it may not be recognisable in terms of any of the OR practitioners armoury of models. In this case a structure may have to be guessed at, a model devised to describe it, and then the model tested against the real life situation.

In cases where the logical relationships between variables in the system are not clear, or are very complex so that any model would only be a rough approximation to reality, an alternative approach is available. This involves writing a decision flow chart which describes the system, then arranging to simulate the processes which occur at each node. In effect, the system is operated on paper, not in reality. Some work at the University of Lancaster on optimising labour allocation in technical processing activities is an example of the simulation approach (Buckland et al 1970). An operations researcher would recognise a queueing problem here, but there is also a complex allocation problem because not all the activities involved are under the direct control of the librarian - those of the bookseller and binder, for instance. The variables for each in-house processing activity were recognised as input rate, labour, rate of work, processing capacity, backlog of items and output rate. The simulated system was run over a thirteen week period to examine the effect of various possible allocations of labour in each technical processing department on the build-up or reduction of back-logs and delays. Separate work at Lancaster on optimising loan and duplication policies resulted in a simulation of the borrowing process on the basis of a decision flow chart shown below.
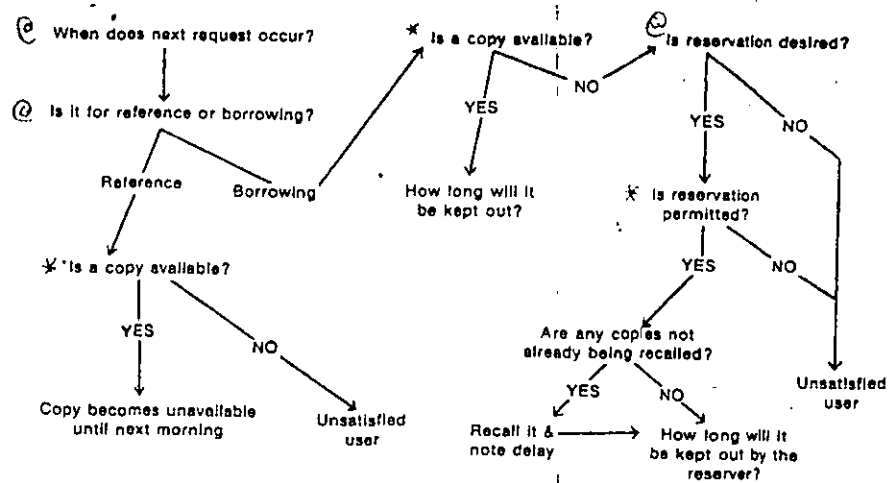
At the nodes marked ✧ a variable operates which is under
the control of the library - the number of copies of a book the
library owns, the number of reservations permitted, the loan period
expressed as a distribution of return times. At the nodes marked @
a probability is involved, and these events are simulated by throwing
dice or, in a computerised simulation, by random numbers sampling--
each number having a particular outcome assigned to it. For a parti-
cular setting of the controllable variables the computerised simula-
tion was programmed to report the percentage of requests which were
satisfied. A management game was based on this simulation (Mackenzie
1972).

Table 3 shows a selection of operations research work in
libraries. It is obvious from the table that one or two models have
dominated thinking about library problems - especially the Zipf dis-
tribution. This could be because of the limited range of problems
tackled, or it might reflect the fondness of an investigator for a
particular model. Certainly the application of OR to libraries does
not appear to have followed for the most part the team approach, the
advantage of which is that different aspects of the problem under
study can be seen by minds trained in different disciplines. One
would imagine that someone trained in psychology or communications
engineering would add considerably to the insight of a mathematician
in this area.

What library and information service problems might benefit
from the OR approach? Elton and Vickery (1973) suggest marketing
problems - what packages to offer at what price, and what promotional
strategy to adopt. This is of course an area in which OR has often been

Table 3   Some operational research studies in libraries

| Year | Author | Topic of Study | Model or method used. | Variables included in the analysis |
|------|--------|----------------|-----------------------|-------------------------------------|
| 1948 | Bradford | Distribution of papers on a subject | Zipf distribut. | |
| 1963 | Cole | Minimisation of unsatis-fied demand for journals | Exponential and Bradford dis-tributions | No. of journals hel No.of years retaine |
| 1964 | Morse | Book use over time | | Subject field |
| 1964 | Cox | Compact book storage | | Space wasted, mean book height, no.of different shelf hgt maximum book height |
| 1967 | Lister | Selection of books and serials for storage | | Age since publ.,tin between loans, cost of storage,cost of loans |
| 1968 | Morse | Arrivals and length of stay in library | Poisson distr. Exponential d. | |
| 1968 | Consad Research Co. | Usage of books over subject areas | Factor analysis | Occupation of clien |
| 1968 | Morse | Book use | Queueing theory Poisson distr. Exponent.distr. | Loan period, no.of loans, unsatisfied demand, no.of copie |
| 1968 | Morse | Book use in a collect-ion with no duplicates. Retirement to storage. | Markov | Loans in previous y expected future loa expected unsatisfie demand. |
| 1968 | Buckland & Woodburn | Allocation of funds between acquisition, storage and inter-library loan. | Bradford & Cole exponential distributions | Titles held, ILL c titles stored, satisfied demand. |
| 1968 | Brooks | Total number of journals to use in a search | Bradford distribution | No.of journals al-ready searched, & no. of refs.they contain |
| 1969 | Wood & Bower | Usefulness of abstracts publications | Bradford distribution | |

Table 3 continued

| Year | Author | Topic of Study | Model or method used | Variables included in the analysis |
|------|--------|----------------|----------------------|------------------------------------|
| 1969 | Hawgood & Morley | Allocation of funds between accessions, loans, ILL, reference work, reader advice | Linear programming | Marginal costs, librarians and othe staff available, seats, shelving, boo budget |
| 1969 | McGrath | Loans for each subject category | Correlation coeffts. | Books publ. in U.S./ faculty members in depts. related to each subject catego |
| 1969 | Fussler & Simon | Relegation of books to storage | | Publication date, purchase date, lanç uage past use, time since last use, sut ject area, populari |
| 1969 | Raffel & Shishko | Optimum mix of types of library seating | Linear programming | Minimum no. of seat preference of users for certain types |
| 1969 | Leimkuhler | Optimum time to keep books | Inventory theory | Acquisition costs, holding costs |
| 1970 | Morse | Organizing collection to enhance browsability\n\nHow user could best allocate browsing time | Submarine search model. | Division of collect ion, storage of par of collection, time available for brwsr expected productivi of subject sections |
| 1970 | Buckland et al | Book loan events | Monte Carlo Simulation | Requests, copies, reservations possit borrowing to refere ratio, loan period, recall delay |
| 1970 | Brookes | Subscribe to journals or obtain photocopies of articles of interest? | Bradford-Zipf distribution | Subscription cost, photocopy cost |
| 1970 | Brookes | Minimum number of bibliographic aids for a branch library | Bradford-Zipf distribution | No. of aids at centr library, cost for a search at branch an central library |

Table 3 continued

| Year | Author | Topic of Study | Model or method used. | Variables included in the analysis |
|------|--------|----------------|----------------------|-----------------------------------|
| 1970 | Brookes | Viability of branch libraries | Bradford-Zipf distribution | Probability of satis fying a request at t branch,cost of getti to libraries,proport of users who will vi branch first,expecte user cost of satisf. |
| 1971 | McGrath | Measuring library use using loans data only | Correlation coefficient | Loans,in-library use of material |
| 1971 | Bommer | Effect of teaching and research activity on future level of demand | Regression analysis | Past loan figures Teaching and researc activity of faculty. |
|      |        | Optimum number of new titles to buy in a subject area | Exponential dist. Bradford distribn. | |
| 1973 | Kraft & Hill | Optimum allocation of funds for journal purchase | Multiple choice model | Expected use |
| 1973 | Bookstein & Swanson | Accuracy of book reshelving | Sampling model | Expected use.No.of loaned books in a section |
| 1975 | Rouse | Optimal resource allocation | | Waiting time for service, probability of being served at once |
| 1976 | Chen | Duplication of in-demand books | Morse | Loan frequency |
| 1978 | Spurlock | Allocation of book fund among competing subject areas | Morse | Loan frequency |
| 1980 | Getz | Viability of branch libraries | Regression equations | Use, cost of travel to next branch, cost of opening, book purchases, opening hours. |

'applied in industry. The same applies to another of their suggestions, long-range planning. Pursuing another line of thought they suggest that OR would be useful to discover what statistics to save from the records of library transactions - those statistics which are relevant to various library decisions which can be expressed in terms of a model.

A more specific suggestion from Elton and Vickery for OR investigation is the relationship between users' perception of the quality of services and the extent to which they use them. This is an interesting suggestion because it recognises the users of library service as people whose aid could be sought in measuring quality of service. Their perceptions might not be an accurate measure of effectiveness, but they would be useful. Elton and Vickery also suggest that OR be used to investigate the connection between inputs for specific services and their effectiveness, and that diagnostic tools be developed in this area. "Libraries are sufficiently complex systems that it would be useful to have available simple means of telling whether performance could be regarded as satisfactory, which, if it could not, would also provide pointers to what was wrong." They give as an example the relationship "average stocks proportional to the square root of turnover", which indicates that an effective ordering policy is being followed for a retail outlet.

This sort of approach might be preferable to the building of mathematical models which represent the whole library system in terms of inputs and outputs as Leimkuhler (1971) suggests. Elton and Vickery describe the main problem here - to what level of detail does one have to go in order to derive a logical connection? A model which catered

for all the factors likely to be encountered would be very complex

and probably not used for this reason, says Elton (1973).   It is

doubtful whether it is worthwhile trying to build models connecting

inputs with outputs of library systems.  The dream is that they

would give a convenient management tool to predict how much benefit

would accrue from more funds put into the system, but there is

serious doubt that outputs are proportional to inputs.  It would be

much more useful to develop an explanatory model of libraries from

the user's point of view in human terms, to give some insight into the

significance of cost, value and effectiveness to library managers, and to

use mathematical models to help with managing or understanding isolated

parts of the system.

5. Management techniques

A study of the growth of management science and its influence

on professional managers would fill a large book, but two techniques

in particular, Planning Programming Budgeting System (PPBS) and

Management by Objectives (MBO), have influenced our ideas about cost,

value and effectiveness in libraries.

PPBS is a technique that has a lot to offer organisations

like central and local government, which have "unlimited objectives

and limited resources".  They need to see some priorities for allocating

what funds are available.  Also if all funding can be seen in terms of

one set of objectives at government level, it becomes easier to resist

pressure from powerful departments for funds which could be better

allocated elsewhere.  The effect of PPBS is to analyse expenditure by

the purpose for which it is spent, and to make visible the results
of such expenditure by identifying criteria of success, and indicators
of the extent to which these criteria are satisfied. Thus the technique
is useful for sorting out objectives, for reviewing both expenditure
and progress over time, and for choice between alternative "invest-
ments". It is recognised by the users of PPBS that the indicators will
not necessarily refer to the ultimate aims of a service. For instance,
pupil/teacher ratios have been used to indicate the output from the
educational service, although the real objectives of education are at
a higher level than this. They are not so easy to count, however.

The report of a feasibility study to introduce "output budget-
ting" into the DES concluded that it was practicable to do so for all
the activities  for which the department was responsible (DES 1970).
In a series of charts the DES presents objectives, programmes and indi-
cators of effectiveness for education, research and other DES involvements.
Public libraries are seen as part of the means to "provide social,
educational and recreational opportunities" additional to those
provided in the formal educational system.   Indicators of effectiveness
suggested for public libraries are:

> Number of books out on loan
>
> The efficiency of reference service, assessed by
> by surveys of users or books or both.

The Baines report suggested that PPBS be adopted at local authority level.
In order for such a system to work, however, it must be possible to
see the plans of various departments (Health, Education, Transport,
Leisure, Arts etc.) in terms of programmes which can be compared.  A
great deal of work has been done towards implementing this suggestion -
witness the discussion papers on output measurement referred to below.

A working party was set up to look into the application of PPBS in the public library service (DES 1973). Its report points out that libraries have to try to produce programme budgets so as not to be at a disadvantage in the competition for funds, and gives as an example the output budgetting techniques in use at the Hull and Coventry public library services.

At the time, Hull was operating a style of MBO and Coventry an approach to PPBS. At the level of the individual library service both techniques involve managers being clear what it is they are about, and developing a plan over time. Objectives are listed, then the programmes by means of which they are to be realised. At this point the two approaches diverge.

MBO is concerned with making sure that each person knows what part (s)he has to play. Training is given where necessary. Achievement targets are set and half-yearly checks on progress towards them are made. Staff are rewarded for their good contributions. PPBS is more concerned with how much money goes into each programme, and measures to reveal how much is got out. (Let us spend most on the things with high pay-off. Let us check that we are doing things in the right way as regards their cost and effect). MBO is mainly about allocation of people's time and effort; PPBS about allocation of the funder's money.

Bryant at Hull knew that standards for public libraries are not a challenge to librarians because they deal with minimum requirements for staff and materials. While trying to formulate a book-selection policy, he found that the things the library was trying to do in providing material for its clients began to surface. This led to the first stage of his MBO scheme in which he tried to relate book selection policy

to <u>all</u> the needs involved - details of the community served, the
librarians' own objectives for the service, the requirements of other
services which used books, the basic desiderata for the nature and
quality of material purchased and lastly, his own selection criteria.

For each service the issues on which decisions had to be
taken and the alternatives that should be considered were exposed by
breaking down a "programme" - the loan service for instance - into
parts by client and by type of material. In this way the authority
could see exactly what each area of the corporation's services was
trying to achieve. Objectives for each service were clarified by
asking what it was that was being provided, and for whom. Then under
each programme was set out a list of objectives, the means to be used
to achieve them, the specific tasks involved, and who was responsible
for implementing them (Table 4). For each task a target was set -
initially by the staff - and some sort of performance measure which
could be used to decide whether the target had been met. Output measures
and impact measures were separately listed. Impact measures tended to
relate to the effectiveness of the library in reaching the clients for
each programme (see Table 5).

Bryant lists the benefits of his approach as follows:

It exposes choices between services and within services.

It helps a library to be more purposeful.

It gives a continuous review of what, why, and how well the
library is doing.

It shows the extent to which the library is having an impact on
the community.

It encourages staff participation.

It systematises allocation of work to staff.

It allows training needs to be identified

| OBJECTIVES | STRATEGIES | KEY TASKS | TARGETS | PERFORMANCE MEASURES |
|---|---|---|---|---|
| 1. To ensure provision of a comprehensive stock of children's books throughout the system. (N.B. Stock revision in general responsibility of individual dept. | a) By cooperation in book selection | i) To purchase at least 1 copy of all titles 'on approval' (c.f. book selection policy); at least 1 copy of significant new titles per District - distribution of less noteworthy titles. | 100 of new titles | No. of requests for new books |
| | | ii) To maintain stock of children's play sets. | £100 of additional sets | Use. |
| | b) By cooperation in book withdrawal | To retain at least one copy of all out-of-print children's books. | | |
| 2. To increase stock effectiveness. | a) By improving speed of supply of any required book. | To circulate lists of reserved books. | 26 x 4 lists | Reduction in length of time before books supplied.(Sample checks). |
| | b) By anticipating some demand from schools. | To initiate 'project' sets. | 4 sets or | Use made of these collections |

Table 4 continued

| OBJECTIVES | STRATEGIES | KEY TASKS | TARGETS | PERFORMANCE MEASURES |
|---|---|---|---|---|
| | c) By regular production of booklists. | To produce lists to publicise new services,e.g., play sets, project sets,and 'situation' lists, e.g.,starting school and other lists aimed at pre-school child, e.g.,'no-text' picture books. | 10 lists | Use and reaction (sample checks of reservations and enquiries generated by list). |
| 3. To make the most effect- ive use of available staff. | a) By having within each District non- professional staff with interest in children's work. | To ensure avail- ability of such staff. | At least 1 per District | Enthusiasm of non-professional staff. |
| | b) By periodic meetings with these members of staff. | To organise meetings | 4 meetings | Success of children's activities |
| | c) By coopera- ting with other members of teams when appropriate | To seek coopera- tion as approp- riate. | 2 occasions | Whether service or activity was improved. |

Table 5.  Current and proposed output and impact measures,
Kingston upon Hull (DES 1973)

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OUTPUT MEASURES

---

Number of registered readers.

Total of books issued from each service point per week, month or year

Total number of users of reference departments, homework rooms and newsrooms.

Number of activities for children mounted

Number of talks given and visits received

Number of publications and press releases issued,lectures and broadcasts
   given, visits received

Tickets sold for Hull Film Theatre.

Number of bookings for accommodation

Number of school project loans made

Number of children attending activities

Number of enquiries answered per staff/hour

Occupation hours per study seat

Number of photocopies, photographs, and microfilms produced

Number and  duration of exhibitions mounted

Attendance at cultural activities.

---

IMPACT MEASURES

---

Percentage of registered readers to total population.

Percentage of users of special services to total persons in category served.

Total number of books on loan at one time for each service.

Number of books issued per head of population

Percentage of enquiries successfully answered

Percentage of occupation of study seats

Variation in number of school project loans made

Percentage of children attending activities to potential audience.

Variation in production of photocopies, photographs and microfilms.

Number of people viewing exhibitions.

Relation of use made to accommkdation provided

Average seats sold per Hull Film Theatre performance

Membership of Hull Film Theatre

Percentage of adults attending cultural activities to potential audience.

Reaction to promotional output  e.g.Requests for books included in book-
   lists, press releases used etc.

Variation from previous performance.

It helps to counteract "that disease of just carrying on with something because it has always been done."

It points up the relative importance of a service or a function

It makes for staff involvement and staff satisfaction

It shows that writing down objectives is good - it isolates the issues which confront you.

It indicates what is expected from staff, and, for them, how well they are doing.

No-one reading Bryant's description could possibly doubt the usefulness of this approach to library management. So why does not every large library use some sort of analytical technique? When Drake (1979) tried to discover librarians' attitudes to using planning and control systems, she found that a third of her respondents had not even tested them. The less convincing reasons given were lack of time or money or staff to do the job, difficulties in communication with staff because they worked on different sites or at different times, and (an often quoted reason) that the staff would not put up with this sort of thing.

There were several objections that resulted from respondents having thought about the problems involved. Several people pointed out that since the librarian did not control staff salaries and promotion, he would be unable to operate a reward system. A number of librarians who attempted PPBS advanced to the stage where it was realised that objectives were in conflict, but they were discouraged from getting beyond this point. (For example in a university library, the students need more space to work. They also need more books to study. The librarian must also keep costs down.) Several librarians mentioned political problems which get in the way of library planning - this is seen by planners as a major block on rational planning systems in any area, of course, but is not a convincing argument for not trying.

The best things about techniques like MBO and PPBS can also work against their effectiveness. For instance, it may be said that with PPBS the manager takes control of the enterprise. This is surely a desirable state of affairs, except that PPBS can be operated with no input from the client community at all. Most accounts of the technique emphasise careful research to identify client groups as a preliminary step - but not all applications of PPBS involve this. It can also be said that the manager's vision is widened because different aspects of resource management have to be considered before a programme and its indicators are fully defined. This is surely a good thing, except that PPBS can lead to the same indicators or measures being employed to advise quite different aspects of planning and control : allocation between programmes, choice between alternative methods of giving a service, measurement of effectiveness (See Chapter 3). Wessel (1969) determined to apply management techniques to libraries, but recognised separate aspects of planning and control, which in his opinion called for quite different techniques in their handling (See Table 6).

However, there is no doubt that PPBS has influenced thinking about effectiveness of library service. The Public Library Research Group policy statement on adult reference services (Public Library Research Group 1981) illustrates this point well. It lists objectives of the service, activities involved in realising the objectives and measures which could be used to evaluate the service (Table 7).

Table 6. Wessel's recommendations for the application of management techniques in libraries (Wessel 1969)

| Aspect of library effectiveness | Recommended technique for planning and control |
|---|---|
| The extent to which the library supports the mission of the parent organisation | PPBS plus a study of the purpose of the parent organisation |
| Organisational closeness to clients and their managers | Study the relationships between line and staff management |
| The extent to which the combination of services offered gives optimum support to the library's objectives | PPBS including cost-effectiveness analysis and utility analysis, involving value judgements |
| Effectiveness of individual library services or products | Percentage of needs which pass each event required to accomplish the objectives of the service, or to accomplish the production of the products |
| Preference of users for service from the library vs. other sources or channels | Value analysis of competing services or products |
| Unit cost and effectiveness of operational outputs | Standard costs and times |
| Contribution of library output to the value of library services or products | No technique suggested |

47

Table 7. Public Library Research Group draft policy statement on adult reference services

Policy Statement: Reference and information services exist to provide, directly or as a referral point, for the information needs of the community

| Objectives | Activities | Measures |
|---|---|---|
| 1. To make available to all sections of the community, information relevant to its needs. | 1.(a) Assess the requirements of the community | 1. (a) Community surveys undertaken on a continuing basis. Questionnaires directed at particular groups of the community |
| | (b) Provide resources as appropriate | (b) User satisfaction surveys. Statistical analysis of queries received as a proportion of total community population |
| | (c) Train staff in resource exploitation. | (c) Unobtrusive testing.<br>Obtrusive testing, i.e. test questions in fixed period.<br>Observation and analysis of reference procedures.<br>Statistical analysis of queries received, those attempted, those successfully answered and the average time taken. |
| | (d) Establish contact and co-operate on a continuing basis with staff at other information-providing agencies | (d) Evaluation of occasions when reference to agency is necessary |
| | (e) Consider shared resources where appropriate. | (e) Cost comparison of provision of information by home body with provision by agency |

42

Table 7. (continued)

| Objectives | Activities | Measures |
|---|---|---|
| 2. To promote public awareness of the service | 2.(a) Continuing public relations programme | 2. (a) Increased use of service. Attitude surveys of users and non-users of service. |
| | (b) Personal contacts with sections of the community with special requirements. | (b) Increase in use of service by a special group following contact. |
| 3. To help to ensure that users take maximum advantage of the service. | 3.(a) To interpret the service to users for future benefit. | 3. (a) Increase in use of all aspects of the service |
| | (b) User education programme. | (b) Increase in use of service by users themselves. |
| 4. To provide special support services where appropriate (e.g. technical, local government information, local studies,etc.) | 4.(a) Provide specialist staff and resources according to the particular need | 4. (a) Increase in use of special support services. User satisfaction surveys. |

6. Output measurement studes in local government

A big challenge in putting PPBS to work is the quantification of output of alternative services or methods of giving them. The Institute of Municipal Treasurers and Accountants (IMTA) - later the Chartered Institute of Public Finance and Accounting (CIPFA) - has sponsored a series of "output measurement discussion papers" which focus on outputs from services as the most important factor in decisions about how to allocate funds in the public sector. The working party stress the importance of knowledge of the effects of policies in deciding on the allocation of resources - it is not sufficient to know that one's authority is not spending wastefully, or that is spending more or less than another authority on housing for the aged, for instance. What really needs to be considered is the extent to which provision of homes for the aged contributes towards solving the problems facing the aged. Existing work on planning and control is criticised in that the bulk of it concentrates on the efficiency with which resources are consumed (CIPFA 1974). Output measurement (the study of products and their effects on those for whom they are intended ) is important to organisations which operate PPBS because it involves a comparison of the outputs associated with alternative plans. But output measurement is important in its own right - it does not necessarily have to operate within a framework of programme budgetting, but can be nevertheless a valuable aid in policy making.

The working party statement, which is included as part of each discussion paper, distinguishes between intermediate and final outputs from a service. Measures of intermediate output show what a service is doing for its clients. Final output measures show the effect

it has upon them. Intermediate output measures enable an authority to compare its performance meaningfully with other authorities. Examples of intermediate output measures are number of A-level passes, number of hospital beds. Final output measures are measures of impact on the community. For instance, final output measures of a programme to promote the well-being of the elderly in a community will not consist of number of houses built for the elderly,or number of meals delivered to their homes, but will reveal the extent to which their overall wellbeing is either maintained or improved by similar policies.

This treatment recognises several other important features of provision and impact of services. For instance, the concept of need is treated in an objective manner by looking at the clients of a service and seeing a standard of ability or wellbeing which it is desirable (and possible) to maintain. Need is distinguished quite clearly from demand by treating it in this way. Needs can influence policies through a standard set up as a way of establishing a relative measure of need. Policies can be stated specifically, in terms of needs, getting away from the broad philosophical definition of policy characteristic of a service having no real contact with its clients.

Another feature which service providers in particular need to keep in mihd is that input and final output measurement in a particular social area cannot be treated as an isolated situation. For instance, a relatively small proportion of the leisure needs of the populace are provided by local authorities since there are many private inputs in this area. Davies (1973) mentions earning power as an example of an output measure which can be affected by factors outside the system in which it is being used. For instance, he says, many high earners become so because of innate ability or by marrying the boss's daughter!

Wagner (1982) discusses earning power as a measure of the value of a university education, and concludes that "there are clearly some difficulties in using earnings as an indicator of the value of output". Also, alternative policies may affect different groups of people in different ways, so that beneficial effects on the target group may not be the only outputs to be considered. Using this view in resource allocation, the standards which are set are standards of provision, but they are expressed in terms of output. They contrast with conventional standards for provision of services, which are usually set in terms of input - number of places for students, number of books per 1,000 of population.

The discussion papers themselves show how attempts have been made to apply output measurement ideas in various areas. The situation in the personal social services (IMTA 1972) is very close to that in librarianship, where unmet needs may be recognised and it is clear what can be done to help, but there is at present no way clear to decide how the limited resources available should be allocated among the needs.

Leisure provision (CIPFA 1974) is seen in terms of demand, not need. It is apparent that the young and the old, having more time for leisure activities, need provison. Outputs are seen as contributing to health, or keeping people off the streets. But how can a pattern of need for leisure among the working population be seen? Since the local authority and private interests both contribute to the available leisure facilities, the local authority does not need to compete in the provision of the more profitable services - it needs to provide theatres, not nightclubs; concert, not bingo halls. The emphasis in the leisure discussion paper is towards inputs (standards for provision per 1,000 population, quality of facilities expressed as construction and materials standards) and towards intermediate outputs

(use, and satisfied demand). There is no real attempt to discuss final outputs, and one is conscious of how decisions on the area of leisure are made solely on the basis of demand. A suggestion that final outputs can be seen by merit-weighting of use measurements makes little sense because it cannot involve the level of need in the community, and hence can make no fundamental change in the decision process.

Discussing output measurement in education, Davies(1973) talks about the value of a cause-effect relationship between output measures and some aspect of the service on which decisions are being made. He suggests that it might even be better to have a crude measure relating to an aspect in which one is really interested, than to use precise measures of aspects which only approximate to what concerns one the most. He cites ASH (average student hours) as an easily obtainable figure with doubtful descriptive, explanatory or predictive value in the measurement of learning. He makes the additional point that even without being used in formal systems like PPBS, output measures are useful to analyse the effectiveness of the organisation - its personnel, its processes, its structure and information flows. For example, having to develop measures acts as a catalyst to agreement on the objectives of an organisation. To formulate measures at all, the area in which an impact is to be made must first be clear, and the institution must know how to recognise that an impact has been made. The needs and demands of the clients must be known, and how far the institution's perceptions differ from those of the clients. At a personal level, output measures can help by aiding the translation of objectives into a prescription for personal activity, and they can assess the extent to which an individual has contributed. Assessment

of the institution itself by its funders is more effective in the

presence of a series of commonly held key indicators, particularly

if the indicators "distinguished between raw resources, processes,

provision, response and impact".

There are output discussion papers for education, leisure,

transport, social services - and other papers are promised. At the

time of writing there appeared to be no discussion paper on library

service, although public libraries are mentioned in the paper on leisure.

Output measures proposed are library membership as a proportion of

population, book issues, and numbers of enquiries - certainly not final

outputs. Waiting time for reserved books and numbers of unanswered

enquiries are suggested as measures of unsatisfied demand. One may

ask : what does one do, having made these measurements?

A seminar in output measurement for public libraries was

organised by the output measurement working party of the Public Libraries

Research Group in October 1973 at which the then chairman of the IMTA

working party gave an introductory presentation. There were papers from

public librarians and teachers of librarianship on various aspects of

output measurement. The tenor of the meeting was "we have no generally

agreed measures". Discussion centred on setting up a database for

statistics - difficult because "some authorities would not or could not

accept the criteria laid down by the Library Association" - and on

measuring user satisfaction with the book they took away. It emerged

that PPBS was being used in some libraries, but without monitoring of

output. Morgan made the point about leisure services' equating need

with demand, and asked if this was an appropriate approach to output

measurement for public libraries. As far as the recorded discussion

shows, no-one took up this rather important point. (Public Libraries Research Group, 1974).

Subsequently, a meeting of reference librarians at Warwick in March 1974 considered output measurement in the reference library (Browne 1974). In the discussion, possible measures were considered, including time taken to answer questions, the appropriateness of the answers, and the proportion of the clients who return to use the service a second time. A promising suggestion was that a pool of enquiries for unobtrusive testing of services be developed. One can sense from the recorded proceedings the confusion which underlay the meeting - due presumably to lack of a generally agreed analysis of what it was they were about.

It is important that librarians make the effort to recognise final outputs, even if they cannot, or will not, count them. This is because they are the key to understanding about the effectiveness of library services.

7. Economics as an influence on library resource management

Like operations researchers, economists have been tempted to look at libraries as examples for application of their own brand of analysis. On the whole the results have been extremely useful for librarians, because economists have been able to make us see what is done in quite a different light.

"Economy is the art of making the most of life" said George Bernard Shaw. He always was able to get to the heart of the matter quickly. Economics is far from being an impenetrable topic, but it does have more than one main theme. Most economists would insist that

economics concerns money. Pigou (1962) defines it as "that part of
social welfare that can be brought directly or indirectly in relation
with the measuring rod of money". The idea of the market, of trans-
actions involving the exchange of goods at a price is a recurring
theme in economics. A second theme is that of value, worth, benefit -
profit if you like, but not necessarily in cash terms. For instance,
"welfare economics" concerns the benefits or disbenefits which
accrue to individuals or whole communities as a result of government
planning of their environment or social services

A third theme, the one that Shaw identified, concerns "the
allocation of scarce resources among competing uses" (Rees 1968). Most
of us are presumably familiar with the sort of interrogation which
begins "How much did you spend at the races today?" and are familiar
with the reaction of the questioner who goes on to point out how the
home, or the rest of the family might have derived benefit from the
investment.

These three themes of cost, value and alternative investment
are at the root of most human problems, but are most vexatious where
"the measuring rod of money" is not present. In a market situation
goods are made at a certain cost to the producer and sold at a certain
price to the buyer, and the value of the goods is quickly apparent to
both parties. Furthermore the existence of a price brings us all to a
common level - we can pay up or look elsewhere. "Prices and other
market instruments allocate the scarce resources within a society and
thereby constrain the desires of participants and coordinate their
actions" (Becker 1976). Things are not so clear when "the measuring
rod of money" is absent. The work of so-called non-profit making

institutions like schools and hospitals <u>is</u> paid for by the public,

but since most of us do not have to put our hands into our pockets

on each occasion of use, there is no easy way for us to attach a value

to each use of such services. The producers of services like education,

medicine, urban planning and construction have money to spend, but see no

obvious cash return for their investment. Consequently, they find it

difficult to choose between alternative projects or services, and to

justify their requests for more resources from the central public fund.

The economic problems of libraries and information services,

whether in the public or the private sector, can be seen in a similar

light. As investors, they compete for the limited amount of cash in

the public (or private) purse. As non-profit organisations they have

no cash return from their services to make allocation decisions clear,

neither can they point out adequately the value of what they do.

a) Marketing

It is not proposed in this thesis to consider the promotion

of library services. However there are advantages in looking at library

service as if it were an industry producing a product for the public to

consume, because it raises interesting questions - for example:

> What return <u>is</u> there?
>
> How efficiently are the inputs converted into outputs?
>
> At what "markets" should the services be aimed?
>
> In what areas does the enterprise operate?
>
> How does what the library contributes fit into the market
> picture?
>
> What can it do <u>better</u> than the competition?
>
> What has to be controlled to produce consistently high
> quality?

Librarians frequently complain of low market penetration (they

do not have as many users as they would like to have). If librarians

produced salad cream, they might be able to see their low "sales" in terms

of the following problems of potential users or non-users:

> They prefer mayonnaise.
>
> They prefer another producer's product, which is better advertised, or tastes or looks better, or is better.
>
> They never knew we sold salad cream.
>
> They do not like it because they were never given it by their mothers.
>
> They have tried it, but it adds nothing to their enjoyment of life.
>
> They can never find the stuff in the store.
>
> The salesgirl is unresponsive or rude to them.
>
> The quality varies noticeably from pot to pot.
>
> The lid is difficult to remove each time, and makes a mess.

Kuehl (1973) suggests that marketing philosophy is useful to librarians because it brings the client into the picture. It causes the supplier to consider the utility of his service, and to "adapt the service to the wants and desires of user segments". He stresses the need to anticipate the requirements of users, in contrast to what he calls the conventional view of marketing - producing a product and promoting it actively to achieve high sales volume. This approach ignores the utility of the product to the client, by concentrating on the product itself - its production, its technology. He gives microfiche copies of reports as an example of this. The convenience of microfiche technology has led report clearinghouses to adopt the form for dissemination of reports, but as anyone who has tried to use a microfiched report knows, this is not what users require. (East's problems in using computerised databases, reported in a recent editorial (East 1983) suggest, he says, a preoccupation with information systems, as opposed to services on the part of the suppliers).

In particular, Kuehl suggests that the value of a service be seen in terms of its "utility dimensions" - its form, time of presentation,

physical accessibility and so on. For me this is the useful part of Kuehl's paper. He describes an aspect of value that is associated with personal use of library services, and relates it to characteristics of a service, like timeliness and ease of use.

b) Theories of the library

One or two librarians have attempted to use concepts from economics in proposing theories of the library. For instance, Buckland's success with his work on optimising the availability of books in a university library by understanding how duplication and the loan period affect availability has tempted him to propose a "theory of the library" analogous to the theory of the firm, but using document availability in place of profit. Such a theory is inevitably restricted, since it is based on just one aspect of library work, and a passive aspect at that. Book availability does not relate to current awareness, enquiry and search services in the useful way it relates to satisfaction of demand for a specific document. Use of the library as a study space - a major use of academic libraries - is certainly not related to document availability. Buckland's theory as he describes it is beyond criticism however, since it is hedged around with all sorts of ifs and buts - he even excuses document availability as "a partial measure like profit" - as if a private company which did not have profitability as its first objective would last for long (Buckland 1975). More recently, Buckland has presented a more comprehensive theory of the library, which involves three interlocking sub-systems. There is a "political and management" system, which controls allocation of funds to libraries and within libraries, a "cognitive system" which controls the formulation and posing of enquiries, and an "economic system" which controls the use of the library by individuals on the basis of their personal assessment of the costs and benefits of use (Buckland 1983).

Moore (1976) cites the theory of production as useful to public libraries. The theory as he describes it relates to substitution among inputs. Under certain conditions the inputs to a production process can be combined in different proportions to produce a given output. Whenever one input becomes more expensive relative to another, then the proportion of the expensive input should be reduced "if the optimum level of output is to be achieved". Moore's suggestion is that to deal with current increases in costs, libraries should buy fewer books, since "the price of books is rising much more rapidly than the price of staff".

I doubt that Moore is justified in applying the theory of production to libraries. His treatment is an oversimplification of the library situation, since machines and services bought in from outside are also inputs to the library production process. Also the theory of production assumes an efficient and effective production process - that the consumption of resources has been optimised, and that the product is suited to the needs of the clients - so there is much more to it than juggling with inputs.

c)   A different viewpoint

One advantage of the intrusion of economists into the little world of the librarian is the refreshingly direct approach they bring. For instance, Getz (1980) sees the basic choices of public libraries as "how many facilities to operate, how many materials to put in each, and how many hours to operate". He goes on to show how the answer to lack of funds to operate all the branches of the New York Public Library is not to reduce opening hours and bookstocks, since this would only result in reduced demand. An efficient library system would operate fewer branches, giving a less crowded pattern. An efficient library system would spend money on more current books and longer opening hours, since these are the things which increase demand. (Getz defends what he says with cost and benefit calculations).

Librarians, Getz complains, seem to think that money should
be spent on libraries until everyone uses them. As an example, he
quotes Lancaster's idea that a library should strive to satisfy 90%
of the population's need. This is not in accord with the notion that
the benefits of libraries must be balanced against their costs. It
rejects consumer preference as a criterion for judging service levels.

Another economist, J.N.Wolfe, invited to study computerised
abstracting and indexing services, observes that "there is limited
value in providing secondary information services of great technical
capacity if the particular characteristics of the services ... are not
much appreciated by those who use them, and if the services they dis-
place offer characteristics more strikingly appreciated."

d) OSTI / British Library initiatives

Wolfe's study (1971) was sponsored by the Office for Scientific
and Technical Information. It came out of the OECD information panel's
discussions in 1966/7 on how much time and money was devoted to in-
formation. Wolfe tried to compare the <u>cost</u> of printed abstracting and
indexing services, and information services given in-house from a library,
with their <u>benefits</u> to the researchers using them. One of his conclu-
sions was that more, not less, should be spent on information supply to
research and development - even by the more information-conscious firms.
By this he did not mean to give the green flag to wholesale adoption
of computerised access to abstracting and indexing services, in fact
he pointed out that this would not make economic good sense unless it
substituted for the work of the in-house information department.

Wolfe's technique was to ask a sample of 306 research and
development chemists and engineers about research time saved them through

use of abstracting and indexing services, and about what extra salary
they would think might compensate for the absence of information
services. Because a much simpler survey method would be to obtain
information officers' estimates of benefit, he did this as well and
compared the results with those from his survey of research and develop-
ment workers. The analysis showed no significant relationship, the
information officers estimates having "an upward bias". This could be
because of their having more or better information on the value of the
abstracting and indexing services. For instance, the information
officers could have included their value to the library as an input to
current awareness or search services   It may be that an information
officer would include in his estimate the value of abstracting indexing
services to departments other than the Research and Development Department.

Wolfe's study has been described as "ahead of its time" and
it has been said that it was ignored, because the library and information
community did not understand it. It is not without its flaws. One of
Wolfe's main recommendations was for a technique which could be used to
compare the effectiveness of alternative information systems in terms
of which characteristics of services contribute to their effectiveness.
He tried to provide such a method by inviting research and development
workers to comment on the relative importance of speed, coverage,
relevance, detail, arrangement and indexing to the effectiveness of five
sorts of secondary service. So far so good. , Unfortunately, although
the figures for abstracting and indexing services are useful, one cannot
make comparisons for criteria between types of services, because the
reported figures obviously reflect their relative use more than the
relative importance of each characteristic to effectiveness! Neverthe-
less, it is true to say that the report was "ahead of its time", since
we are now ready for such comparisons (Blick 1977).

After the Wolfe report a decision was made not to fund further effectiveness/benefit studies, but to concentrate on studies of costs instead. However, the climate of opinion was beginning to favour benefit studies in social services generally, because of the growing interest in output measurement. Accordingly, two economists from LSE were invited to "critically summarise previous research ... on cost-effectiveness and cost/benefit measures of scientific information ... to identify areas for future research in this field, and to report". The result was a primer in cost-effectiveness analysis and cost-benefit analysis for information workers (Flowerdew & Whitehead 1974). Its chief value lies in the explanation of ideas in the field of economics that it gives. The section on cost-effectiveness analysis is probably unique among such writings for its clarity and comprehensiveness. Flowerdew does in fact critically examine previous work, but since he finds it all wanting in terms of the correct application of economic theory, this part of the report has little value. The sections which discuss the problems of library and information work, in an attempt to show how economics is relevant, are useful. The same cannot be said of a section on information itself. Economists recognise information as something different from manufactured products (for example, Stiglitz 1979, Galatin 1981, White 1982), but it is not possible to learn anything useful about library management from these discussions - except perhaps that life might be simpler if people always paid for the information they obtain.

The recommendations for future work amount to many man-years of toil. They call for a study of all the resources currently being devoted to information transfer, together with a study of the consumers

of information and their preferences. A number of case studies were
also suggested : a cost-benefit study using veritable economics
techniques, and a cost and pricing study - on efficiency of information
service, or on the effect of the pricing structure of abstracting and
indexing services on the demand for them. There was a plan to set up
a government-supported centre at LSE on the economics of information,
but Flowerdew went abroad before this could happen. In 1975 the
British Library invited research proposals on the economics of informa-
tion in an attempt to build on the Flowerdew & Whitehead analysis,
but without much success. In 1981 the British Library called for a broad
review of studies of the economics of information, and this was under-
taken by John Martyn, of Aslib. In his summary Martyn (1981), identified
BASYC and an unpublished classification by P.A. of information transfer
activities as two responses that were made to the 1975 British Library
invitation. Martyn outlines problems and deficiencies of past studies,
and asks whether attempts to measure the value of information may not
be attempts at an impossible goal. He points to the lack of under-
standing which is preventing useful work on cost-effectiveness of
information systems - work which would give guidance to information
workers about which systems to apply in their local environment.

Martyn's suggestions for further work in the area are as
follows: A descriptive model of information activity in the U.K.,
guidelines to encourage librarians to cost their activities, a study
of library users to see what benefits they perceive in the use of
information and information systems, a cost study of the use of numeric
databases, case histories which show the value of information, and a
study to isolate criteria for assessing the effectiveness of information

systems other than information retrieval.

Martyn's paper has since been published, together with the proceedings of a British Library seminar (Martyn & Flowerdew 1983).

e) Applications of economic theory

Economists have contributed several ideas of use in the practice of library management. Here are a few examples:

(i)  The cost of something is more than the price one pays for it: there is a cost to the provider and user of a service associated with convenience or frustration which needs to be considered in decisions about allocation of funds, or choice between alternative ways of giving a service.

(ii)  The costs to be considered in making a decision are just those involved in the activity under scrutiny.  Money already spent is a "sunk" cost!

(iii) There is the notion of opportunity cost :  for example to a student the cost of his education could be said to be the cost of the earnings he forgoes while studying, not merely the tuition fees. The cost of a computer installation is the cost of the other things one could do with the money that goes into purchase, rental and maintenance.

(iv)  Economists have equated the value of a library service with the value of the client's time it saves, or with the cost to him of the next best alternative  :  this is the "shadow price" of the service. Getz (1980) used this approach when he calculated the value of a branch library as a function of use and the cost of travel to the next nearest branch.

(v)  There is the idea of marginal cost  :  the costs of producing a single extra item of library service vary enormously between services. A single loan costs very little when contrasted with the cost of one comprehensive literature search through abstracting and indexing services, reviews, handbooks and so on.  Perhaps libraries should introduce fees which ration the services with high marginal cost.

(vi)  When deciding how much of an activity should be provided the deciding factor should be whether the benefits of an extra unit exceed its cost.

# C O N C L U S I O N S

Having seen a summary of the sort of thing that goes to make up our current understanding of the relevance of cost, value and effectiveness to library management, a reader might be forgiven for concluding that it does not seem to add up to anything in particular. In 1981 Bird published comments from librarians whose feelings about evaluating their libraries had been solicited. That studies in this area have not been cumulative was one of the more frequent comments. Other responses which show a need for some sort of overall view were that the theoretical basis of evaluation is not clear, or has never been addressed, that it is not clear how the studies could be applied in different sorts of library, that management science techniques, such as those put forward by Wessel and Morse, are incomprehensible to librarians, and that no attempt has been made to establish a relationship between input and output of library service, or between output and the extent to which it achieves the objectives of the service. Many librarians feel work in this area to be theoretical, and unrelated to the practical business of running a library. Many of the studies have been done by non-librarians, they say, or as part of an academic research effort, not by practising library managers. Measures have been put forward, but not tested in libraries. Another common reaction is against measures of "use" to evaluate library service. What is measured is what is easy to measure, and important features of library service, like response time, are ignored.

I cannot agree with some of these comments from librarians. For instance, studies made in libraries by non-librarians are actually useful to librarians, because of the fresh insights they bring associated with different ways of looking at the problems of library management. Also studies made <u>outside</u> librarianship are useful to libraries for the different management techniques they suggest.

Librarians' objections to work in the area because it is part of academic research is unfortunate. Academic work has a greater chance of building upon previous work, and it can be more rigorous because more time and greater care can be devoted to it. Librarians complain that it is not clear how studies might be applied in different sorts of library, yet academic researchers are in a position to try out methods - whereas librarians may not wish to spend valuable time trying out methods new to them just for the sake of advancing their subject.

The reaction against "theoretical" work that is "unrelated to the practical business of running a library" is puzzling. It may arise from librarians having focussed on just those resource management problems that are peculiar to the sort of library they operate. Much of librarians' work in the area has been on one or two aspects of management- allocation, efficient consumption of resources, the availability of books in university libraries, for instance. Yet practitioners from all types of library recognise problems that would yield to an overall theoretical approach to evaluation and resource management: that studies do not add up, that intermediate output measures are unhelpful, that effectiveness of service is not presently assessed in terms of criteria of importance to the clients.

There are in fact, resource management problems that are
just as important as the allocation problem, but because in the past
they have not been recognised as pressing problems, there has been no
attempt by practitioners to understand them in the same detailed way.
Examples are justification of funding, quality control, and choice
between alternative approaches to individual operations and services.
Another problem for practitioners is the multitude of measures available.
A theoretical framework could explain which measures are useful, and
for what purpose.

It is widely agreed that some input from the clients is needed
for effective management of libraries.  What is not clear is the nature
of the required input.  A theory that explained what input was available
from users, how it might be obtained, and how it related to resource
management would be most useful.  The work on "evaluation" of library
services dates back to the 1950s, but because it is taught and practised
as a separate sub-discipline, its relevance to resource management is
not seen.

An understanding of the main ideas in the area of cost, value
and effectiveness which could be widely agreed (because it was related to
the idea of service, rather than public library service, or industrial
library service) and which was relevant to the needs of library managers,
would act as a scientific paradigm appears to act, by making it clear what
is known and what is relevant, and by showing exactly where further work
is needed.  This is what I have tried to provide.

CHAPTER     2

## A conceptual framework for resource management in libraries

The literature supplies only two comprehensive models of
cost, value and effectiveness measurement as related to library re-
source management.  Both arose from practical needs.  Orr's often
quoted model (1973) comes from looking back over his work on evaluating
library effectiveness at the Institute for the Advancement of Medical
Communication.  He presents "a general framework for considering the
advantages and disadvantages of different quantitative measures".
Parker (1978) finds herself having to supply a scheme for library
evaluation to fit in with a performance measurement technique used by
the Canadian Treasury Board's planning branch.  Her model shows five
performance indicators, and how they relate to library evaluation.

### Orr's model

Orr looks at measures in the context of the help a library
manager might need in negotiation of funds and in planning.  He sees
the manager's tasks as including justification of continued or increased
funding to meet his responsibilities to the clients, allocation of
funds in a way such that the effects of funding make the greatest possible
contribution to goals, and what he calls "maximation" - to ensure that
the resources allocated to any particular activity are employed. to
maximum advantage.

In discussing measures, Orr looks at the individual library
service, and defines two important characteristics of a service : its

quality and its value. Quality (how good is the service?) he defines
as a function of the capability of a service to meet the user needs
it is intended to serve. Value (how much good does it do?) is a
function of the beneficial effects accruing from its use as viewed by
those who sustain the cost. He distinguishes between direct measures
of these ultimate criteria (quality and value), and indirect measures
based on some related criteria which are necessarily used because of
the difficulty of formulating direct measures of quality and value.
He defends his "fuzzy" definitions of quality and value on the grounds
that further refinement involves risking the loss of their utility as
"intuitively meaningful and simple statements of ideal standards to
which one can refer when considering various substitute or proximate
criteria which may be easier to implement."

Orr points out that in practice measures of resources and
measures of use are used as indirect measures of quality and of value;
for example:

|  | Indirect measures in terms of | |
|  | resources | utilisation |
| --- | --- | --- |
| Quality | Size of collection. Staff/client ratio. | No. of items borrowed per client. |
| Value | Book budget | No.of questions answered or items found |

Orr's model describes a relation between four variables in a cause and
effect sequence, looped on itself, thus:

```
                     QUALITY                                      VALUE
                       | |                                         | |
   Resources ————————> Capability ————————> Utilisation ——> Beneficial
         ↑                                                      effects
         |_____|
```
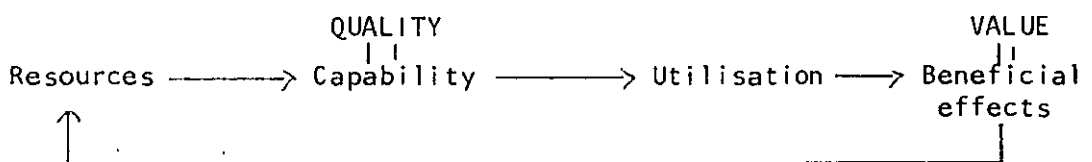
such that when resources are increased, capability is increased, and so on. He qualifies this by saying that capability, for instance, will not increase in proportion to an increase in resources. Orr would ideally like to see a mathematical model which codifies these relationships. This would be a versatile aid for planning and control. The model would be used to predict cause and effect, rather than as a means of translating measures of utilisation or resources into measures of quality and value.

A direct measure of capability of a service is needed as a sensitive measure of the effects of changes made in processing, intended to give greater return from given resources. A direct measure of total value is needed for justification of continued funding, and a model to show how value increases as support increases. Value measures for each service are needed, with a model which relates the value of each service to the support it gets. This would be used to inform decisions about allocating funds between services.

There are some very good things about Orr's model. For instance, he begins and ends by discussing the library manager's needs, and this puts the whole thing into a practical context. Nowadays one would want to extend his list of tasks of library resource management to include choice between alternative ways of giving a particular service, and it is doubtful whether the direct measure of capability he suggests - satisfaction of requests - would be sufficiently discriminating.

The model allows for value and capability measures to be made for each library service, not just for the library as a whole, which clearly makes for more flexible management; also some measure of user input is included in the model, through satisfied need (capability).

My chief criticism of Orr's model concerns his use of the word
quality. He has chosen this in preference to "effectiveness" because
even when he wrote his paper the word had become meaningless in library
circles, so that it carries "little intuitive meaning". However, he
does define quality as the capability of a service for meeting the user
needs it is intended to serve. This is ambiguous, but on closer read-
ing it is clear that by "user needs" Orr means the documents or infor-
mation that the client requests, and by capability he means the propor-
tion of demands which are satisfied. This seems a shallow interpretation
to put on the idea of quality, which should be defined in terms which
enable one to control the goodness of a service by recognising how
well or badly it is given. Measures of quality need to be diagnostic,
possibly they do not need to be "measures" in the sense of numbers of
things at all! Orr ducks the quality issue again when he talks about
what constitutes value in library service. He deliberately excludes
as aspects of value the things that reflect on quality of a service -
ease of use, lack of client frustration. These are part of the cost
of a service to the user, and hence by Orr's definition they should be
included in any measurement of value.

In Orr's need for a predictive model linking inputs with out-
puts one sees the influence of Management by Objectives, PPBS and so on,
and the basic idea of a service industry that all planning and control
has to start with the funds available. It is the funds available that
decide what services are attempted and to what extent - rather that
the opportunities associated with client need. Also in order to postu-
late a mathematical model which can be used to predict increases in value
from increases in resources, Orr has had to use concepts which are
capable of measurement - resources in cash, capability as satisfied

demands, use, and beneficial effect as time saved the client or attributed value or time spent using the service - and to neglect important concepts like ease of use, frustration relevance, thoroughness and so on : concepts that are important to the client.

## Parker's model

Parker's main concern is to provide efficiency and effectiveness measures for her library. The interrelationship between the "performance evaluation components" of library service is shown in the model below:
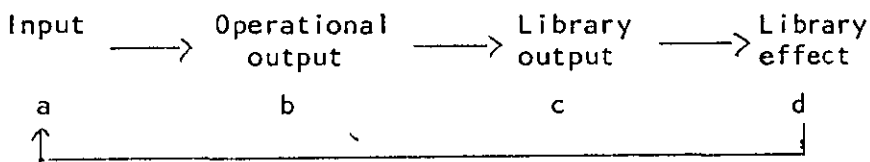
Input is defined as the cost of the man-years of effort involved in service. Operational output is the goods and services provided by the individual work processes of the library - for example the number of loan requests handled per annum. Library output is described as "the units successfully provided by the operational work processes, and which have an impact external to the library's operations". An example would be satisfied loan requests. Library effect is the effect of the information received on the user's research effort.

There is no intention to connect these quantities in the way that Orr would like, but the measures are used to derive efficiency and effectiveness ratios as follows:

$$\text{Operational efficiency} = \frac{b}{a}, \quad \text{Operational effectiveness} = \frac{c}{b}$$

$$\text{Library efficiency} = \frac{c}{a}, \quad \text{Library effectiveness} = \frac{d}{c}$$

$$\text{Library cost-effectiveness} = \frac{d}{a}$$

Parker allows that "until the effect of the library can be approached more definitively instruments to directly or indirectly measure the library effectiveness and cost-effectiveness concepts will remain elusive".

The management system for which Parker has to supply indicators sees the need to separate effectiveness and efficiency measurements, presumably because at Treasury Board level effectiveness measurements would be useful in helping with allocation of funds between departments. This is a good idea in any case, because a service can easily focus on efficient conversion of its input into outputs and neglect the question of whether it is providing the appropriate outputs. At the time of writing none of the indicators had been provided.

Another point in favour of the Parker model is the indication that final outputs can affect funding. However, it is subject to the same disadvantage as Orr's model, in that because figures and ratios are the main requirement, "measures" which would have a diagnostic effect on the goodness of services are excluded. Parker is less concerned that Orr with individual services in any case, requiring overall measures of output for comparison at Board level with similar measures for other government service departments.

In summary, one could say that the existing resource management models of library service show overdominance of the "management orientation" vs. the "user orientation" towards library evaluation which Oldman (1976) recognises. "Researchers wish to replace rule of thumb by scientific management" is how she describes the management orientation. In doing so they focus on the system and measures derived from it, at the expense of the client. To make an attempt to formulate objectives,

to realise that they are in conflict, then to abandon the idea is typical of this approach. To replace conflicting objectives with one simpler aim which makes it easier for PPBS to be carried out, as Hamburg (1974) did, represents perhaps the culmination of a management orientation to evaluation.

The best thing that the management orientation brings with it is that the library manager takes over control of his operation, and is obliged to analyse what he is doing, and why, and how. Perhaps the worst aspects are the focus on objectives and measures, and the mistaken feeling that because the library operation can be seen as a large system, it has to be planned and controlled as such.

It seems likely that a model could be devised which provided for management of a system but nevertheless allowed scope for user input. This could be done by dropping the need for a predictive model on the lines of Orr. This would have the effect of allowing some measures which were not numbers. It would also set the manager free to use quite different techniques when dealing with separate aspects of his system like efficiency, effectiveness, quality and value.

## Needs for library resource management

If we agree that efficiency means the efficient conversion of labour and materials etc. into products, it is clear that a manager must be concerned about the efficiency of his organisation or system. This applies whether at the level of an activity or a service. (The product may be a stuck-on label or the post opened on the boss's desk, or it may be some thing that the client can use). In both cases it would be advisable to take into account not just the cost of production, but the quality as well.

Certainly it would be foolish to compare the efficiency of production
of services across different libraries without having some index of
their relative quality.  Similarly if someone arrived at a much cheaper
way of fixing codes onto the backs of books, one would want to know how
it compared with existing methods as regards durability.

A manager needs to obtain funds and to allocate what is available
across existing services.  As regards obtaining funds, the need to justify
requests for more cash is felt by most librarians these days.  Indeed the
funder may require some indication of return on investment to help with
his own allocation decisions at the higher level.  If the librarian is able
to see some final output (in terms of value to the client) from his services,
this can be useful for justification purposes.  Final output can also be
used to advise decisions about allocation of funds between existing services.
It is final output which is appropriate here, because the question of
whether an extra unit of service should be provided rests on the basis of
whether its benefits exceed its cost. (Getz 1980).

The manager has another need, associated with choice between
alternative ways of giving a particular service, which is increasingly being
felt at a time when everyone seems to be in the information business.
The problem arises because the alternatives can have different outcomes for
the client, so that a choice cannot be made on the basis of cost alone.
For example, should the librarian provide a current awareness service from
primary material, using his staff to scan and report to the clients, or
should he obtain and circulate a service from outside?  Should cataloguing
and indexing be done in-house, or be obtained from a co-operative or national
service?  The question of computerised versus manual, bulletin versus SDI,

within the library, provide further examples of the sort of choice

which cannot be made on the basis of cost alone.

To sum up, the chief needs for resource management are as

follows:

- To know what contribution the library can make to the client
  community.

- A way of allocating funds when there are more things to be done
  than funds to carry them out, and when funds have to be divided
  between existing services.

- Some means of justifying increased or continued funding.

- To ensure the efficient conversion of resources into services or
  products.

- To be able to measure and control quality of services or products.

- A way of choosing between alternative methods of giving essentially
  the same service.

The term effectiveness has been avoided because it means so

many things to different people.  (The same applies to efficiency to a

lesser extent, but it has more intuitive content, because of common usage

outside librarianship in connection with use of, say, fuel or time).

Totterdell (1976) uses "effectiveness" in a special way - to mean how far

a library has promoted itself as a means of satisfying its community's needs.

Perhaps we should use the term for this vital but neglected aspect of the

effect of libraries.

## An input-output model

Overleaf the library or information department is shown as a

system with inputs and outputs to each stage:

| Funder | | Library | | Client as a libr. user* | | Client as a worker or liver |
|---|---|---|---|---|---|---|

Input
(Resources)

Intermediate
output
(Services)+

Final
output
(Benefit or disbenefit)

e.g. Labour
Materials
Cash

e.g. Loans
Enquiries
Current
awareness
Searches
A collection
Catalogue and
Indexes

e.g. Time saved
Frustration
Money saved
Improved production
Contribution to life
Reduction of anxiety
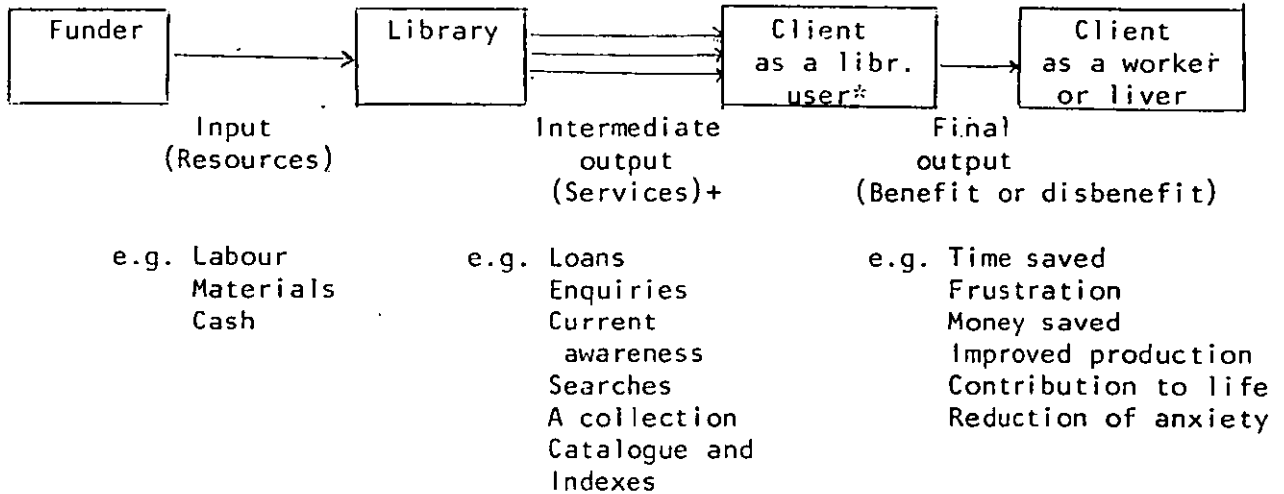
\* Separating the client as a user of the library from his role as a member
of a user community helps to point up his different types of need -
for information, documents etc., where the library might be able to
contribute, and separately as a library user who reacts to the library
service and has expectations about the way it works.

+ We could define a service as "what the client uses directly", so that
it includes outputs like a collection for browsing, or a catalogue and
finding aids.

Figure 3 shows the same model into which have been written the
information flows from the user and the system which help with the
management of the system in terms of the chief needs for resource manage-
ment already discussed. .

The model becomes helpful at the point where clients' needs
are known, so that first level objectives, in terms of what the library can
do for the clients, have been formulated. Decisions on how funds are to be
allocated among these provisions can be advised by looking at the costs of

Figure 3. Model of a library or information service showing information useful in resource management

| Funder | → | Library | ⟹ | Client as a library user | → | Client as a worker or liver |

Inputs
(resources)

Intermediate outputs
(services)

Final output
(impact)
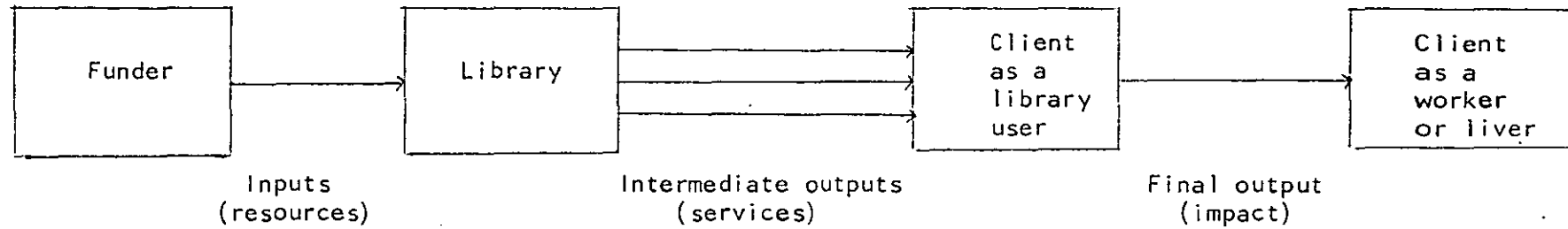
Cost of library operations
and services in terms of
materials, labour etc.

Numbers of loans
            photocopies
            bulletins
            enquiries
            users

Frustration or time spent
Time saved
Money saved
Contribution to work or life

Useful for:

Efficient conversion
    of inputs

Useful for:

Quality criteria for services

Justification for funding

Allocation decisions

implementing each objective and the final output - the impact the

programme or service is likely to have on the clients - as far as possible

in cash terms.    The comparison of alternative programmes in terms of their

costs and benefits is a well established technique for advising decisions

in areas where there is no price mechanism to control demand and production.

The problems of quantifying benefit and converting into a cash equivalent,

and those associated with choice between programmes having benefits felt

by different client groups are discussed in detail in Chapter 3, and

methods for dealing with them are described.

Efficient use of labour and materials to produce library

products and services is investigated by using the methods of administrative

effectiveness which have been described briefly in Chapter 1.  The quest

for efficiency involves examining the times, cost and sequence of library

operations to produce the same intermediate output.

For the justification of requests for continued or increased

funding, it is no longer sufficient to present to the funder a list of

inputs (resources) required.  A programme budget, showing how labour,

materials, and other costs are spread over library operations and services

may be acceptable for justification purposes, but increasingly some sort

of evidence of return on the funder's "investment" is required.  For this

purpose evidence of client benefit can be used.  This may be expressed in

cash terms, as client time or money that has been saved, or as a price

obtained for services.  On the other hand evidence that useful inputs were

supplied to the clients' activities could be provided in cases where a cash

return would be difficult to establish.  Examples of all these approaches

are given in Chapter 4.

The quality of library service is important for several reasons. Because of the connection between efficiency and effectiveness, if a procedure or service is made more efficient by lowering the cost per unit of intermediate output, who is to say that the final output has not been diminished? Quality is also relevant as well as cost when a choice is being made between alternatives for a particular service - bulletin versus SDI for current awareness service, manual versus mech- anised enquiry service, for instance - or when the contribution of each towards the service is being assessed. The connection between quality of library service and use - Totterdell's penetration of the client community - must be obvious to anyone who looks critically at the sales figures for different brands of beefburgers, or erasers, or sausages.

What is quality in this context, and how is it measured? Quality of library service is the extent to which it satisfies criteria which relate to its value to the client. In other words, quality is not expressed in terms of final output, but in terms of criteria which can be derived from final output. Figure 3 shows that the value of library service is associated with time saved the client, avoidance of frustration, and a contribution to his work or life activity. Now what aspects of, say, an enquiry service would tend to save the client's time, reduce his frustration, or increase the likelihood of his going away from the library with something useful? The quality criteria for enquiry service involve the collection as well as the staff, and would relate to such things as currency of the collection, staff's knowledge of sources, as well as their personal abilities.

It would be difficult to deduce quality criteria for all library services in this way, and of course even more difficult to secure

the agreement of librarians on what criteria should be used to

measure and control quality.    Luckily, however, the literature of

librarianship contains many records of what library clients find critical

to the value of the main types of library service.    Thus, we do not

always have to deduce criteria for measurement and control of quality if

we can bring ourselves to accept this user input.    In Chapter 5 this

view of quality is defended, and it is shown how it can be applied to

different library services.

In Chapter 6 is shown how the cost and quality of alternatives

for giving a particular service can be used, through cost-effectiveness

analysis, to advise on a choice between alternatives.

CHAPTER   3

Allocation of resources among competing needs


There are allocation problems at different levels.  At a
higher level than the public library manager, the funder has to decide
how much to spend on libraries and how much on the schools.  The research
director of a private company has to decide what proportion of the
cash in hand to allocate to research personnel, equipment, and support
services (including an information department).  At a lower level, the
allocation of the book budget among subject classes may be considered
a reason for deliberation.  Simply stated, the allocation problem is
what happens to the librarian whose task it is to plan a library or
information department.  He can see what has to be done, but the funds
to do all of it are not available.  More often, allocation problems
arise because funds are cut, and what remains has to be re-distributed.

Many voices speak against the necessity for any formal examin-
ation of allocation decisions by librarians.  Webster (1977) presents
some of these excuses for action:

- things are changing too rapidly for analysis to be worthwhile;

- management techniques are expensive to carry out, and their
  very expense calls into question the value of the results;

- the librarian inherits a system where at least 80% of the
  resources are already committed;  there is very little
  flexibility for planning;

- the "political process" has worked best in the past. (This
  means making friends with the boss, possibly.)

The Project for Evaluating the Benefits from University Libraries (PEBUL)
at the University of Durham (Hawgood & Morley, 1969) was based on the

production of an operational model of how resources had been allocated
in the university library, which by using sensitivity analysis could
demonstrate what would happen if resources were allocated differently.
"They went backwards from the actual library situation to discover
the previous hidden maximising criteria" (Oldman 1976).

They discovered that the library was being run as though "one
item added to stock was worth the same as 4.6 items on inter-library
loan or 1300 hours spent by users consulting material in the library or
90 items on long loan or..." (University of Durham, 1969). Even a
casual inspection of these figures demonstrates that they are not related
at all to relative benefits received by the clients from these provisions.
It is "the value placed on different aspects of library service by the
library authorities which is inferred."(Flowerdew & Whitehead, 1975).

Case studies show that librarians' approaches to responses to
reduced funding are often to cut provisions which in the end make it more
expensive for the funding body to do things which previously benefited
from library handling because of economies of scale - buying, circulating,
and storing materials centrally, for instance.

The basic problem of allocation is undoubtedly that of involving
the library's clients in the decisions being made. A number of approaches
to allocation which attempt to involve the impact of services or other
provisions on the clients have been proposed:

- PPBS, which depends on the formulation of objectives
  related to the clients' need and attempts to relate
  funding to their degree of attainment.

- CBA (cost-benefit analysis), which treats allocation
  as an investment decision, and distinguishes between
  alternatives on the basis of the sum

            Total benefits - Total costs
  for each alternative.

- BASYC, which involves the use of choice ratings by the
  clients and the providers of the service.

## PPBS (Planning, programming budgetting system)

PPBS was developed originally by the Rand Corporation. U.S.Secretary of State Robert MacNamara introduced it into the Department of Defense in 1961, and later it was taken up by other departments of the U.S.Federal Government. It is not so much a technique as a radically different way of looking at financial control. Under the conventional system of budgeting, the Treasury would receive reports from Departments itemising their needs for the coming year for salaried staff, materials and supplies, and giving an estimate of incidental expenses. The Treasury's role was to keep total departmental expenditure within limits. As far back as 1949 the Hoover Commission was urging the U.S.Government to concentrate its attention on the work done by departments or the services they rendered, rather than on the things each department wished to acquire. In this way the Federal Government would be able to "establish priorities and make allocation decisions in terms of material objectives, without the pressure that the more parochially oriented departmental estimates usually aroused" (Balls 1970). In 1968 PPBS was adopted by the Canadian Government, and "produced a greater awareness of the interelationships of all areas of government activities, and of the fact that decisions on one sphere may have significant implications for decisions in others."

The main characteristics of PPBS are that the total expenditure of a department is related to its outputs by a process of cost accounting, that an attempt is made to show some connection between the cost of an output and its value, and that costs are projected over several years so that the long-term financial consequences of decisions become apparent.

PPBS rests on a first step of identifying objectives based on the "realistic unmet needs" of the community being served (Bromberg 1971). This could take about half the time spent on a programme budget, says Bromberg. Examples of this sort of objective for different types of library are given below:

For a public library:

- To supply the reading material that the public asks for (Carnovsky 1968)

- To provide reading matter of a superior quality

- To ensure that a child's reading is not dependent on the ability or willingness of its parents to buy books. (Newhouse & Alexander 1972)

- To aid in daily occupations (Hamburg et al 1974.)

- To provide information requested (Hamburg 1974).

For a university library:

- To provide material for students' coursework

- To provide material in general support of research at the university.

- To provide a copying service

- To provide places for private study

- To provide readers' information service, including bibliographical services for research and teaching staff.

For an industrial library:

- To collect and organise material in the subject area of the parent organisation.

- To collect and index for future use the reports of the parent organisation.

- To supply staff of the organisation with information requested.

- To alert staff to new publications, ideas, materials, methods etc. in their areas of interest.

- To supply a translations service

- To supply an editing service for the organisation's reports or other publications.

- To manage the organisation's word-processing system.

- To make surveys to help with decisions on future projects.

Next, the programme categories necessary to achieve the objectives are listed. Hamburg et al (1970) lists different characteristics of division for producing a programme structure from an objective by construction of a sort of hierarchy - population, document type, library function, library department, etc. The programme budget for the MIT libraries, for example, is broken down by function, then by department (Raffel & Shishko 1969):

Programme 1  To provide a general and research collection

- selection

- ordering

- new item preparation

- cataloguing

- circulation (lending)

- information, bibliographic aid, interlibrary loan

- research reading desks

- collection storage and maintenance

Programme 2  To provide required reading and facilities for study

- purchasing and Xeroxing

- cataloguing and processing

- reserve reading and study desks

- reserve collection storage

- reserve circulation and general services.

Before subdivision of programme categories into actual library activities it is as well to consider the constraints that will operate.

The funds available and the cost of labour and materials (at present and for a few years ahead) will limit the choice. Bromberg recommends sitting back at this stage and making an effort to think of <u>all</u> the ways in which the objectives could be achieved in each programme category.

The key operation in PPBS is the assessment of alternative activities by first of all estimating their costs now and for each of several years into the future, and then by attempting to compare their advantages. The costing procedure is discussed in the Appendix. Activities are seen as the sum of all the tasks that go to make them up, and their cost as the sum of labour and materials costs involved in these tasks. One approach to comparing the advantage of alternatives is by estimating their value, as attempted in cost-benefit analysis; another is to rate them against quality criteria as in cost-effectiveness analysis (see Chapter 6).

When decisions on the programme activities have been made, benchmarks can be set up to measure progress towards the intended objectives. These should ideally be measures of impact on the clients of the service, and should be of such a form that if the question "has it been done" is asked, the answer can be "yes" or "no". (See Fig.4, Column 2, for example).

A programme budget can be linked to a standard resource budget by means of a "crosswalk" tabulation for the next financial year, as illustrated below (Bromberg, 1971).

# Figure 4

Manager's guide for the Reference Librarian, Coventry (1972/73)　　(DES 1973)

| Item | Key Result Area | Standard of Performance | Control | Actual Results and Comments |
|---|---|---|---|---|
| 1 | To reorganise Section in readiness for Central Library Stage II. | a. When a revised staff establishment for Central Library (I) was agreed by Director.<br>b. When a revised staff establishment for Central Library (II) was agreed by Director. | Minutes of Senior Management Team.<br>Minutes of Senior Management Team. | |
| 2 | To satisfy the needs of the community for reference and information materials and to provide incidental study facilities. | When, within the policy of the Department, not more than 20% of enquirers fail to be satisfied to the best knowledge of the staff. | Report of quarterly 1-day sample. | |
| 3 | To maintain the use of the reference and information services. | a. When at least 70,000 consultations of reference books were made by the public in 1972/73.<br>b. When at least 30,000 photocopies were supplied in 1972/73.<br>c. When at least 15,000 volumes were borrowed from the scientific, technical and business collection in 1972/73. | Annual statistics.<br>Annual statistics.<br>Annual statistics. | |
| 4 | To maintain an effective service to users of Business, Scientific and Technical information. | a. When the membership of CADIG was maintained at 54 at March 1973.<br>b. When good communications were maintained with all members and, in particular, outlying members.<br>c. When liaison with other cooperative information services helped to fill gaps in the general awareness of topics of current importance by publications and public lectures. | CADIG: annual report.<br>Prompt publication of newsletter and visits to and from members.<br>Correspondence. | |
| 5 | To collect, conserve and organise for use all available printed records of Coventry and its environs. | a. When all relevant in-print items or new publications were acquired.<br>b. When, where possible, identified gaps of out-of-print material were filled.<br>c. When satisfactory progress was made in establishing a working collection of popular material.<br>d. When items of substantial monetary value were identified and their security improved.<br>e. When all acquisitions were promptly catalogued and indexed.<br>f. When 4 resource packs on local studies topics were available for use by March 1973. | Record of accessions.<br>Accessions list and correspondence on queries.<br>25% of approved list available by 31st March 1973.<br>List of items agreed and appropriate action taken.<br>Examination of un-catalogued accessions.<br>List of packs available. | |
| 6 | To further and promote the study and appreciation of local history by schools, research workers and members of the general public. | a. When a satisfactory contribution to the Working Party on School Resource Centres was made.<br>b. When adequate response was made to all requests for lectures or exhibitions on local studies. | Director's personal assessment based on Working Party's minutes.<br>Diary kept including requests not met. | |
| 7 | To maintain and improve cooperation with other sources of local study material. | When a satisfactory contribution to the Coventry Documentation Group was made particularly by the publication of a COVDOC directory. | The published directory. | |

| | Reference Main Library | Bookmobile | Branches | Program Outreach | Direct Business Service | | | Reader Service Total 1972 |
|---|---|---|---|---|---|---|---|---|
| Personnel | | | | | | | | |
| Books, Periodicals,etc. | | | | | | | | |
| Materials | | | | | | | | |
| Furniture & Equipment | | | | | | | | |
| Travel | | | | | | | | |
| Capital Outlay | | | | | | | | |

It will be seen that the concept of PPBS is wide-ranging, since it embraces objectives, cost.and effectiveness and/or value of outputs,forward planning, and even quality control. It is also a very flexible concept, since the rigour of its application can vary while retaining its value as an aid to resource-management. For instance Hamburg's PPBS system for public and academic libraries is built on a single objective, to avoid the problem of conflicting objectives, which can complicate a PPBS analysis. His objective (the maximisation of exposure of documents of recorded human knowledge) is capable of being measured - which makes the choice between alternative activities to achieve programmes and the setting of benchmarks relatively easy. However Hamburg has been much criticised for using as an objective an intermediate output measure, which cannot relate directly to value to the clients of the service.

Also Hamburg's concept of document exposure "loan time" is unrealistic,
since a borrower will certainly not peruse a document for the total
loan time. He may not read it at all. In a real situation one would
have to derive some fraction of loan time which could be taken to be
exposure time (or assume that exposure time was the same whatever the
length of loan) in order to simplify data collection. Asking
borrowers to say how long they spent on the borrowed document is a
time-consuming way of collecting evidence, and it relies for its success
on accurate recall by the client. Borrowers would have to be inter-
viewed at the library desk to obtain the information.

The calculation of exposure time for documents used inside
the library is a real challenge. Perhaps the most ingenious answer is
to assume that it is some function of document loan time for the library
in question.

Hamburg presents a diagram to show how his measure is two
steps away from a library's ultimate effect on societal objectives:
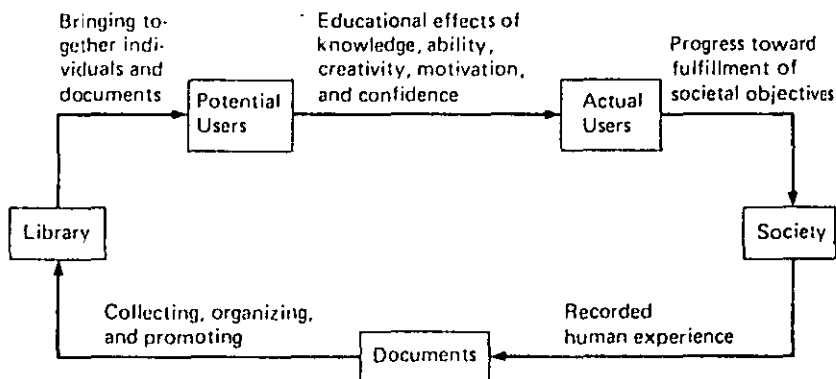


However document exposure could not be used in a PPBS as a measure
relating to seating requirements in an academic library, for instance.

Applied to library resource management, PPBS can help the
funder and the library manager, because the budget presented for his

approval shows the cost of the output services as well as what funds

the librarian requires for people, materials etc. The funder can

see how his money is being spent, and can become involved in the planning

and assessment of alternatives, where previously his role was to

question expenditure.

For the library/information manager, PPBS has many advantages.

Some are presented below, alongside a summary of the steps involved.

| Steps in PPBS | Usefulness to manager |
|---|---|
| 1. Identify objectives | Validity of objectives is questioned since they must be further analysed. |
| 2. Devise programmes to achieve objectives | Helps to convert hazy objectives into something more concrete. |
| 3. Analyse programmes into activities. | Encourages a systems approach to planning the work of a department, and across departments. |
| 4.Consider alternative activities:<br>- their cost<br>- their relative value or effectiveness | Improved decision-making. Encourages review of means to objectives, and clarifies assumptions made at stage 2. |
| 5.Establish benchmarks to measure achievement of objectives | Encourages collection of regular management information from the system, and review of objectives and performance. |
| 6.Link programme budget to annual resource budget. | Encourages thoughts about efficient use of labour and materials. |

## Cost-benefit analysis

To go into a business deal solely on the basis of how much

cash one has to put down would clearly be foolish. Although the size of

the stake is important, what it will earn over the life span of the

project would be the deciding factor for most people. Cba is a technique

used to inform the choice between alternative investments when the

earnings and the costs of a project are not necessarily in cash, and when the people affected may be communities as well as individuals.

An example of a cba was the Roskill Commission's analysis of the choice of site for a third London airport. Here the stake was the cost of building, or adapting an existing site, spread over a number of years, and things like the loss of peace and quiet, historic buildings and a bird sanctuary. The returns were the advantages associated with easier travel and increased trade, as well as receipts in cash for air fares.

The aim of cost-benefit analysis is to identify all the costs and all the benefits of a proposed project, and to express them in terms of cash. In this way, as well as being able to make a comparison between competing projects, the worth of an individual project can be assessed by subtracting the present value of its costs from its benefits.

$$£B - £C = £W$$

(Flowerdew and Whitehead 1974, CIPFA 1974).

A cost-benefit analysis has this advantage over a mathematical model used to aid decision-making - that it can be made to fit a particular situation more accurately than can a model. By its nature a mathematical model includes only things capable of quantification, and so tends to abbreviate or approximate to the situation it attempts to describe.

It is as well to point out that cba tends to be used retrospectively in library applications, to answer the question "Did we make the right decision" - for justification, not allocation decisions, in fact. This despite the apparent applicability of the characteristics of a capital investment decision given by Harmon (1973) to library and

information systems. viz:

    (a) A substantial amount of money is invested in capital projects;

    (b) The resources invested are committed for a long time period;

    (c) It is difficult to reverse a decision to do it this way;

    (d) Success or failure may hang on the decision;

    (e) Plans must be made well into the uncertain future.

The discussion which follows, and as far as possible, the examples given, will be confined to the use of cba as a tool for use to aid allocations decisions. Comparison of costs and benefits to show value of an existing service is discussed in Chapter 4.

Cost-benefit analysis involves the following operations (Flowerdew and Whitehead 1974, Clay 1970):

1. Alternative systems or projects are described in detail

2. Exhaustive lists of costs and benefits are prepared for each alternative

3. The lists are examined : costs and benefits are separated, identical items eliminated, similar items combined

4. A means of measurement for each item, in appropriate units, is devised. A list of sources to be used for this data is compiled

5. A value is calculated for each cost and benefit item in the appropriate units

6. For items which are not naturally expressed in terms of cash, attempts are made to convert them to cash. Lists are made of the immeasurable costs and benefits associated with each alternative

7. A comparison of projects is made on the basis of their worth (see above), taking into consideration the immeasurables for each project

8. The effect of changing the assumptions made in calculating costs and benefits is tested.

Flowerdew and Whitehead give a step-by-step example of a cost-benefit analysis of the problem: should financial support for conference attendance by academic staff be increased?

Problems in the application of cba tend to arise at the following stages:

| Stages | Problem in application |
|--------|------------------------|
| 2 | Identification of costs and benefits |
| 3 | Which costs to use in the cost-benefit analysis sum |
| 4-6 | Quantification of costs and benefits, and their expression in terms of cash |
| 6 | Discounting costs and benefits to present value |
| 7 | Handling "immeasurable" costs and benefits |

## Identification of costs and benefits

In order to identify accurately the benefits and costs of a proposed service, it has to be seen as part of a larger system than that embracing the provider and the client. For instance, final outputs in which we are interested may be caused by things other than the service for which we are trying to establish benefits. (i.e. Davies' example of the attempt to equate the benefits of education with the salaries earned by graduates - increased salary can result from things other than qualifications gained). Conversely the benefits of a service are not only felt by the individuals who receive it, but the impact may also be measurable at the level of the community to which they belong. Also the benefits of a service intended for one community may rub off on another. The scented garden planted by the Hoylake and West Kirby Council for its blind population gave me great pleasure in the summer time, although I did not feature in a head count of official users!

In listing the costs and benefits of a service one has to come to terms with the fact that not all the costs are to the provider, nor all the benefits to the recipient. For instance, personal current

awareness service from a library is characterised by high staff costs, which can be traded against the benefit to the clients associated with a saving in time in performing the sifting and browsing done once by the information staff. However, there is also a benefit to the library in respect of the knowledge about the work of its clients which it receives as a result of giving the service, enabling a more appropriate acquisitions and indexing policy. If the cost of producing bibliographies can be reduced by cutting out staff time spent on annotation, well and good. But part of the cost of a bibliography is the cost in clients' time to make use of the list.

A third problem is that not all the costs and benefits of a proposed service are clearly apparent at the time of making the analysis, and may be missed altogether. Etnyre (1973) reports a cost-benefit analysis on the installation of an indexed file of microfilmed technical reports. When the system had been in use for some time it was found that, due to the reduction in the time taken to identify pertinent documents, some research studies were being completed 40% ahead of the scheduled time. This meant that the work capacity of the laboratory increased by 12%, and more work could be taken on, amounting to an extra £70,000 per annum in revenue.

The various categories of costs and benefits that have to be considered in a cost-benefit analysis are listed below:

Systems costs

Salaries
Materials consumed
Space occupied
New equipment bought or maintained
Development of system or programs

Staff training to operate system

Costs arising from breakdowns of equipment, and power failure

Costs arising from a need to update programs or hardware

Cost of self-repeating errors accidentally introduced.

### Benefits to library and information unit

Feedback obtained on clients' needs and interests

Revenue collected from sales

Kudos for section from a successful service

Greater expenditure agreed by funder

Possibility of system being capable of additional tasks

### Costs to the user

Travel time to use the service

Waiting time to use the service

Time taken to get a result from the service (finding, checking)

Frustration from inadequate information about service

Frustration and time wasted when service gives no answer to need, after having raised one's expectations of success.

### Benefits to the client or his community

Time saved from performing the service for ones self

Time of project or process reduced as a result of information found and put to use

Increased output or extra work taken on

Increase in earning capacity of individual

Increased status in community

Cost-reduction ideas gleaned from information gained

Comfortableness from seeing how ones work relates to a concensus

Standard of individuals' work consistently higher

Satisfied expectations

## What costs to use in a cost-benefit analysis

When cost-benefit analysis is conducted in order to inform a decision, the costs considered must be those incurred purely as a result of the activity under consideration - or as Flowerdew & White-head put it "the cost which would not be incurred if the project were not undertaken". In a decision on whether to set up a new service which involved materials purchased anyway and a computer which was already in use in connection with other work, the cost of these would not be considered in the cost-benefit equation. "Costs that have al-ready been incurred are the costs of past decisions" (.Bickner 1971). Flowerdew and Whitehead distinguish between costs of this nature, which they call economic costs, and accounting costs. Accounting costs are the costs used in preparing and reporting on a budget. They are the financial costs that appear on a balance sheet. For example, if input costs were being accounted to the outputs of a service in order to judge a satisfactory price to charge users, then a proportion of materials and machine costs would need to be included.

If the decision to be advised is whether to increase the number of things being produced already (a wider distribution of the bulletin, SDI to more of the clients demanding it) then the costs to be considered are those associated with the production of extra single items. These are the "marginal" costs of the operation.

## Quantification of costs and benefits

In any cost-benefit analysis it will not be possible to express all costs and all benefits in cash terms, so that some will remain in the form of statements to be considered in the final stages of the analysis

alongside the result of the sum £B - £C = £W. For instance how do you put a cash value on safety, noise level, cleanliness, health, morale? Nevertheless, it may be possible to quantify some of the so-called "immeasurables" in units other than pounds and pence, and this represents a useful activity, bringing them into focus.

One approach to quantification of immeasurables is the rating of expressed opinion or attitude by the recipients of a service or other provision. Because of a natural tendency to prefer what we have now to some uncertain provision in the future, and because of the uncritical delight which follows an offer of something for nothing, especially if other people are already receiving the offered good, not much help can be expected from the answers to questions about how a hypothetical new service would suit clients. Orr's (1968c) checklist of alternative approaches to library services has been used to find librarians' and clients' relative valuations by asking them to allocate a fixed number of points among them. An attempt was made to use the judgements in a cba to advise allocation of funds. Stuart (1977) attempted to assess the disbenefits of delay in supplying requested publications by asking for opinions on the inconvenience caused on a scale "no effect" ..."a little inconvenient"..."inconvenient"..." highly inconvenient" However, it is difficult to see how generalisation about a particular type of service could be made from this sort of rating - so susceptible would the answers be to the nature of the clients' need at the time, and their expectations of the extent to which a particular publication would satisfy that need.

A temptation which has to be resisted in quantification is the acceptance of a measure of cost or benefit just because it is capable of expression in terms of cash, ignoring perhaps other more important

outputs which may be in less suitable terms - time,quality, quantity,

for instance.   Which is better, asks Davies (1973), a crude measure

of an appropriate variable or an accurate measure of a variable which

is only an approximation to the one which interests us the most?   In

Davies' example, "average student hours" is used as a measure of the

* efficiency of learning.   Average student hours is a measure of

intermediate output.   Intermediate output measures would be acceptable

as part of a cba if it were possible to establish a connection between

an intermediate output measure and a final output involved in the analysis

(CIPFA 1974).

To aid allocation decisions via cost-benefit analysis, cash

values of benefits must be obtainable for planned future services as

well as for existing services.   Benefit from existing services is

discussed at length in chapter 4, so here a limited number of techniques

appropriate to valuation of planned future services and provisions will

be mentioned.

The alternative cost of a service has been used as a statement

of its value.   This is the cost to the client of the next best alter-

native.   Since it can be estimated, alternative cost is suitable for

valuation of planned future services.  Getz (1980) estimated the value

of a branch of the New York Public Library system to its users as the

travel time and cost to reach the next nearest branch.         Hu (1975)

in comparing the costs and benefits of an existing bookmobile service

with those of a planned books-by-mail service, estimated the benefits of

these services in terms of the cost to the client of going to a library

instead, or buying or renting copies of books to read.   The benefit of

a current awareness service has been estimated by calculating the time

* Average student hours (ASH) is a measure of contact time with
students which can be used to compare with the cost of teachers
and equipment to achieve this contact time.

its clients would spend in scanning materials if there was no service (Mason 1973).

The advantage of the alternative cost approach is that substantial figures for benefit may be obtained, because the benefit to a single user is estimated, then this is multiplied by the number of users. However the valuation is no better than the estimates used in the calculation. In particular, the number of users of a future service may be difficult to estimate. When used for justification purposes, alternative cost calculations are subject to other objections, which are discussed in chapter 4.

Benefit from planned future services has also been estimated by asking prospective clients what they would be prepared to pay for the service. There are serious conceptual and methodological difficulties with the technique. For instance, if the respondents have not used the service, they are not able to vote on its benefits. For a new type of service, they may not even be familiar with the sort of benefit that they are likely to obtain. Again, either the sum of a benefit statement from all the future users must be obtained, or a sample of the users must be asked what they would be prepared to pay, and the values grossed up to a total value for the user population. Where the users of the new service are not known for certain, interviewing them all or taking a sample of them is likely to be very difficult. Whereas "prepared to pay" technique may be suitable for estimating the value of a service offering familiar benefits, like those from leisure activities for instance (Curry 1980), the method seems ill-suited to the valuation of new library services. Its use to obtain an idea of the benefit from existing services is discussed in chapter 4.

To help with decisions about how a public library book
budget should be allocated Newhouse and Alexander (1972) devised a
model which related the estimated benefit derived from each type of
book to its cost. The costs used were the average purchase price for
books in a class and the costs of processing. As regards benefit, the
model assumes that a loan confers on a borrower 1/10 of the benefits
of ownership of a book. It uses willingness to pay as a measure of
benefit, so the benefit from one copy of a book is related to its price times
the proportion of borrowers who would have bought the book for themselves
if the library would not have obtained a copy. This amount of benefit
would accrue each time the book was borrowed, so is multiplied by the
average circulation for a book in its class. Benefit is calculated in
two parts, before and after 1966 using different weights, $r_1$ and $r_2$, to
discount circulation so that the effect of falling circulation over time
is felt.

The benefit/cost ratio of purchasing additional books in a
class is given by

$$\frac{B}{C} = 0.1 \left[ \frac{a_1 \, p_1 \, q_1 \, r_1}{p_1 + 5.55} \right] + \left[ \frac{a_2 \, p_2 \, q_2 \, r_2}{p_2 + 5.55} \right]$$

where p is the price of the book, 5.55 dollars is the cost of processing,
r is proportional to the discount rate, q is the average circulation of
books within this class, and a is the proportion of borrowers who would
have bought the book for themselves if the library had not obtained a
copy.

A study of this sort is loaded with a number of assumptions, not
all of which can be true for each loan of each book. For instance, it is

assumed that each circulation of a book supplies benefit to the reader. Other assumptions are that a dollar is worth the same to all borrowers, (Newhouse and Alexander say that this is not a wild assumption, because public libraries in smaller towns like Beverly Hills "generally serve a rather homogeneous population") and that readers who would not buy the book would be prepared to pay something less than the purchase price for borrowing it.

Benefit cost ratios based on an examination of at least ten titles per class vary from 2.53 for Mysteries, to 0.05 for Public speaking. Some examples are given below.

Newhouse and Alexander seem pleased with their results, because the most highly ranked classes have B/C ratios that exceed those of the lowest ranked classes by about 20 times. The model indicates only those classes that the library should begin to strengthen. This is because the number of books in a class does not determine the circulation of books in that class. (After a while of buying books in a class with high B/C ratio circulation of books in that class would decrease, because not all books in a class are equally popular, and the library tends to buy the most popular books first).

| Class | B/C | Rank |
|---|---|---|
| Mysteries | 2.53 | 1 |
| Psychology | 1.51 | 2 |
| Pre-school fiction | 1.38 | 3 |
| Adult fiction | 1.18 | 4 |
| Young adult non-fiction | 1.11 | 5 |
| Art appreciation | 1.08 | 6 |
| Business skills | 1.07 | 7 |
| Medicine | 0.96 | 10 |
| Life Sciences | 0.87 | 12 |
| Poetry | 0.29 | 27 |

## Conversion of costs and benefits into cash

Traditional ideas on the evaluation of peoples' time for the purposes of cba favour valueing working time at the wage rate - "a procedure that is almost universally accepted" (Watson 1973). A reasonable valuation of non-working time is at less than the wage rate, since the time spent or saved is not productive time.

However if empirical evidence shows a value for time which differs from the assumed value,then this can be used instead. The evidence would involve observing choice on the part of the user. (For instance, in attempting to value travel time, it was noticed that drivers are sometimes willing to take a route involving additional mileage in order to save time). The values of time obtained in this way are clearly peculiar to the situation under study. Since they are not related in any way to the wage rate, they must not be used in cba comparisons involving alternative provisions where a function of the wage rate is used for time valuation.

Nevertheless the principle of observing choice on the part of the user is a useful one. For instance in valuation of a current awareness service by time spent in using it, if clients choose to study their copy of a bulletin over coffee, or on the bus, or at home, they are signifying that they do not wish to spend prime time on it, and it could be argued that this says something about how they value the service.

The principle of opportunity cost also affects the calculation of the costs of space and labour costs for use in a cost-benefit analysis. "The only reason you hesitate to spend a dollar ... is because of the alternative things it will buy" (Bickner 1971). This means that the space costs for running a proposed service are the benefits obtained by using that space in the most profitable way -renting it, or using it for bingo, perhaps? The cost of wages or salaries included in the

analysis similarly ought to represent the social value of the best alternative use of the workers concerned (Culyer 1972). If workers would otherwise be unemployed, the social costs of their labour for you are equivalent to the value they place on their leisure time.

Materials and machine costs for use in cost-benefit analysis are susceptible to the same principle. Keller (1969) makes a telling point when he declares the real cost of computers to be the benefits foregone from activities that can never be undertaken because of the rising costs associated with computers already installed.

Discounting costs and benefits to present value

For a number of reasons the costs of a project (and the benefits received from it) in the future are likely to be different from the present day costs or benefits. Firstly, since money received now can be set aside to earn interest, it is more valuable than money received in the future. Similarly dollars spent in the future are worth less than dollars spent today. Hence the costs or benefits of a service in the future must be discounted by the relevant interest rate to make them commensurate with the present costs or benefits of the project (Newhouse and Alexander 1972). With a discount rate of $i\%$, one pound's worth of benefit now should be treated the same as £ $\dfrac{1}{(1 + \frac{i}{100})^n}$ received in n years time (Flowerdew & Whitehead 1974). Fisher (1971) quotes Federal Government agencies as having used a discount rate of between 5 and 15 percent from "time preference" discounting.

Inflation will send up the future costs of a project and, by implication, the cash value of its benefits. This may call for a discounting procedure separate from the time preference discounting described above.

Thirdly, uncertainty about future technology and strategic change needs to be allowed for in a cost-benefit analysis of projects planned over an extended period of time, or in an area where rapid change is taking place. Discounting is not a popular way of accounting for the possible effects of change. One alternative approach is to add to the costs an allowance for a special study to resolve any un-forseen problems. Another is to use a gross adjustment factor (Fisher 1971) based on what has been overspent on similar projects in the past. Such a factor could be made sensitive to differences in timing, expectation of technological advance, and the length of the development portion of the project by comparison of these variables for the similar projects on which overspending occured and for the project under analysis.

## Handling "immeasurable" costs and benefits

In a cost-benefit analysis there will always be some elements of cost or benefit which "cannot be brought alongside the measuring rod of money". Several approaches have been used to try to bring them into a decision.

Where there is doubt about the true costs of a project, or where it is suspected that much has been missed out, then the costs can be overestimated, and the benefits minimised when working out the cba sum. If despite this the programme turns out to be socially worthwhile, then it must be worth proceeding with. Conversely, generous estimates of "fuzzy" benefits can be made, with costs if anything understated. If such an analysis shows a programme not to be worthwhile, it can be re-jected with confidence. It is possible that similar immeasurables can be cancelled out across alternative projects being examined. Perhaps a cost

can be offset against a fuzzy benefit within the same project.

Another approach is to make a decision on the basis of the costs and benefits of each project which were actually measurable. Now consider whether the value of the fuzzy costs and benefits is sufficient to change this decision.

e.g.      £ benefits - £ costs = £ Worth

Project A   £200,000 - £50,000 = £150,000

Project B   £180,000 = £70,000 = £110,000

Project A is clearly the winner here, but are the fuzzy benefits of project B worth the apparent difference in worth between the projects, due to the larger cost of B and the fact that not all the benefits are easily quantifiable?

Among several projects on which a decision has to be made, suppose that project Y looks good. Now resolve the immeasurables in favour of the next best choice. How does project Y look now? This is really the sort of approach used for the sensitivity analysis which should be the final part of a cba exercise.

Raffel and Shishko (1969) used a quite different approach to handling the immeasurable costs and benefits of alternative projects. In an analysis of the possibilities for the allocation of funds at the MIT library, they made a survey of how 700 users reacted to the alternatives. The alternatives and their costs were presented in tabular form (Fig.5) with a description of the benefits or disbenefits that each alternative entailed. Users were asked to weigh the costs and benefits of the alternatives and to choose those they would prefer, at 3 different budget levels. (They had so much to "spend" on the library, and had to decide how the cash was to be allocated).

The method is useful because the analyst does not have to place a value upon alternative provisions, but is presented with the preferences of the users of a library's services. The analyst still has to compare the valuations of different groups, and decide on an allocation between provisions, but this is not based on his estimate of their relative value.

There was every indication that personal preference was the deciding factor in respondents choice, and not the perceived value to M.I.T. However Raffel and Shishko received only a 40% return in their survey which limits the validity of the generalisations they made. (The questionnaire was distributed two weeks before the start of the examinations, which perhaps is not a good time to solicit students' preferences about library services). Another criticism is that reading descriptions of benefits and disbenefits associated with alternative provisons is not the same as experiencing them. However the respondents on a pilot survey thought that the comparisons given with the alternatives were meaningful.

The survey told the analysts which systems all the members of the university community would like to have, but it also allowed them to see the numbers supporting or opposing certain of the systems. Also the intensity of preference could be guessed at by assuming that if respondents maintained their valuation of a provision right across the range of supplemental budgets (from 200,000 through 100,000 down to zero dollars) then the provision was a very important one from their standpoint.

lengthened to two days.

| Alternative | Benefit Considerations | Annual Additional Cost to Present Library Budget |
|---|---|---|
| 1. 50% of the library's holdings of books which account for about 25% of total library circulations for the year, would be removed to an on-campus storage facility. There, these books would be stored as they are presently arranged (i.e., according to conventional Library of Congress classification) but access to the stacks would be restricted. Librarians would retrieve requested books on demand. | 1. Browsing possible only under special circumstances, such as for theses, special projects, etc. Users would also encounter an average delay of 1/2 hour to retrieve stored books. | 1. $ −10,000 |
| 2. Again, 50% of the library's holdings of books which account for about 25% of total library circulations for the year, would be removed to an on-campus storage facility. There, these books would be stored compactly (i.e., shelved chronologically and by size). Access to the stacks would be closed, and librarians would retrieve requested books on demand. (Note: 1 and 2 cannot both be selected.) | 2. Browsing impossible since books are not stored by subject classification. Users would also encounter an average delay of 1/2 hour to retrieve stored books. | 2. $ −25,000 |
| 3. *Expand seating* (all types) in libraries by 10%. (Note: From systems 3 through 6, only one may be selected.) | 3. Users would be able to find "choice" seating accommodations more easily. | 3. $ +25,000 |
| 4. *Expand seating* (all types) in libraries by 20%. | 4. Users would be able to find "choice" seating accommodations more easily. | 4. $ +50,000 |
| 5. *Cut seating* (all types) in libraries by 10%. | 5. Users would find it more difficult to obtain a seat in the library. | 5. $ −25,000 |
| 6. *Cut seating* (all types) in libraries by 20%. | 6. Users would find it more difficult to obtain a seat in the library. | 6. $ −50,000 |
| 7. The decentralized reserve collections would be replaced by two main reserve-study centers (one already in the Student Center, and another similar facility located near the Sloan-Hermann complex). (Overnight circulation would be permitted from this latter facility. Areas now in the libraries devoted to study-reserve would be converted into stacks. | 7. Replacing the decentralized reserve systems with two main study-reserve centers would lessen the current convenience of the more localized reserve collections, but would allow students to do all their work at one location. | 7. $ −75,000 |
| 8. The library would lower the charge for Xeroxing to local commercial rates, provide an operator, and encourage users to reproduce library material. | 8. Users could duplicate important material at low cost and would be able to use the material outside the library. | 8. $ +10,000 |
| 9. Ten supplemental *departmental libraries* located near classrooms would be built to house 10 years of the 20 most used journals and a collection of 3,000 books, including some required and recommended reading. These libraries would also have about 15 seats, but would provide no services beyond minimal cataloging. These might be contiguous to graduate lounges and study areas. | 9. Such departmental libraries would provide more conveniently located working collections, and increase the availability of required and recommended reading. | 9. $ +160,000 |
| 10. Instead of providing a reserve article per 10 students, the libraries would make enough complete Xerox copies of all articles (6) pages or less for each student in the relevant course and would distribute these articles. | 10. Students could have a complete file of required articles for future use, and could read and study them at any time, in or out of the library. | 10. $ +80,000 |
| 11. *Increase* annual acquisitions by 10%. (Note: From systems 11 through 14, only one may be selected.) | 11. Libraries could buy more new books as well as older books to "round out" the MIT collection. | 11. $ +80,000 |
| 12. *Increase* annual acquisitions by 20%. | 12. Libraries could buy more new books as well as older books to "round out" the MIT collection. | 12. $ +160,000 |
| 13. *Decrease* annual acquisitions by 10%. | 13. Libraries could buy fewer books. | 13. $ −80,000 |
| 14. *Decrease* annual acquisitions by 20%. | 14. Libraries could buy fewer books. | 14. $ −160,000 |
| 15. The amount of time spent by professional catalogers on each book would be limited to a shorter period. The proof-reading and checking of catalog cards would also be curtailed. | 15. The number of subject references for a given book would be limited. There would also be minor errors and other shortcomings in the catalog. | 15. $ −75,000 |
| 16. The library would cut its reference staff by 10%. | 16. Bibliographic services and information aids would suffer. | 16. $ −25,000 |
| 17. The library would add to its reference staff by 10%. | 17. Bibliographic services and information aids would be improved. | 17. $ +25,000 |
| 18. The library would implement a direct telephone line to, say, Wellesley, staffed by additional professional librarians on Wellesley. In addition, interlibrary loan would be improved by increasing internal operating efficiency and direct messenger pickup. | 18. Users would be able to find out about books at another university library and would be able to obtain books within hours. | 18. $ +30,000 |
| 19. The library would operate a long-range messenger service to the Library of Congress in Washington. | 19. Users would be able to obtain books from the Library of Congress if they could not be obtained from a nearby collection. | 19. $ +10,000 |
| 20. The library would purchase paperbacks of about 1/2 of books on reserve. This would treble the book/student ratio from 1:10 to 3:10. Circulation periods for these books would be lengthened to two days. | 20. Users would find required reading more readily available and would be able to take out these books for longer periods. | 20. $ +50,000 |

Figure 5. Costs and benefits of alternative library provisions (Raffel & Shishko 1969)

## Cost-benefit analysis - a useful technique?

According to Balls (1970) cba is not a substitute for judgement, but a means of narrowing the range over which pure judgement must be applied. If cba were the sole criterion of how an information manager should organise his services he might well find that almost all his effort should go into one or two services that obviously give the best return, neglecting others that the users claimed to be helpful (Arnold 1976).

Urquhart (1976) doubts the value of formal cost-benefit analysis in decisions about information systems and services. Speaking about information aid to research, he maintains that we should be prepared to feed the geese that lay the golden eggs, and supply them with all their information needs. "Eventually the total value of the eggs will be far greater than the total cost of providing for the geese". Nevertheless, one may assume that cba has considerable value, associated with the careful analysis of a situation which its use requires. Cunningham (1973) describes it as "a valuable heuristic" useful most of all when library or information service staff have grown blind to the possibilities for improvements in the service. Of course faith can move mountains, but not all men can be persuaded of this simple fact. A reasoned argument might succeed where Urquhart's approach would not convince a funder.

In the face of political considerations which will inevitably force a decision in a particular direction, cba could represent a total waste of effort. This view, outlined by Raffel (1974) seems to seriously challenge the value of cba until one remembers the interdependence of political and economic analysis. Is not the persuasive power of a clear demonstration of advantage irresistable? In any case it seems that

privilege, largesse or just plain hunch will always form part of

funding decisions by managers whose responsibility it is to distribute

large sums of money. For their advisers to abandon analytical

techniques because of this seems foolish. For them to criticise these

techniques for not including political considerations shows a lack of

understanding.

Raffel and Shishko's technique of having a sample of the

clientele choose between alternative allocation programmes has the

effect of quantifying user costs and benefits through the choice they

make, thus dealing with the problem of "immeasurables". However, these

authors found that the clientele was made up of sub-groups with different

preferences on how the available resources should be allocated, and

that these preferences were often in conflict. Several of the alterna-

tive projects studied showed benefit, but there was still a problem in

choosing between them, because they met different objectives held by

different subgroups.

A technique of resource allocation which accepts that this

situation exists and attempts to make use of it is BASYC - "Benefit

assessment for systems change". It starts with a problem (how to allo-

cate the book fund, for instance) attempts to identify the most important

goals of librarians, clients and funder in relation to the problem, lists

alternative solutions and decides between them on the basis of the ex-

tent to which they contribute to these goals.

A BASYC analysis consists of the following steps:

1. The categories of people who might be affected by the
   policy or system change are identified.

2. The goals of each category are listed, and weights are
   obtained to indicate relative importance of the goals.

Figure 6. Basic goal-tree for public library case with hypothetical weights and scores

(From Hawgood and Morris 1978)

| OPTIONS (A Decentralised automated) compared to existing<br>(B Centralised manual decentralised manual<br>(C Centralised automated) system | | | GOAL WT. | CURRENT OPTION SCORE<br>-10 to +10 | | | FUTURE OPTION SCORE<br>-10 to +10 | | | UTILITY CONTRIBUTION<br>Goal wt. x<br>Future score | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GROUP | TYPE OF BENEFIT | DETAILED GOALS | % | A | B | C | A | B | C | A | B | C |
| Public | Individual | Keep personal information private | 3 | -3 | 0 | -5 | -3 | 0 | -5 | -9 | 0 | -15 |
| | | Widen personal choices | 4 | 0 | +5 | +5 | 0 | +5 | +5 | 0 | 20 | 20 |
| | Collective | Provide more jobs | 3 | 0 | -2 | -4 | +3 | -2 | -6 | 9 | -6 | -18 |
| | | Improve general education | 10 | 0 | +2 | +2 | 0 | +5 | +5 | 0 | 50 | 50 |
| | GROUP TOTAL | | 20 | | | | | | | 0 | 64 | 37 |
| Library staff | Knowledge fit | Use abilities more fully | 2 | +1 | +2 | +4 | +1 | +2 | +4 | 2 | 4 | 8 |
| | | Allow more skill improvement | 0 | +1 | +4 | +2 | +1 | +4 | +2 | 0 | 0 | 0 |
| | Psychological fit | Decrease routine work | 3 | +6 | 0 | +6 | +6 | -4 | +6 | 18 | -12 | 18 |
| | | Increase responsibility | 1 | 0 | -3 | -3 | 2 | -3 | -1 | 2 | -3 | -1 |
| | Ethical fit | Preserve friendly atmosphere | 2 | +5 | -5 | 0 | +5 | -5 | 0 | 10 | -10 | 0 |
| | Efficiency fit | Quieter working conditions | 1 | -3 | -4 | -2 | 0 | -4 | +2 | 0 | -4 | 2 |
| | | Make hours more regular | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Task structure fit | Widen variety of tasks | 2 | +3 | -3 | +1 | +3 | -5 | +1 | 6 | -10 | 2 |
| | | Improve contact with users | 1 | +3 | -7 | 0 | +3 | -10 | +2 | 3 | -10 | 2 |
| | | Increase personal discretion | 2 | -2 | -5 | -7 | -2 | -10 | -5 | -4 | -20 | -10 |
| | GROUP TOTAL | | 15 | | | | | | | 37 | -65 | 21 |
| Library users | Speed of service | Decrease waiting time | 4 | +6 | -4 | +6 | +10 | -10 | +10 | 40 | -40 | 40 |
| | | Preserve short travelling time | 4 | 0 | -10 | -10 | 0 | -10 | -10 | 0 | -40 | -40 |
| | | Decrease searching time | 3 | +1 | +2 | +3 | +1 | +2 | +3 | 3 | 6 | 9 |
| | Comprehensiveness | Increase scope of collections | 8 | 0 | +5 | +5 | 0 | +9 | +9 | 0 | 72 | 72 |
| | | Increase hours of opening | 4 | 0 | 0 | +2 | 0 | 0 | +4 | 0 | 0 | 16 |
| | Confidence | Improve book location aids | 2 | +3 | 0 | +3 | +3 | 0 | +3 | 5 | 0 | 6 |
| | GROUP TOTAL | | 25 | | | | | | | 49 | -2 | 103 |
| Rate-payers | Increased income | Introduce commercial services | 2 | 0 | +5 | +5 | 0 | +5 | +5 | 0 | 10 | 10 |
| | Decreased costs | Reduce stock duplication | 6 | 0 | 0 | 0 | 0 | +6 | +5 | 0 | 36 | 26 |
| | | Decrease staff numbers | 10 | 0 | 0 | 0 | -5 | +3 | +7 | -50 | 30 | 70 |
| | | Rationalise accommodation | 7 | 0 | +5 | +5 | 0 | +5 | +5 | 0 | 35 | 35 |
| | | Minimise development costs | 5 | -7 | 0 | -5 | -7 | 0 | -5 | -35 | 0 | -25 |
| | GROUP TOTAL | | 30 | | | | | | | -85 | 111 | 126 |
| Library committee | External | Improve public image | 2 | +5 | -3 | +2 | +5 | 0 | +6 | 10 | 0 | 12 |
| | Internal | Improve flexibility | 8 | -3 | +3 | +2 | -3 | +3 | +4 | -24 | 24 | 32 |
| | GROUP TOTAL | | 10 | | | | | | | -14 | 24 | 44 |
| GRAND TOTAL | | | 100 | | | | | | | -13 | 152 | 331 |

3. A short list of projects alternative is drawn up.

4. Each short-listed option is scored from -10 to +10 for its likely contribution to each goal. (0 means no effect on the goal that is different from the effect of the present system).

5. The goal weights are multiplied by the scores to obtain a "utility contribution" for each goal, and these are summed for each project.

6. The sensitivity of "total utility" of each project to changes in the assumptions made in setp 4 is examined..

Figure 6 is an example of a BASYC analysis of 3 alternative book accession systems. Workshop sessions were set up in which participants acted as representatives of the different categories of people concerned. In a public library context this means the public, the library staff, the users, the ratepayers. The representatives drew up the goals recorded in column 3, except that the job-satisfaction goals of library staff were derived from a list from a previous study and attitude survey. The scores awarded to the effects of alternative projects are based as much as possible on objective measures like costs and times. First of all, current costs etc. are considered to obtain a "current option score". In a later session future costs and volumes and assumptions about future trends are included to give a "future option score". It is the intention that these operations are repeated until sufficient insight on the effects of alternative projects on each sub-group is obtained. Hawgood et al have written computer programmes to make the many recalculations involved.

The main problem of BASYC as the authors see it is that the weights that the various sub-groups attach to their preferences must not be too out of line. In the example, option A was preferred on the whole by the staff as meeting their personal goals, and could have

been the project which was selected, if staff representatives had
allocated higher goal weights. One wonders what the effect of having
actual members of the sub-groups involved in the workshop sessions
would be. Presumably they are represented by systems designers and
librarians. (Hawgood and Morris 1978, Morris 1979a, Morris 1979b).

## Conclusion

A conflict between Oldman's two approaches to resource
management is apparent in the techniques for resource management des-
cribed above. PPBS stands or falls on the ability of the system's
manager to perceive the "right" objectives, with little or no formal
input from the clients. BASYC on the other hand aims to derive an
analysis of how the goals of the various groups involved are affected
by each of several alternative projects - yet its final resolution
appears to depend on arbitrary weightings of these goals. These tech-
niques are immensely valuable heuristically, but the specific advice
they give tends to represent the needs of one dominant group. CBA
appears to offer a middle road, with alternative projects assessed for
their net social benefit. Yet is not client benefit estimated by the
systems manager? Very often the assessment is done through "surrogates" -
output measures certainly, but connected only indirectly with the impact
of services on the clients. Examples are Hamburg's document exposure
time, Kent's number of users per item of stock (Kent 1979), Newhouse and
Alexander's (1972) proportion of borrowers who would have bought a
target book if it was not in the library stock.

A radically different approach to allocation decisions has
been considered in the area of Personal Social Services (IMTA 1972).

There is a similarity with the library and information situation;
although most of the work of the PSS is in response to demand, local
authorities have a legal responsibility to provide help for all
physically and mentally handicapped persons and children in need of
care, so there are "non-users" who could benefit from the service as
well. What is proposed is that final output be measured in terms of
the degree of achievement of certain standards which could be applied
to the actual and potential clientele, and that the available funds be √
spent to maximise the degree of achievement over all clients. Wager
(1972) proposed fourteen different components in five groups as a basis
for the standards.

| | | |
|---|---|---|
| Sensory perception | : | sight, hearing |
| Intellectual processes | : | speech, mental clarity, stability |
| Personal care | : | washing, dressing, bathing, continence |
| Physical mobility | : | mobility inside and outside, negotiating stairs and steps, ability to sit and move about without falls or guidance. |
| Domestic activity | : | house cleaning, meal preparation. |

This sort of approach to the allocation of resources could be applied
to library management, in some areas at least. Below I have tried to
make an analysis similar to Wager's for social life and for professional/
/academic life.

A. Social life

| | | |
|---|---|---|
| Awareness | : | Extent of interest in world issues; local politics; changes in immediate surroundings; social, political, economic, moral, technological issues and ideas. |

| | | |
|---|---|---|
| Information use | : | Extent of knowledge of educational opportunities, legal rights and obligations, sources of data and ideas for social life. |
| Experience | : | Time spent on music, poetry, art, drama, sculpture, the novel, travel. |
| Self-realisation | : | Degree of realisation of personal interests, degree of interaction with other persons, interest in biographies, spiritual experience. |

B.  Professional/academic life.

| | | |
|---|---|---|
| Information consciousness | : | Time given to information collection, interest in current information, maintenance of personal indexes or files, knowledge of sources of data or information, index of isolation (visitors, visits, conferences etc.) |
| Information Use | : | Creativity, change in approach to work or subject or teaching etc. |

One problem is that there are no obvious standards of achievement similar to those which can be applied to assess physical or mental agility in the elderly.  Studies of the user which tell us about his use of information and materials could help us to establish such a standard.

In a relatively closed environment like an educational establishment, an industrial company or a government department it should not be too difficult to assess the degree to which potential library clients are existing below such a standard.  However, how does one go about obtaining useful information about the level of deprivation in the public sector?  While most people would agree that to help the elderly to enjoy a more tolerable old age is desirable, not all citizens are likely to agree to standards of literacy or awareness or self-realisation being set for them.

## CHAPTER   4

## Justification of the funds spent on library and information service

The need to justify requests for funds arises in all organisa-
tions constantly.  An example is the industrial library scene, where the
work can grow from the clerical activity of buying and looking after the
documents previously acquired separately by staff from different depart-
ments, to a useful intrusion into the information-processing part of
their jobs - as regards technical and marketing staff, anyway.   The
problem has been to persuade managers that libraries can do more than
centralised document acquisition and processing, and that having started
the systematic collection, examination and indexing associated with
information work, it would be foolish to abandon it to save a little money.

"Why is there a credibility gap between management which
thinks that information services cost far too much, and are a luxury,
and librarians and information officers, who believe that such services
are indispensible", asks Wilson (1974).   The librarian or information
officer is like a general practitioner - he is using his knowledge and
special skills to give a service which is appreciated when it succeeds,
but at the same time the money spent on his support is given grudgingly.
This could merely betray a lack of faith of society in the continued
support of its physicians, or of managers in their information providers.
Fortunately it is not as simple as this.  Why does management regard
information services as a luxury?   There are several contributing
factors.

A good deal depends on the sort of management involved.  The
manager who holds the purse strings may have a scientific approach to

problem-solving, or it may be his way to play things largely by ear.
The first type of manager can see some advantage in the systematic
collection of information about the task in hand, and its dissemination
to staff. A person of the second type is more likely to see a library
as educational in function,and be less able to see the need for an
organised information service.

In many organisations library and information services are
part of the general overhead, their cost being spread over all depart-
ments in the organisation. At times of financial stress there will
inevitably be pressure on top management from department heads to reduce
the burden of overhead charges, so that they may see a larger part of
the organisation's revenue available for running their departments. At
these times the canteen, the gardens and the library can suffer. The
need to reduce the size of overheads shown on a cost analysis submitted
in support of a merger or takeover bid can have a fatal effect on
libraries and other service departments. This sort of situation has
occurred in universities as well.

A concept that has done more harm than any other to library
funding, in industry at least, is that of the profit centre. It became
fashionable a few years ago to regard each department of a company as
having a financial input and output, and to encourage at least a balance
if not a net profit from departmental operations. Applied to marketing,
sales or production departments the profit centre concept can give a
departmental manager a convenient yardstick for measuring efficiency.
However, as in the case of Management by objectives a few years earlier,
the profit centre idea is not applicable to all departments with equal
success. Yet in the profit centre era a department without a cash output,

or one capable of easy conversion to cash, becomes a "non-profit centre". In this situation non-profit centres are in an unfavourable position when we need to show a convincing cost analysis. This is another reason why "information is considered less indispensible at times of economic recession" as Oldman (1976) puts it.

Industrial librarians' recipes for dealing with what Armstrong (1972) describes as " a keen smell of corporate surgery in the air" are mostly reactions to the impositions laid on them by accountants which have been described above.

- if library services are charged to the departments which receive them, the library is no longer part of the general overhead.

- if a value in terms of cash can be ascribed to the effects of library activities on its clients or on the organisation, then the library has a cash output to balance against the money consumed in its running, and can assume the more respectable status of a profit centre.

These and other approaches to justification will be discussed under five headings:

1. The use of intermediate outputs
2. Attempts to show a benefit in terms of cash
3. Measuring the total client time "spent" on the services
4. Charging for services
5. Demonstrating that the funds provided have been used to supply specific information inputs to the work of the clients.

1. <u>Intermediate outputs as a means of justification</u>

Use of intermediate output measures for justification has been heavily criticised on two counts. First the number of things produced by a service is proof only that the service has an output. It could be doing the wrong thing very efficiently. Secondly, acts of use are suspect as measures of value because it cannot be assumed that a

client will obtain something of value just because he has borrowed a
book or sat at a table or asked for a photocopy or been sent a bulletin.
However, Klintoe (1971) found that the presentation of an analysis of
intermediate outputs from the Danish Technical Information Service
and their costs to his funder was a useful justification technique.
He used this method successfully at the Danish Technical Information
Service.   His regular statement to his funders has two columns (Fig.7).
The second column shows opposite each service a list of accomplishments
for that service.   In the first column is shown the costs of these
outputs in terms of salaries and materials for each of several services
provided.   Klintoe describes the main advantages of his presentation
as follows: "discussions with the Board of Directors can be conducted
on the level of policy issues, not on detailed expenditure" and "The
public auditor ... can see exactly how the money is spent and the use
to which it is put".   His method of justification is not just a balance
sheet.   It explains how the inputs have been re-arranged to the advantage
of the clients, and in this lies its value for justification.

| Costs | | Accomplishments |
|---|---|---|
| b) Requests for procurement of Information (DK/S tasks) | | |
| Salaries, engineers (2594 h) | Dkr. 118,333 | 213 tasks from 116 diff. inquirers, i.e. |
| Salaries, office staff (914¾ h) | - 15,994 | 3 organisations |
| Consultants | - 5,117 | 8 centres of spec. knl. |
| Information materials | - 5,127 | 104 mfg. companies |
| Transportation and car-fare | - 4,875 | 1 public service |
| Hotel and board allowances | - 1,295 | |
| | Dkr. 150,741 | 213 tasks have been: |
| | | 199 – procurement of information |
| | | 14 – planning and management |
| | | of courses and conferences |
| Cost per request: Dkr. 708 | | Turnover per order: Dkr. 606 |
| c) Requests by telephone | | |
| Salaries, engineers (660 h) | Dkr. 31,602 | Approx. 2000 requests. |
| Salaries, office staff (86¾ h) | - 1,524 | |
| | Dkr. 33,126 | |
| Cost per request: approx. Dkr. 17 | | Free of charge. |

Fig.7.   Extract from a statement of costs and intermediate outputs
presented to the funding agent for justification purposes
(after Klintoe 1971).

## 2.   Showing a cash benefit as a means of justification

The several approaches to justification by showing a monetary
advantage as a result of information services are summarised in
Table 8.

| | | |
|---|---|---|
| 2a) | Attempting to trace a money-saving event back to information supplied by the service. | Hanson & Slater (1963); Moisse (1976); Cawkell (1972); Arnone & Jackson (1973); Hess (1973); Martyn (1964); Strable (1975); Martyn (1980). |
| 2b) | Showing the cost of supplying information as a small fraction of the possible advantage to be gained from using it. | Wills & Christopher (1970). |
| 2c) | Showing the alternative cost of a service | Mason (1972);  Magson (1973); Hu (1975);  Blagden (1975). |
| 2d) | Showing time saved for the client by performing the service for him. | Mueller (1959);  Amer.Chem. Soc.(1969);  Nightingale (1973); Fearn & Kovalik (1973); Wolfe (1974);  Mason (1973);  Blick (1975). |
| 2e) | Finding what clients would pay to receive the service. | Hawgood and Morley 1969); Dammers (1973);  Martyn (1980); Kiewitt (1979);  Keller (1969). |

Table 8:   Justification techniques which show a monetary advantage
from services.

2a)   Tracing a money-saving event back to information supplied by the
service.

That information has been supplied which can be shown to have
given an advantage to a client or to the organisation is a powerful
source of justification for an information service.   One tends to think
here of massive sums saved in investment funds or research time.  Martyn
(1964) from a survey of 647 scientists engaged in industrial, academic
or government research, estimates that about 1% of all research expenditure
in the U.K. in 1962 was unnecessary, because published work was not seen.
Hanson and Slater, Moisse, and Strable give examples of this:

"General Electric spent countless dollars investigating
methods of producing man-made rain by seeding clouds
with dry ice and silver iodide crystals. After two
years of work it was found that similar work research
had been reported in Holland, twenty years earlier."

- Hanson and Slater.

"A company librarian was told by a chemist in a steel mill
about an experiment which had solved a problem at a cost
of 10,000 dollars. The librarian told him that the
Germans had previously conducted the same experiment,
arriving at the same conclusions, and that their com-
plete report was on file. The report on the library
shelf probably cost less than five dollars when
purchased; it brought the total cost of the data to
10,005 dollars".

- Strable

"Several years ago, an electrical engineer spent seven
long weeks working out an intricate circuiting problem.
Later, to his and his firm's dismay, he found he had
duplicated the work done by another engineer earlier
that year. The other engineer's solution had been
reported in detail in a leading journal. Unfortunately,
our first engineer hadn't known about it."

- Strable

"During World War II, one of America's vital defence
plants maintained a costly staff of 800 engineers who
did little else but original research on a multitude
of projects which engaged their talents from anywhere
from two weeks to six months ... This ran into astron-
omical sums of money. And finally some management
expert, wondering about the necessity for this outlay,
selected 50 research projects at random and investigated
them thoroughly. To the amazement of the top officers,
he demonstrated that in fifty percent of the cases he
could have obtained the same, or better, information by
going to the library first - at a fraction of the cost!"

- Strable.

Obviously one or two corporate triumphs traced to information

supplied by the service will help. However, in creative work of any

kind there is a quiet series of useful inputs of lesser magnitude

going on all the time.

Hess suggests that when people bring items back to the library, they should be asked what use has been made of each item and for what purpose (for research, for teaching). Hess says "it is likely that this usage produces benefits indirectly", but this is as far as his suggestion goes. Hess's idea thus appears to be closer to measurement of use than to measurement of value. If we wished to extend his idea into value measurement we would need to conduct a small interview with each client as s/he returned material from loan. This would disrupt the workings of the library, because long queues would form at the library counter. A more convenient method would be to ask clients to write down their positive experiences in using a document, on pages attached to it. These notes might tell the librarian whether an incident of use had provided any value. (The notes might also be of value to subsequent readers of the document, because they indicated a reaction to reading it or using it).

Cawkell suggested that what he calls "action hits" should be identified. These occur when a library client obtains an article, reads it, and takes some beneficial action. A benefit to the client would be associated with each action hit - a sort of one-off saving traceable to the library/information service. A client might find Cawkell's question difficult, not because there had been no useful inputs to his work, but because the source of the information or document which supplied the input was not remembered as coming from the library service. Arnone and Jackson (1973) queried users as to what cost reduction ideas were actually gleaned as a direct result of "knowledge transfer by the system" and reported a similar problem: "to identify what part the technical information centre played in the ultimate success of the idea".

Both Allen (1977) and Blagden (1980) have reported project
work that tackles the problem of tracing information inputs involved
in a useful impact back to their source. Allen used the Solution
Development Record as a means of monitoring the progress of problem-
solving activities during engineering design projects, and to relate
progress to the use of technical information. The SDR provides a record
over time of the progress of a group of engineers towards a solution for
a technical problem. Each week a lead engineer in the group is asked to
provide an estimate of the probability of each alternative approach to
the problem being the approach finally chosen as its solution. At the
same time the engineer records the source of any new information important
to the project. As Allen says: "the probabilities plotted over time
become a graphic record of the solution history"
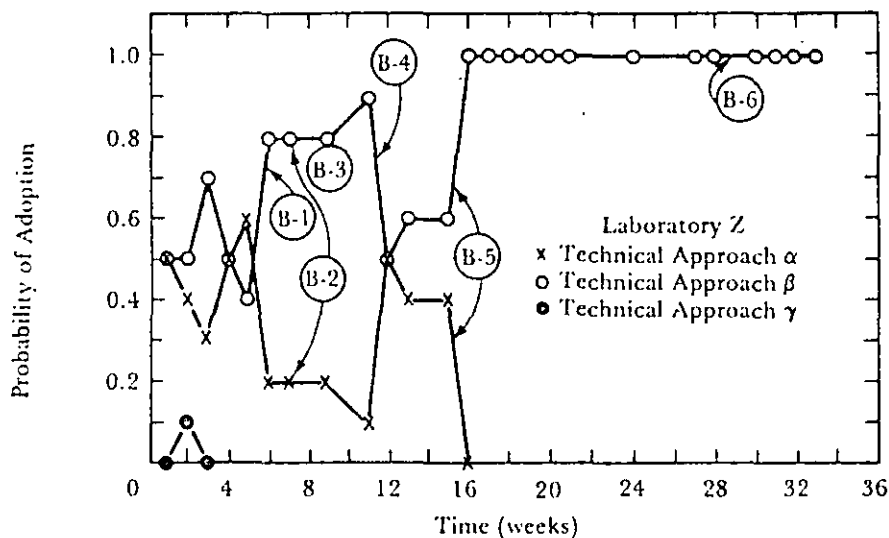


Probability over time for three alternative approaches (Allen 1977).

In the figure, the information inputs which proved important to the problem (the design of a very large dish antenna) are indicated as a letter in a circle. It must be admitted that the inputs indicated by the engineers for this project were mainly of information obtained from their own experimental work. Only $B_1$ and $B_6$ represent information inputs from outside the project. $B_1$ was test data from the project sponsor, and $B_6$ was information about possible fabricating machinery for the antenna. Allen's conclusion that the design engineers used informal channels of information much more than the literature should not prevent the SDR being used to trace inputs from an information service or a library. The technique would not be suitable for tracing the use of information in work like that of a manager or a social worker, because of the non-sequential nature of much of such work.

Blagden's approach establishes a link between the used information and the service by showing a borrowed item to the client. Blagden conducted interviews at GLC to see what support was given to the design process by incidents of use of the extensive file of manufacturer's literature on building products. People who had used the trade literature collection were shown material they had borrowed, and asked questions about the purpose of the loan, and the use of information contained in the material borrowed. Out of twelve clients, two said they could not remember borrowing the items, and three had read the material but had not used it directly. Seven had used the material in connection with the design process. This would have given a "beneficial impact ratio" of 58%, except that the evaluatory information supplied with some of the items implied that they were not entirely approved for use by GLC's division.

Martyn (1980) asked recipients of an information bulletin to
guess at the cash value of its contribution to their work performance
on a scale from five to twenty pounds per annum.  A question of this
sort is ambiguous:  the cash value of the bulletin could be because of
the time a client saved in not having to scan for current awareness, or
it could refer to value from information inputs received from reading
articles mentioned in the bulletin.  Martyn admits that respondents found
the question difficult to answer, and expresses surprise that so many
clients were able to give some estimate of value.  Respondents would
firstly have to think about how they could answer the question, and then
decide on what basis a cash estimate could be obtained.  Martyn has made
it easy for respondents to make a <u>guess</u>,  I believe, by giving a scale
of values on which they may make their reply.

In attempting to trace benefits from the use of library
materials or services in this way, we are counting what Hu (1975) calls
"consumption benefits".  Longer term benefits, arising out of such things
as·the enhancement of personal experience, are not discovered.  They
nevertheless represent important "hits" in the future.  For instance Hall
(1972) tried to show how possession of an information service can make its
clients more used to looking for information and putting it to use in
their work.  It is difficult to get clients to admit that an information
service, however good, has had an effect on their habits, in my experience.
Longer term benefits can accrue from information or documents supplied
by a library when such information is not put to use right away, but may
start a new train of thought, or open up prospects for new work or a new
approach to existing work.  It is difficult to see how such benefits can

be identified, except perhaps by sample interviews using a critical
incident approach.

A full catalogue of benefits from a library or information
service would be incomplete without counting benefits to the organisation
to which the clients belong - the company, the university.  These are
often at a level which would make them not discernable in interviews
with users of the library service, although this would depend on the
seniority of the user, and the elapsed time between the act of use and
the interview.   A recent report from the British Library (Martyn 1983)
suggests studies of benefits from information used in project work to
be made at the level of managers of such projects, presumably in order
to include benefits to the organisation.

2b)   <u>Showing the cost of supplying information as a small fraction
      of the possible advantage to be gained from using it.</u>

Another justification technique is to relate the cost of
getting information to ensure success for a project to the profits
expected, or loss to be avoided.  The cost can usually be shown to be a
very small fraction of the expected loss or profit.  Wills and Christopher
give an example in which the project is the launch in another country, of
a product currently sold in the U.K.   How much should the company be
prepared to spend on information to help with the decision?  The payoff
at various percent shares of the new market is calculated.  Prior to
collecting any information, there will be an estimate of the probability
of achieving various shares of the new market.  The lowest likely
profit (or highest loss) to the company represents the maximum sum it
would be worth paying to avoid an unfavourable outcome.

This sum would need to be translated into library or information terms. The nod that this justification technique gives to expenditure may not necessarily mean that the library would increase its stock. An information officer might spend time and money using information resources outside the library. On the other hand if the project was going to bring regular needs for information or documents, books or periodical publications might have to be ordered. The technique seems to be a very satisfactory way of justifying library expenditure. Blagden refers to the problems of keeping records of library time and money spent on materials associated with a project. The technique would be easier to operate in an organisation which was working on a small number of projects, if records were required to be kept. The technique does not show explicitly what part of the profits from an operation are due to the library contribution - but then it is intended as a way of justifying library expenditure, not a proof of the value of that expenditure.

2c) Showing the cost of alternative provision of a service

Mason (1972) suggested that one way to establish the value of a current awareness bulletin would be to use the cost of a similar but commercially published bulletin. Justification would consist of comparing the cost of the commercial publication with the in-house service. One would have to be sure that the commercial product was sufficiently similar to the in-house service not to involve the clients in extra work to make up for any deficiency of coverage.

Magson (1973) applied the idea to the information unit as a whole. He calculated the cost of various outputs in another department of his company, and compared these costs with the production costs of similar

outputs from the information service. He found that it would cost three times as much to produce some outputs - such as information bulletins and a directory - outside the information section, thus justifying their production by the information service. Magson has been criticised for carrying out a "cost comparison" not a "cost benefit" exercise, and because he has assumed that the information service is producing satisfactory outputs which are needed, before establishing them as less costly to produce than the next best alternative (Wills & Oldman 1977). The first criticism could be a quibble, because "alternative cost" is a perfectly acceptable way of valueing something (Hu 1975, Getz 1980). The second criticism applies not just to Magson but to all cases in which the alternative cost of a service is used to give an idea of its value, unless the study includes an admission from the clients of a service that it does, in fact, have some value for them (for instance, an admission that they would be prepared to pay the alternative cost, or separate evidence of value obtained from using the service).

The cost of alternative provision was used by Martyn in his survey of bulletins produced for local authority officers in Leicestershire (1980) in order to obtain an indication of perceived value. He asked the bulletin clients, "suppose this were a commercial service bought in from outside, like a journal or a magazine, what sort of price tag would you expect to see it carry?" The question is a bad one for two reasons: it encourages respondents to make a guess, and it equates a bulletin with a primary journal. The question might have been phrased better by reminding the user of the sort of value inherent in an information bulletin - that it collects together references from a number of publications which the client is saved the trouble of seeking out individually.

2d)  Showing time saved for the client

Perhaps the most commonly reported approach to justification
is to compare the cost of a service with the cost of the time saved
the client by not having to do the things which the service does for
him.  An alternative cost is being calculated, but it is the client who
is supplying the alternative, not some outside agency.  (The full
alternative cost to the client should include any fees and the cost of
any travel as well as the cost of time he would take to perform the
service for himself).  Some examples are given below.

In 1969 the American Chemical Society commissioned a survey
of 2790 chemists in an attempt to find the time saved them by various
sorts of secondary service (abstracts, title publications, patent
indexes, and computerised SDI services).  The main problem was that
respondents found it difficult to work out estimates of time saved.

Nightingale (1973) attempted to justify a current awareness
bulletin by asking clients how many extra journals they would have to
scan themselves if no bulletin were available.  The median was six extra
journals.  The total annual cost of the extra scanning at ten minutes per
journal for the 400 bulletin recipients was calculated as £29,600.  The
bulletin cost was £2,500 per annum, so there is a saving of £27,100.

Nightingale's estimate of benefit is clearly artificially
enlarged because of the assumptions he makes.  Only thirty percent of
the bulletin recipients responded to the questionnaire, and a quarter of
these answered that in the absence of the bulletin they would do no extra
scanning.  These respondents should not have been included in the time-
saving side of the calculation.  But apart from this, Nightingale has

assumed that all <u>recipients</u> of his bulletin are also bulletin <u>users</u>.
This is a bold unjustified assumption to make about a service which
arrives unsolicited on peoples' desks.  If the percent response to
his questionnaire is any guide, the number of clients who make use
of his bulletin to save themselves time is nearer to 100 than to 400.

It is difficult to see how clients could give anything but a
very imprecise estimate of the number of journals it would be necessary
for them to see if the bulletin was not available. A better question
would have been "how many extra journals <u>would</u> you read?   I believe
a more realistic reply would have been obtained by asking about the
<u>time</u> clients were willing to spend in doing extra scanning rather than
about numbers of journals.

Blick (1975) made a similar calculation and found that his
bulletin saved £75,800 a year in scanning time.  This was 3.6 times its
cost.  Blick asked for time spent scanning in the absence of the
bulletin, not an estimate of the number of journals that would be scanned.
This  should make the answers more representative of value, since it
relates more directly to the user cost consequent upon withdrawal of the
service.  However Blick interviewed only 10% of bulletin recipients for
this investigation, and made assumptions from the results about the
behaviour of the other 90%.

Fearn and Kovalik asked the clients of their computer SDI
service to state how many hours of their time per week was saved by
elimination of the need to scan abstracts, current contents pages, etc.
They were able to calculate that a total of 8,000 man hours per year was
saved by the 68 recipients of their service.  The average hourly salary

of a client X 8,000 minus the cost of the SDI service gave a figure

for net benefit from the service. They found a benefit of three dollars

from every dollar spent.

Mason (1973) calculates the difference between the cost of

an enquiry service given by the information unit, and the cost of the

clients doing it for themselves. (Rothstein suggested this approach to

showing the value of "reference service" in 1964).   The advantages

of centralised documentation and the expertise of the information workers

shows through in the results of such a calculation and makes it useful

for justification purposes.

Kramer (1971) used a similar approach to show that 1071 hours

of library staff time saved the clients 9,479 hours in total on literature

search.   Kramer admits that he asked clients to guess how much time the

library searches saved them.   He justifies his method in that it has

supplied management with a "rough yardstick" of the value of library

search services.

In an interesting experiment Blagden (1975) compared the time

taken by a library service to answer enquiries with the time taken to

obtain information on the same topics from sources outside the clients'

library.

Library clients were asked what sources they would have used

to answer previous enquiries of theirs in the absence of the library

service.   A student was employed to tackle the enquiry, using only the

sources suggested by the enquirer, or additional leads arising from them,

In all cases where an answer had been provided by the library service,

the search took longer when conducted outside the library.   In all but

two cases less information was found than had been supplied by the library service.

Blagden says that the results illustrate the enormous time savings which are possible with an in-house library service (140 to 250 minutes in this case), but also the superior quality of answer from an in-house service.

Time saved has been used to show benefit of a document delivery service by mail (Hu 1975), part of the alternative cost of which is the time taken to travel to a bookshop or a library. The cost of books purchased or rented was included in the alternative cost as well.

Perhaps the main criticism of "time saved" justification studies is that estimates made by a librarian of time saved his clients can be widely inaccurate. A second serious criticism is that such estimates can be made in the absence of a nod from the client that the service does in fact save any of his time. Bowerman (1971) points out that "a saving of time is not necessarily an increase in productivity unless the time saved is used for something productive". It cannot be assumed that an hour spent on information seeking is equivalent to an hour spent on one's work (Wolfe 1974). In particular it seems inappropriate to add up small time savings of five to fifteen minutes or so to obtain a value of time saved, since these small times are by themselves relatively worthless. Blagden (1983) suggests that if cost and benefit comparisons are to be made in this way, then the cost of time wasted in making use of the library should be added to the cost side of the equation.

However, Mueller's work on electronics engineers leaves one in no doubt of the value of a speedy information service to them. He

found that once the need for information arises, an engineer's productivity drops rapidly until the information is received. Some men, working on one job only, stopped altogether. Typically the engineer in this situation slows down, tries alternative approaches to the problem, and looks for alternative sources for information. There is a 25% drop in efficiency in a typical situation (Mueller 1959).

The value of an information service to its clients should be indicated by the maximum amount they would pay to keep it going (Flowerdew & Whitehead 1974). This is the thinking behind the attempt by Morley & Hopkins (1969) to justify a current awareness bulletin. They found that staff in receipt of the bulletin would give an average of £6 per head of their own money to keep it going. On the other hand they would vote £32 of university money for this purpose! The Durham University survey included the sentence, "Please note that you well may be asked to pay the amount to which you commit yourself", in an attempt to obtain realistic estimates from clients. In the event, twenty-two of the recipients of the bulletin were prepared to vote sufficient funds to pay the labour costs of producing a bulletin for thirty people.

Kiewitt (1979) found this sort of question useful in setting up a computerised search service. Wishing to know whether she should offer descriptor searches or free text searches of the ERIC database, she asked users to record the price they were willing to pay for each search. The average of their replies roughly correspond to the cost of a descriptor search.

An explanation of the low amounts offered in answer to a "prepared to pay" survey may be that respondents fear that they may be required to pay for the service in the future. (The Durham survey

included the sentence "please note that you may well be asked to

pay the amount to which you commit yourself", which probably explains

✓ why such paltry amounts were offered). Another possibility is that

clients offer small amounts because they cannot see the added value

of a service. An enquiry service from a library, for instance, relies

on a good reference collection and the expertise of staff in using it,

but clients asked how much they would be prepared to pay for the

service may not take this into account. Similarly, a bulletin has

added value because of all the scanning and selection which goes into

preparing it.

In the context of industrial information services to profess-

ionals, Flowerdew and Whitehead (1975) ask whether the individual's or

the organisation's willingness to pay should be assessed. I would say

that since it is the individual recipients of a service who have to pay

any penalties of use, and since they are the agents through which any

beneficial effect to the organisation must pass, then they are the

ones to establish an opportunity cost.

Morley and Hopkins (1969) point out that what people say they

are prepared to pay is not the same as what they would, in fact, pay.

Flowerdew and Whitehead (1974) say that an economist would prefer to

value something by observing what people would actually pay for it,

rather than ask what they are prepared to pay. It is difficult to know

how to react to these criticisms. Of course if libraries could charge

for their services without fear of losing their clients they would

presumably be prepared to put a price on them for a few months or weeks

to find out how their clients valued them. Economists would still be

uneasy about the validity of the method, since it is the <u>maximum</u> that a

person is willing to pay for a good that indicates its value to him. To go to such lengths just to obtain a "correct" valuation to use in justifying expenditure seems foolish.

Flowerdew and Whitehead also say that although there are serious difficulties in answering a hypothetical question like the "prepared to pay" question, the method, used carefully, "can provide relevant and useable information for assessing the value of information services to users". Hu (1975) asked the clients of book delivery services what they would be prepared to pay. He thought that "a good approximation of value perceived" by the client could be obtained by this method. For instance, Hu found that if a client lived further from the town library, then he offered to pay more for a service that was brought or sent to him. On the other hand, heavy borrowers "had a very negative attitude" towards paying for delivery services. I would say that the prepared to pay question is more useful for the valuation of a service with which the client has had some experience, than for the valuation of a one-off service, or a service planned for the future where the client has had no regular opportunity to see its value. In all cases where the question is used, an attempt should be made to make the client understand about "added value" of the service, or disbenefit that will be avoided by its use. The fact that what the client is prepared to pay represents money which he will be unable to spend on other materials should be pointed out.

Keller's (1969) idea for finding the value to students of their university library was to give each student a "library allowance" which is drawn upon each time he makes use of the library. Keller does not go into any detail about his idea, so it is difficult to evaluate it.

On the surface it seems a useful technique, because the librarian
would at least know which parts of the student body made use of the
library. It is not clear how a valuation could be obtained, however,
unless Keller has in mind the idea that the time spent in the library
would be deducted from a student's time allowance. This would be
difficult to measure for a large number of users, and in any case would
give an imperfect idea of the value of the library services.

3) <u>Clients' time "spent" on the service as a means of justification</u>

In a market situation,goods are manufactured at a certain
cost to the provider and sold at a certain price to the customer. Their
value is thus apparent to both parties. In the case of library and
information services, their cost is clearly apparent, but as their
customers do not have to put their hands into their pockets on each
occasion of use there is no realisation of value. The user of library
and information services does pay for them however, with the amount of
his time he spends on the service.

This briefly is the argument for justification of free services
by measurement of the time their clients are prepared to spend in using
them. It can be developed as follows: in a bad library clients may
spend a great deal of time in getting what they want, but they will not
do this very often. They will eventually go elsewhere for the documents
or information which are so hard to obtain through the library. In a
good library, clients may well spend less time per visit, because their
requirements are easily met. However, they will come again and again,
because it costs less of their time to use the library service than
other competing sources of the same information. One could define a good

library and information service as one that can supply useful information at the lowest possible cost to the client in terms of the time he must put into the transaction. Kochen's (1976) measure of the effectiveness of an information service is the number of clients who, having used the service once, come back to it a second time.

A value for current awareness service based on time spent would include time to scan a bulletin or current SDI notification, time to process these in some way (cutting and pasting or entering the items into a personal file or index), time to read the items obtained via the current awareness service - since none of these time-consuming activities would be undertaken in the absence of the service. The times could be obtained by self-administered questionnaire and by inspection of photocopy requests. It might not be possible without an interview to guesss at recipients who did not in fact make use of the service, however. Time spent by the client on processing the service might be solicited via a questionnaire, but an interview might uncover activities of this kind that had not occurred to the client.

To obtain times for in-library use would be much more difficult, since number of user hours could not be measured accurately by turnstile counts alone, and even if they could the time spent in the library building could not be equated with value since it might not all be spent using the services. Time of entering and leaving would have to be recorded, and users asked on leaving how they had spent their time in the library. Orr (1970) discusses the pros and cons of collecting information on the time spent by library clients on using library services by the diary method and by random time sampling using an alarm carried on the person. He comes down on the side of the second method, and gives examples of its use.

Wills and Oldman (1977) criticise "time spent in a library" as a measure of value as crude as "books issued". They are right to do so. The concept of time spent presented here is not time spent in the library, but opportunity cost, and would include clients' time spent outside the library in using materials obtained there or sent by the library. The measure is particularly appropriate for use with clientele who value their time highly - postgraduate students or managers, for instance.

4). Justification of services by charging for them.

Transfer of cash from the users of a service to the supplier provides him with an output to balance against the funds consumed. It has another advantage in that one of the problems with a free information service is that if it is a good one,everyone wants its products. When users of services have to pay for them on the basis of the amount of use they make, they begin to weigh up the value of their transactions with the service, and their use of it may decline. Hence charging for service helps to reduce me-too usage by people who want the service but do not necessarily need it. However some clients may become disadvantaged in deciding that, although they need the service, they are not prepared to pay to use it.

A charge that is there merely to transfer the costing of an industrial library will go un-noticed by its users, since they are not asked for money as they use the service, but a record is made followed by a book transaction between departments. This means that the clients of such a service cannot use the charge in the way that a payment from their pockets would be used - to weigh the possible benefits from using

the service against the cost of use. This could be a good thing,
however, because although the funder sees some justification for his
expenditure on the service in the charges transferred from departments
to the library fund, the clients are not inhibited from using the
library. They would be inhibited in another way if departmental
heads put pressure on their people to reduce their use of the library
so that a departmental allocation for library services is not exceeded.
Even this may not be a bad thing, because it could reduce library use
to those transactions which were likely to benefit the organisation.

Paying for public library services from user charges instead
of from local taxation, in order to justify money spent on them, would
be more equitable than the present system, but would inhibit potential
clients who needed the service but were not willing or able to pay.
The idea offends against the ideal of free access to information by the
public. However users of the public service do receive benefits from
use that are mainly private to themselves and it has been claimed that
the poor, who stand to lose access to libraries if a charge is made, do
not use them to any great extent.

There are three approaches to charging for information services:
to make a token charge in order to show that the services are valued;
to charge so as to cover the cost of the services; and to sell the
services in an attempt to make a profit.

4a) A token charge

Any charge which the clients will bear can be used to demon-
strate the value of a service, but Zais (1977) reports that the appropriate
price is the cost of producing the single items provided. This price is

open to detailed interpretation, but the idea is to ignore the fixed

costs of the whole operation.    For instance, the cost of a search

might be the cost of the searcher's time, ignoring the cost of the

stock or database he searched.    A bulletin might be supplied at the

cost of paper, printing and distribution for a single copy, ignoring

the scanning cost and the cost of material scanned.    Provided that a

simple formula for calculating charges could be worked out, this system

of pricing could be used to give the funder an idea of the value of the

services to the clients.    However, one thinks of Arnold's comment that

unless large amounts are to be transferred it "may be absurd" to set up

an accounting system to deal with them (Arnold 1976).

4b)    Cost recovery

Charging to recover all costs of the library/information service

on the face of it seems a sensible procedure, but it is probably the

most difficult of the three approaches to get started.    A costing

exercise on the library and information system has to be done, and some

way found to allocate the costs of materials, machinery, the manager,

the doorman and the teaboy to the services consumed by the clients.

Some system of charging has to be agreed with the clients of

the service, and arrangements made for a charge to be made across

departments.    A problem with operating a cost recovery system for

information services is that more flexibility than usual has to be avail-

able in the staffing of the service.    A fair proportion of part-time

staff on limited contracts can give this flexibility, together with the

use of outside consultants (Griffin 1980).    Another problem is that the

charges made on departments, because they have to be loaded with overheads

of the library and costs of materials acquired but not necessarily

used for a particular service, may have an inhibiting effect.    One

answer is to make a charge which covers the labour cost of services,

and to agree with departments an annual sum based on their usage which

will go towards the cost of materials and library overheads (Cook 1972).

4c)   Charging to make a profit

A convenient way to justify the funds invested in an information

service is to make a profit, by selling services to customers other

than one's own captive audience.  Examples of situations where this is

possible are the information services of research associations and

professional bodies, when there is no restriction on their commercial

activities.    Both sorts of organisation have a ready-made clientele,

which can be extended.  Media information services, because their files

have to be comprehensive, can easily go commercial.   Examples in the UK

are the F.T.Information Service and the BBC Data Enquiry Service.

An area of the country which has a high degree of technical or commercial

activity, but no good information service besides your own provides a

similar opportunity.  One has to consider how unique is the service that

can be offered, and what potential use there is for it.   Norton (1972)

gives a checklist of questions for those information units thinking of

"going commercial".

The pricing of information services sold on the open market

does not have to conform to one's management accountant's way of seeing

things, so one has a freer hand.  A common starting point is to see what

it costs people to obtain the product by other means, either by their

own efforts or from a commercial source.  The less work the customer has

to put into making use of what is provided, the higher can be the charge. People will pay more for evaluated information than for a list of references (Koch 1972). An updated handbook or compilation is much easier to use than a hardbound book with innumerable supplements, and will attract a higher price. For a service which is unique, one can charge what people are prepared to pay.

In whatever manner charges are made for information services, there will be resistance from clients who previously received documents or information for nothing. Veazie (1971) says that charges affect use in the majority of cases. In his experience 8 - 15% of clients will drop the services altogether, and 16 - 28% will reduce the use they make of them. Terry (1975) describes the introduction of voluntary charges at the regional Primate Information Centre in Washington, where imposition of fixed charges would have been unfair to researchers and students. A fee for each service was suggested, and the client given the opportunity of paying all or some or none of it. Terry found that long-term clients did eventually adjust to the need to buy information previously obtained free of charge. She makes the point that voluntary payments for services could be used as a guide to the value placed on them by clients.

Nancy Van House (1983) makes the point that if a reduction in the time cost of using a service can be made, this might help to offset the impact of charges in the mind of the user.

## 5. Justification by demonstration that the funds provided are used to provide specific information inputs

One problem of justification is that information is not seen as a resource, either by the funder or the client. (Universities are built from concrete and bricks and mortar and trees and water, but without information these things might never emerge as a useful campus). To be able to show a list of information inputs essential to the work of one's clients could be a powerful argument in obtaining the funds to supply these inputs. This would be especially so if an information input was seen to substitute for an input which represented a cost to the client or funder - a literature search, a series of experiments, a report commissioned from outside, a piece of equipment whose use was rendered unnecessary by the information. Apart from being able to see a formal listing, the funder and the clients of an information service will be aware that the analysis is being done, and this will help to make the true nature of the information department's work obvious to them. For example, Fig.8 shows a task analysis of basic research. Each task requires some information for its successful completion, and some of these information inputs are shown.

The literature contains several papers which describe different types of work in terms of tasks, and describe the sort of information which is put to use in those tasks (the papers by Chaddock (1970) and Wolek (1969) on the information requirements of engineering design for instance). Radley (1973) gives a task analysis of company operations as a whole and lists the information inputs, but not in enough detail to provide a convincing demonstration for justification purposes. Some indication of information inputs for investment decisions, forward planning and marketing are given by Aguilar (1967), Schoner (1975) and Jones (1974) respectively.

Figure 8

Basic Research : task analysis and information inputs to tasks
(Whitehall 1979)



**Idea for research** ← Details of other peoples work
- to avoid duplication
- to see what work needs doing
- to stimulate ideas

**(RE) Form hypothesis** ← Current theory of the process being investigated

- how do our ideas fit into what is known?

Information which contradicts the way we are thinking

An existing model to work with

Information which supports our ideas

Concepts from another science or technology which might give fresh insight into the problem

Data from experiment

**Make experiment** ← What methods, techniques, services can we use?

Information which helps with analysis of the data

Information which aids interpretation of the results

**Write-up research** ← Support for the discussion part of the paper

Details of other relevant work

Methods of presenting the results

Full details of references of papers to be cited

Fig.9 illustrates a task analysis of product development, and shows some of the information inputs which contribute to each task. Despite the generality of approach it will be seen that the information inputs give a clear idea of the sort of information which could be collected and disseminated by an information unit serving product development work. Commercial as well as technical information is involved.

Some of the information inputs in Figs.8 and 9 are from Slater (1971), but most were obtained by interviewing workers on research or product development and asking them about the last occasion on which they looked for information to help with their work. The responses were classified to obtain the types of input which appear in the figures. Some of the information inputs to product development were discovered when a programme of evaluation of research and development projects was under way.

In the future, if not already, the managers of academic and public libraries may feel the need to justify their requests for funds with some sort of display of the value of their service, or their ability to make money. In respect of any information service they give, they could use any of the approaches described above. Academic libraries may give information service to individual lecturers or researchers, or to projects. Public libraries may serve local government officials in this way.

The funder of an academic library may be persuaded that a record of the total time spent in using library services or materials constitutes a measure of their worth, since the clients of an academic library put a high value on their time, for the most part.

141

Figure 9

Product development : task analysis and information inputs to tasks

Getting an idea for a new product

Areas in which product development is needed
Consumer need
Competitor product
Patent applied for or granted
Results of basic research
New technology for production
Raw materials used now
Production process used now
News of alternative materials for formulation
Company markets

Evaluating the idea

Cost of developing the idea into a saleable product
Cost of alternative routes to the product
Consumer acceptance
Relevant legislation
Activities of competitors in the area
Price at which product would sell
Size of market for product

Making a prototype

Has anyone solved the problems in another way?
Results of basic search
Available materials and recipes
Available methodology
Design information

Adjusting the prototype to needs of cost

Alternative materials and recipes
Alternative methodology
Cost of raw materials

Planning the production

Available equipment
Design data for equipment
Alternative processes and their costs
Facilities available within the organization
Information on where production plant might be situated

Planning the packaging and/or presentation

Packaging materials
Effect of air, water, time, etc. on product
Packaging methodology and equipment
Consumer expectations of the product

The alternative cost of a documents delivery service or
an enquiry service could be used by the managers of academic or public
libraries as an indication of value, subject to the limitations discussed
in 2c above.

Charges already constitute a justification for continued
public library funding. Presumably in the future public libraries
will be collecting and lending video-recordings as well as sound
recordings, and computer programmes and games as well as books and toys.
Some public libraries can rent out their space for meetings of local
groups. Perhaps they may be persuaded to run and charge for seminars
and courses on the consumer information aspects of education, employment,
human rights, and the pursuit of leisure?

On the suitability of measures of value of services and of
libraries themselves much has been said. Purists look down on practical
measures which offend against one principle or another. There is a
continuing debate which tends to get nowhere. I like very much Flowerdew's
shrewd comment that the approach to value has not been pragmatic enough -
in the sense that evaluation is not about the difficulties of measurement
(in part outside the analysts control anyway) but about providing
information to help managers reach decisions. As Orr said in his frame-
work paper, "most operationally-defined measures depend upon several
assumptions that are demonstrably 'untrue' in some sense". The ultimate
criterion of suitability must be that "the assumptions are accepted as
valid by those to whom the analysis is presented" (Wills and Oldman 1977).

## CHAPTER    5


## Quality control of library services


Quality is a neglected concept in library and information
work, yet it is a key concept.  There is a long history of criticism
of library service by its clients, and ample evidence that the
criticism is ignored by professional librarians.  Bird's survey of
librarians' attitudes to effectiveness measurement showed cynicism
among the profession about information which reflected on performance,
especially information from users (Bird 1981).  Totterdell's conclusions
from the Hillingdon survey of effectiveness of public libraries was
that "they operate on a minimum level of satisfaction, surviving
largely on the goodwill, low expectations and relatively easy demands
of the majority of users" (Totterdell and Bird 1976)

Measurement and control of the quality of public services
is important for a number of reasons. One is that since people do not
have to pay for such a service each time they use it, there is no vote
in cash terms on the effectiveness of the service, such as there is
when goods are offered for sale.  Hence the supplier looks for some
other route for feedback on the effectiveness of the service.  Another
is that non-profit organisations tend to concentrate on efficiency at
the expense of effectiveness (Mckonkey 1975).  An example of this is
given by Bevan et al (1980).  The serving of plated meals to hospital
patients by auxiliaries reduces the cost of feeding by cutting out
wastage associated with serving food from bulk containers delivered to
the wards, and by releasing permanent staff for nursing duties.  It is
by any standards a more efficient use of resources.  But the patients

can suffer. Part of the personal attention which speeds their recovery has been removed, but also it has been found that patients may not eat the food because there is no longer careful supervision to see that they do. The new idea saves money, but it is less effective from the patients' point of view. Totterdell sees in public library service what he calls this "supplier effective, user in-effective" element.

Perhaps the most compelling argument for quality control is that a good service attracts more use. At a time when most librarians are looking for evidence to justify continued funding, a large following of satisfied customers is a most desirable state of affairs. The present trend of cheapening service to accommodate cuts is ultimately self-defeating because it means that the clients are being asked, in effect, to pay more for library service in unsatisfied demand and frustration. They will surely find other ways of satisfying their information or leisure needs. Totterdell suggests a better strategy might be for libraries to give up some services which serve needs well catered for elsewhere, and concentrate on improving the effectiveness of what is left. His recipe for attracting more users is a simple one: "by more effectively carrying out accepted and quite traditional functions, functions that possibly librarians think they are carrying out effectively at present".

## Approaches to quality control

There would seem to be two basic requirements associated with controlling the quality of a service. One is to discover what its clients expect from it with regard to its performance. The other

is to examine the service in the light of these requirements, so that it is designed and maintained to fulfil them. In the library and information field approaches to performance measurement tend to fall short in one or other of these particulars.

For instance, setting goals or objectives has been proposed as a pre-requisite for effectiveness (Weech 1974, Ladendorf 1973, Bunge 1977). According to Bunge "the evaluation of library reference services should consist of the determination of the level of goal achievement". The goals, he explains, are determined by the information needs of the users to be served. One would not wish to quarrel with this. But to a later statement of Bunge's, "Examination of any statement of purpose and objectives that have been developed by the library as a whole should be a starting point for the development of reference service goal statements", I would say that it is perhaps not possible to arrive at useful goals relating to the actual mechanics of giving a service without first understanding what is involved, and on what factors success depends? Evaluation by goal fulfilment sounds like an attempt to evaluate without user feedback.

Another approach to evaluation of performance has been to devise ways of using the statistics of library operations to reassure the librarian that the service is satisfactory. The chief argument against the use of library statistics in this way is that they are measures of intermediate, not final output. They tell us nothing about the successful impact of the library on its clients. Librarians are

aware of this, because when De Prospo (1973) undertook to develop

criteria of effectiveness for the Public Library Association of the

U.S.A., he asked 254 public librarians what library statistics they

would like to use in evaluating their services.  Most of his respond-

ents rejected  "use" statistics for this purpose, saying that they

would prefer to have verbal comment on the service from the clients.

A variation of the library statistics approach is to devise

one general measure which is applied across all aspects of library

service.  An example is Hamburg's "document exposure time" which was

developed as a convenient yardstick to use in PPBS in place of a value

measurement of library services.  This sort of measure is useless for

quality control purposes, because it does not single out a particular

library service, let alone a single aspect of one service. Another

type of general measure is exemplified by Rzasa and Baker's (1972)

"primary measure of effectiveness" which is a composite measure in-

volving a function of total user population, the number of clients who

use the library in a particular time period and the total items re-

shelved in that period.

The quality of a service is often investigated by asking users

what they think of it.  There have been many library studies of this

sort, usually by means of a self-completed questionnaire.  One of its

problems, described by Pizer and Cain (1968), is an inadequate number of

responses.  Also it was suspected that users made "less than candid"

replies, and some respondents would express personal opinions on

services they had not even used.  Totterdell (1976) explains that the

average person does not hold strong views about libraries, so that

questionnaires are "blunt tools" for collecting data on how effective

a service has been because they do not "pierce this comforting

generalisation". Kaske (1973) attempted to assess the level of user

satisfaction with individual services at the University of Oklahoma

library. He asked his users to comment on the quantity of service

available, and to rate their attitudes to quality of services on a

scale :

excellent - good - fair - poor

Kaske invited comment on thirteen library services in this way, but

whereas the responses told him which services were not liked, they

gave no clue as to why not. Another example of user assessment of a

service is Dougherty and Blomquist's study of the relative effectiveness

of departmental libraries versus a central library service with document

delivery to clients' offices at two U.S. universities (1974). The user

was encouraged to rate departmental libraries by giving, on a scale one

to ten, his chances of finding a specific document on a visit to the

library. It was found that the "expectation ratio" related more to the

distance a client had to travel to use the library than to the concen-

tration of documents in his subject field which it contained. Part of

the Hillingdon project in public libraries was to have users comment

on fifteen assorted assertions about libraries ("It's not easy to find

your way in a library"; "Libraries don't have the sort of books I like").

Totterdell's comment was that there were too many favourable replies

from lack of interest, not necessarily because the service was well

liked. He concludes that an effective library needs to conduct user

satisfaction surveys at regular intervals to reveal changes in the level

of library output. It is clear that he means surveys similar to

Stradling's (1966) technique of finding out whether what clients were

given or took away from the library came up to their expectations
by putting a note in the item inviting this comment. I would say
that information from users about what happened when they used a
library service is useful, but not just in this sort of confirmatory
way. It can tell us what is important to the client about the way
the service is given. Some sort of regular scrutiny of the service
is then required to maintain its effectiveness along the lines
indicated.

Examples of a more objective approach to evaluation of
library services are unobtrusive testing, (which tries to get away
from the users' generous or half-hearted assessment), the extent to
which certain standards are followed, and the identification of
criteria for effective operation of a service.

Childers (1972) work on the unobtrusive testing of reference
service makes use of questions to which answers are already known, and
the tester poses as an ordinary library user. An enquiry service
always gets considerably lower marks by unobtrusive testing those it
obtains by asking users to say if they are satisfied with the service,
or by keeping a count of successfully answered questions at the enquiry
desk. Unobtrusive testing is clearly a valuable tool in evaluating
reference service, but the method needs to be improved to make it use-
ful as a means of diagnosis, and used with a set of effectiveness criteria
in mind. What is important about reference service to keep it respon-
sive to clients' expectations? Can unobtrusive testing be used to assess
one or other of these critical factors?

Standards for library service are, as far as I have been able
to ascertain, standards relating to resources: staff, materials and

buildings. It is difficult to see how they could ensure the quality
of library service on their own. There appear to be no standards
relating to the operation of services. Even those standards that are
not obviously quantitative refer to material provision, not services.
For example, "materials acquisition should meet high standards of
quality in content, expression and form" (ALA 1967), "the collection
of fiction should contain an adequate representation of all adult
fiction currently reviewed in the main general and literary periodicals"
(Bourdillon 1962). The recently-published "Guidelines for reference
and information service to public libraries" (LA 1981) are based on
materials, not criteria of operation.

However Beasley (1974) maintains that quantity has a positive re-
lation to quality in a library administered by professionals. If this
means that resources can decide the quality of library service, then
the Childers tests - made in areas having well-funded libraries - give
it the lie, because their reference services were working at a
satisfaction rate of only 50%. Also it is difficult to see how the
professional values of staff can ever ensure the quality of library
service in the absence of a paradigm for effectiveness. Totterdell
(1976) is of the opinion that it is dangerous to assume that what is put
into a service in terms of stock, staff and buildings will automatically
produce a library service which is effective in direct proportion to
those resources, and he gives examples to show what an empty argument
this is. For instance, a library might be buying more than the number
of titles per 1,000 population recommended by the Bourdillon report,
but those selected could be completely unrelated to the needs of the
user population.

Standards have been heavily criticised in that they are not related to the needs of users (Totterdell 1976, Aslib 1963). They are arbitrary recommendations (Stayer 1971) based on statistics from large libraries and the wisdom of the seers (Bloss 1980)! They are sometimes just exhortations to newer types of library service, like media centres (Martin 1974) or formulations of minimum levels of service, but above all they provide no basis for evaluation of performance on their own. Totterdell says standards are not a measure of effectiveness, but that they may be a pre-condition of effectiveness, Bloss (1980) that they are of no use without guidelines for service.

Orr has presented an interesting approach to the "objective" evaluation of library service involving standards of provision, rather than input. A checklist covers 17 categories of service to clients, (Figure 10), and within each category the manner in which each service is administered. For example, with regard to the supply of copies of documents held in the library, there could be either no service at all, self-service, staff-mediated service only, or a choice of staff services or do-it-yourself. The checklist is used to show the level at which each service is given. By weighting the answers it is possible to compare overall scores for level of service from one library to another. Orr has thought out a complex scoring technique to overcome the main problems associated with weighting, and combining the weights of, multiple attributes (Orr et. al. 1968c)

Evaluation of a service begins by first of all recognising what it is about the service that people value. Once we know what people are looking for, we can arrive at criteria to evaluate our own particular contribution towards the satisfaction of their needs. Let

## Figure 10.

## Library Services Classified by User-function Served (Orr 1968c).

I. DOCUMENT SERVICES – providing documents* for which user has correct bibliographic descriptions (citations)
   A. *Making documents available for temporary use*
      1. On one-time basis
      2. On continuing basis (e.g., routing user-specified journal titles)
   B. *Supplying user with personal copies of documents*
      1. Originals (ordering for user)
      2. Facsimile copies

II. CITATION SERVICES – providing citations to documents
   A. *On one-time basis*
      1. Providing correct citations when user has incomplete or inaccurate bibliographic descriptions ("verification")
      2. Providing citations to documents relevant to user-specified subjects
         (a) Sample bibliographies (e.g., "several recent papers")
         (b) Exhaustive bibliographies
         (c) Critical bibliographies (selected for "merit")
   B. *On continuing basis*
      1. General alerting services (e.g., current journal shelves, monthly acquisitions list)
      2. Specific alerting services
         (a) Relevant to specific subject or tailored to interests of user group
         (b) Tailored to user's *individual* interests

III. ANSWER SERVICES – providing *specific* information to answer user's questions
   A. *Simple facts* (e.g., address, spelling of name)
   B. *Simple summaries* (e.g., biographical sketch prepared from multiple sources)
   C. *Complex facts* (e.g., compilation of conflicting data)
   D. *State-of-the-art summaries or critical reviews*

IV. WORK-SPACE SERVICES – providing space equipped for user to "work" † within library
   A. *Work involving library materials*
   B. *Other work*

V. INSTRUCTION AND CONSULTATION SERVICES
   A. *Formal and informal instruction in library-related subjects*
   B. *Helping with user's personal information system*
   C. *Exhibits*

VI. ADJUNCT SERVICES
   A. *Translations*
   B. *Editing*
   C. *Non-print media and equipment* (e.g., films, sound recordings)
   D. *Special services* (e.g., preparation of illustrations)

* The term "document" as used here and elsewhere in this article refers to a discrete bibliographic unit of recorded information, regardless of its type or form; it can be a journal article, book, reprint, technical report, etc., or a facsimile copy of any of these types of documents.

† "Work" is defined very broadly, to include any user activity the library accommodates as a matter of policy, e.g., it may provide rooms for group discussions.

us say we make and sell disposable razors. If we can see the customer
as he really is - someone who wants a smooth shave at least expense in
time and cash and mess, then we know that to have any chance at all
against electric shavers we have to keep our product cheap and easy to
use, and make sure that it will rust after, not before, it becomes
blunt. Now what measurements and controls on materials and production
are appropriate to these quality aims? Staying with the industrial
analogy, evaluation of the end product of a process is pointless unless
the process is altered to upgrade or degrade the product accordingly.
Many library evaluations consist of a separate once-only task, with a
report whose recommendations may or may not be implemented. A properly
worked out evaluation procedure is part and parcel of the process
evaluated (Martin 1974).

Finding effectiveness criteria

The criteria for evaluating a library service can be derived
from an understanding of what the client finds valuable in that service
as exemplified below for current awareness services. However, there is
no doubt that clients' reactions to their own use of a service can
reveal a great deal about its quality.

One approach is to ask clients to name the best and worst
features of services. Pryor (1975) did this for the NASA information
service. He found that after only a third of the clients had been
interviewed a consistent picture began to emerge. The sort of response
he found useful was that the category scheme for his index was not
keeping up with emerging new topics, that the current awareness service
should supply abstracts for easier judgement of relevance, that its
selectivity should increase, and that the response time of the on-line

reference retrieval system was too great.

A failure analysis associated with acts of use of a service is another approach which can reveal criteria for evaluating effectiveness. The client is interviewed before using a service to find what are his expectations. Afterwards the investigator finds out if these have been satisfied, then finds out why not. Of course the reason for failure may be due to lack of knowledge of the service or to bad use of it. However, it is also possible with this technique to build up a list of critical criteria related to the service itself. Lipetz (1970) used failure analysis in his study of catalogue use at the Yale University library and more recently it has been used to investigate the effectiveness of on-line search of computerised abstracting and indexing services (Johnson 1978). Using failure analysis Lipetz was able to discover that critical factors in user success with the catalogue were the physical convenience of use, the generality of subject headings, the extent of the cross-reference structure, and the amount of information supplied on the catalog card relating to content of an item. These findings are confirmed and extended by other failure analyses of catalogue use.

Information on the aspects of library services that are critical to effectiveness can also be picked up from clients' responses in surveys where the client is merely asked to comment on services, witness Stradling's survey of services at the Southend-on-Sea public library (Stradling 1966). The problems mentioned by Pizer mean that there is a good deal of chaff with the wheat, however.

## Deriving measures of effectiveness

How is one to decide that the selected criteria for effectiveness of a particular service have been satisfied? It is at this level of analysis that the idea of a goal or a standard has most meaning. For a criterion like timeliness, for instance, some reasonable numerical value needs to be set and adhered to. In many cases however, a criterion is the presence or absence of a condition, and no numerical value is involved. An example of such a criterion is the availability of up-to-date reference materials or subject knowledge for enquiry work.

How is the lack of achievement of a criterion to be signalled? Some criteria will be measurable at the library desk. For example, response time to supply a needed document not in stock can be measured from the date of request to the date of informing the client of its arrival. Other criteria require for their "measurement" some feedback from a user of the service, for instance the relevance of material supplied in an SDI service.

It is difficult to find measurements which are specific to a single criterion of effectiveness. The measures of recall and precision which have been used since the '60s to evaluate indexing and reference retrieval are a good example. Recall is influenced by the consistency of indexing or by the quality of the information retrieval thesaurus - its lack of cross-references or hierarchical structure, for instance.

## Quality control of SDI service

The application of criteria of effectiveness to quality control can be exemplified by considering quality control of SDI from a library

collection. Many industrial and polytechnic libraries
and a few public libraries give a current awareness service to a
captive audience of either technologists, marketing executives,
teachers and researchers, or local government officers in the form
of "selective dissemination of information" (SDI). This involves
personal notification of material which has been collected and scanned.
The scanner, who may be a subject specialist as well, obtains details
of his clients' interests and records them as an "interest profile".
He scans primary material (journals, magazines, newspapers, patents,
conference proceedings, reports, etc.) or looks for suitable references
to these in an abstracting and indexing services - either in paper copy
or on-line database. When something which appears to affect his
client's interests is found a notification is prepared and sent to the
client. This will be at least the title, author and reference of the
item. Subsequently a copy of the item may be given or lent to the
client if his interest is great.

The main value of such a service to the client is to reduce
the time he needs to spend in scanning new literature, and to produce
items which contain useful operating or strategic information. However,
it must do this with the minimum of extra work or frustration for the
client. From these requirements we can deduce criteria for effective
operation of SDI. The appropriate literature must be covered. The
scanner must be able to recognise and select potentially useful material.
The notification must arrive before the client hears of or sees an item
by other means. There must be sufficient detail about the item in the
notification for its relevance to the client to be clear. A copy of
the original must be available quickly on demand.

Effectiveness criteria for SDI are related to what the client values in such a service as follows:

| Value factors | Effectiveness criteria |
|---|---|
| Reduces time spent scanning | Coverage of literature |
| Produces useful material | Selection of relevant items |
| Minimises time to make use of the service | Timeliness |
| Minimises frustration in use | Content of notification |
| | Back-up service of copy |
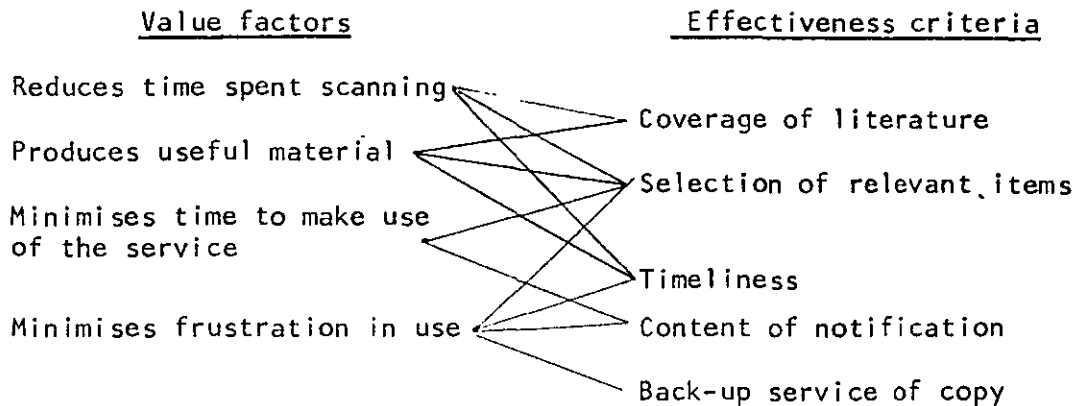
What features of the service have to be watched in connection with each of these criteria, and what feedback needs to be obtained to see whether or not the service is going off course?

Coverage : The scanners need to review what publication there is in the subject area of the service, and then to ensure that they get to know about any new publications in the area. Clients can be encouraged to complain about useful items they have found which were not notified by the service. Scanners should look out for unused elements of the interest profile. Also consistently few or no notifications to some clients may mean that their fields are not being covered adequately by the material scanned.

Selection of relevant items : The records of users' interests need to be kept up-to-date. The amount of knowledge of the subject possessed by scanners will affect their ability to recognise useful material, as will the detail they are able to get from the client on his work or interests. If the client reports items missed or irrelevant items, the interest profile may be out of date, or in not enough detail for the scanner to select adequately. If the scanner can be told about

any very relevant items found, this may help him to improve his
selection criteria. If clients receive consistently large numbers
of items or relevant items of only minor importance, the interest
profile may lack enough detail. Relevant items missed may also
mean that the scanner is having trouble with sources that are diffi-
cult to scan or search. The scanner may need training or practice
with difficult sources, like large abstracting and indexing services
or databases.

Timeliness: Some clients may need to know about new material
as soon as possible after publication (patent specifications, news
of new materials and processes or of competitors' activities, for
instance). The scanner needs to use primary sources in these cases.
Also the system needs to be reviewed periodically to ensure that no
time is being wasted between receipt of new material and its notifica-
tion. A client's report that he has already seen notified material may
indicate failure in either of these requirements.

Content : A source of frustration for the client is to receive
notifications which give so little information about the original
documents that they must be found and read merely to establish whether
they are relevant - let alone useful. If a free photocopy service is
supplied with SDI, a heavy demand for copies can indicate that this is
happening. Ideally the notification should contain enough information
for the client to decide whether the document has anything to offer him.
This usually means that at least an annotation is necessary.

Back-up service of copies : A copy of each notified document
needs to be readily available so that clients are not frustrated by
being notified of an apparently valuable document, then made to wait a

week or so to read it - perhaps to find that it is not relevant. The time that clients have to wait for documents can be recorded at the library desk.

Table 9 shows quality control criteria for an SDI service based on scanning library accessions, with control features and feedback indicated for each criterion. It will be seen that there is not always a 1 : 1 relationship between the sort of feedback that can be obtained and the individual criteria, that is to say the feedback is not completely diagnostic. For this reason as much information as possible should be obtained on the why and how of clients' reactions to notifications, and the librarian needs to do an analysis of the feedback from a client making a negative report. Feedback on an SDI service can be obtained on each notification by attaching to it, or printing it on the back of, a returnable slip inviting the client to respond to statements such as :

Item relevant, but of minor importance
(Please say why).....................

Item not relevant to my interests
(Please say why) ....................

Item is very relevant to my interests

Item is already known to me
(Please say how) ....................

As an example of analysis of the feedback, let us say that the

client produces an item missed by the scanners:

```
        ╱╲
       ╱  ╲
      ╱From ╲
     ╱Material╲ ── No ── ┌──────────┐
     ╲Scanned?╱          │ Extend   │
      ╲      ╱           │ Coverage?│
       ╲    ╱            └──────────┘
        ╲  ╱
         ╲╱
          │
         Yes
          │
          │
         ╱╲
        ╱  ╲
       ╱Adds╲
      ╱  to  ╲── Yes ── ┌──────────┐
      ╲profile?╱         │ Amend    │
       ╲      ╱          │ profile  │
        ╲    ╱           └──────────┘
         ╲  ╱
          ╲╱
          │
          No
          │
    ┌──────────┐
    │  Amend   │
    │criteria of│
    │ selection│
    └──────────┘
```
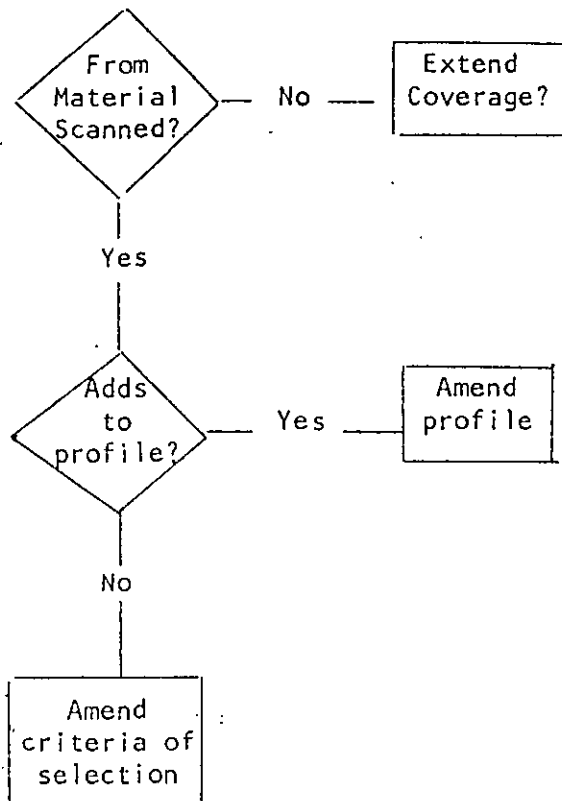
Table 9. Quality control of current awareness service

| Criterion | Control | Feedback required |
|---|---|---|
| Coverage<br>- by subject<br>- by type of publication | Review publications in the subject area & extent coverage<br><br>Obtain notification of new publications in the subject area | Consistently few or no notifications received<br><br>Relevant items missed<br><br>Some descriptors from profile are never used |
| Selection of relevant items | Maintain interest profile<br><br>Subject knowledge required by scanner?<br><br>Is profile detailed enough?<br><br>Training required with "difficult" sources? | Irrelevant items received<br><br>Relevant items missed<br><br>Relevant items of minor importance received<br><br>Consistently large number of items are received |
| Timeliness | Use primary sources in time-sensitive areas<br><br>Review production system to eliminate time-wasting | Items already known to client are notified |
| Content sufficient for client to decide relevance of item | Training in extracting and abstracting | High demand for photocopies of items notified |
| Back-up service of document or photocopy | Copy of original available soon after notification | Time clients have to wait for notified material<br>- document loan<br>- photocopy<br>- read item in library |

## Quality control of enquiry service

Enquiry service in this context means personal response to clients' questions which involves use of the library stock or a source outside the library. Checking references is not included in the treatment but included is the case where the client may have to extract information from a document that he has been given or to which he has been directed, the document being known to answer the enquiry.

Methods of evaluation of enquiry or reference service tend to be concerned with measuring things like number of questions asked, or answered (often broken down by subject area, or type of question) and time taken to answer questions. They do not tell us anything about the quality of the service given. A count of satisfactorily answered questions might seem to be a good overall measure of quality of service. However, Childers' (1971) work has shown reference librarians' counts to be very much on the generous side, and users' counts cannot be relied on because it is rare for them to insist that their question has not been answered, even when asked this. Even if counts of "answered" questions were accurate they would not be useful by themselves in quality control, since without a failure analysis of each problem question, there would be no indication of what was wrong with the service.

However, it is possible to see, in the various user studies that have been made, how certain criteria are repeatedly mentioned as involved in the quality of service. Rothstein (1964) mentions competence in the reference librarian, and the quality of the reference collection as being important. Stradling's (1966) survey showed that clients were disappointed in the age of the reference bookstock and that there was no coverage in some areas. Crowley (1971) found that information

supplied was often out of date. Lopez and Rubacher (1969) were able
to correlate user satisfaction and the personality of the librarian,
and Bunge (1977) reports that failure analysis showed staff's
attitude, ability to handle the "reference interview" and knowledge
of sources to be important. Childers (1972) discovered that com-
pletely inaccurate answers to simple factual questions could be ob-
tained from some of the libraries he unobtrusively tested!

Criteria of enquiry service quality can also be derived
from what the client is known to value in such a service as follows:

| Value to client | Quality criteria |
|---|---|
| Minimise time to make use of the service | Coverage of reference stock |
| Accurate answers | Ability to negotiate enquiry |
| Minimise frustration | Knowledge of sources |
| Courteous/caring attention | Personality of enquiry staff |
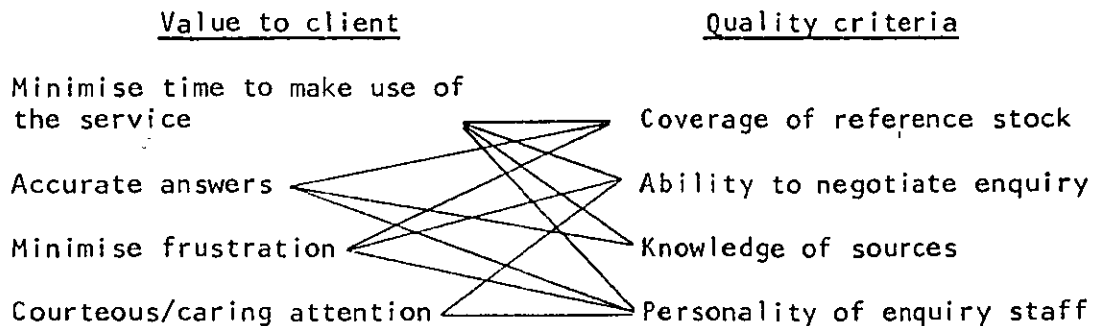
Table 10 shows features of an enquiry service that need to
be watched in connection with each of the quality criteria, and an
indication of how relevant feedback may be obtained. As with the
quality control scheme for current awareness service, it is possible
to see types of feedback which are relevant to more than one quality
criterion.

Coverage of the reference collection: The more useful and
accurate reference sources need to be at hand. Guides to the litera-
ture of various subjects and lists of recommended stock for enquiry
service can be used to discover useful reference material, as can
visits to other peoples libraries, of course. Currency of sources is
important. Access to computerised fact-finding services which are

Table 10.    Quality control of enquiry service

| Criterion | Control | Feedback required |
|---|---|---|
| Coverage of reference collection<br>- by subject<br>- currency<br>- by type of material | Selection policy<br>-relevant materials<br>-current materials<br>-accurate materials<br><br>Use on-line sources<br><br>Retain & renew useful sources | Check stock against lists<br>Date distribution of reference books<br>Rejected questions analysis<br>Record sources used<br>Failure analysis involving stocl |
| Ability of staff to negotiate the client's enquiry | Training policy<br><br>Staff's subject knowledge | Client's reaction to answer given or material provided<br>Unobtrusive testing using questions that need some clarification |
| Staff's knowledge of sources - inside<br>      - outside<br>and ability to exploit them in a search.<br>Speed. | Training policy<br><br>Selection of staff with formal libr. education<br><br>Staff's subject knowledge | Observational testing with questions formulated from material known to be in the library<br>Failure analysis involving searc method<br>Rejected question analysis |
| Personality of staff<br>- accuracy, care, courtesy, involvement | Staff selection policy | Unobtrusive testing, during which attitude of staff is judge<br>Personality testing of staff wishing to do reference work |

regularly updated will help with current information (Sullivan 1981).
Different types of reference material will be collected (not just
encyclopedias, but data books, glossaries, compendia, etc.).  As
regards feedback on the stock, Weech (1974) reports comparison with
lists of reference material to be a good test.  A record of sources
used to answer enquiries could reveal the most useful sources, and
also pinpoint inaccuracies.  A survey of date distribution of reference
stock will reveal any bias towards older material (Houser 1968).
Questions which the staff opt not to answer should be recorded, because
they may be an indication of deficiencies in coverage (Lancaster 1977).
The assumption here is that the reference librarian will refuse quest-
ions because it is known that the library stock cannot contain answers
to them.  Unanswered questions where an attempt has been made may
relate to poor coverage by subject, or to the lack of sufficiently
current material.

Ability of staff to negotiate the enquiry (the socalled
"reference interview") depends on their training or formal education in
librarianship, and on experience of enquiry work.  Subject knowledge
can help staff to gain the enquirer's confidence and so find out more
quickly what is required.  The common tendency for clients to generalise
a request or to frame it in terms of a book has to be questioned.
Feedback on how the client feels about what has been provided in the
way of an answer helps the librarian to judge whether negotiation has
been successful.  An alternative source of feedback on enquiry negotiating
ability is unobtrusive testing of the librarian, using questions which
need clarification (King 1973).  In unobtrusive testing a tester,
posing as a user, puts questions to the service to which an answer is
known in person or over the telephone (Childers 1972).

Staff's knowledge of sources and ability to exploit them in a search: Reference staff need training and experience in the types of material that are useful for an enquiry service, and in their use. In technical areas knowledge of the subject as well as the literature will affect question-handling ability (Rothstein 1964). Knowledge of sources outside the library can be important. As regards speed of enquiry handling,Bunge has shown formal library education to be related to this ability. In some cases knowledge of a foreign language can be important (Rothstein 1964). Discussion of feedback on searches, and of unobtrusive test results can be very helpful to the reference librarian wishing to achieve an improvement in performance. Records of sources which staff have used can be discussed to reveal little known or exploited sources; as can lists of questions which staff have rejected (Lancaster 1977a). Searches which failed can similarly be discussed, and if necessary, investigated. The reasons for failure may reflect on knowledge of sources or on ability to use them (Weech 1974). Unobtrusive testing, using questions that have been searched in a particular library in the past (Bunge 1977), can help to improve staff's use of the available resources.

Personality of enquiry staff: Lopez and Rubacher (1969) arranged for a professional psychologist to rate librarians for personality on scales used for counsellors and psychotherapists for empathy, respect, genuineness and "concreteness". There was an 83% matching between total score on the test and patron satisfaction with the reference interview. This is perhaps an interesting start, but obviously more work needs to be done in this area. Personality testing of recruits for reference work is an obvious form of control, but King (1973)

suggests unobtrusive testing during which the reactions of the
enquiry staff are observed.

On the whole control measures and feedback for reference
service are at a primitive stage. The present suggestions for
evaluation seem to depend on obtaining client's reactions or on a
failure analysis of some sort for each act of use of the service.
However, it has been shown in other areas that quite detailed quality
criteria can be obtained by considering a number of such surveys, so
that evaluation does not have to depend on examination of the details
of each act of use. For example, user studies and failure analysis in
connection with catalogue use has shown the specific factors which are
critical to quality of a catalogue, at the level of up-to-date-ness of
the subject heading list, methods of arranging and detail given in
individual records and so on. In other words, more analytical work
needs to be done on the reasons for unsatisfactory enquiry service, so
that much more detailed criteria can be obtained than those in column
one of Table 10. For instance, "currency" is a useful criterion for
reference materials, but what other characteristics of the tools of
the trade are important to success? How do different types of material
relate to the pattern of a search through reference tools for answers
to different types of question? What sort of knowledge about sources
facilitates their use? In formulating quality criteria for enquiry
work, we also need a more detailed knowledge of the human aspects.
What makes for speediness in enquiry work? Is personality really im-
portant to success, and exactly how is it important? A more detailed
analysis of what is critical would enable evaluation to use more systems
measures, and rely less on user reactions to each and every search, or
on unobtrusive tests of samples of the service at regular intervals. This
is not to say that user feedback is not involved in quality control
(see p.154).

## Quality control of document provision services

A common use for a library is to find a copy of a known document. The value of this library service for the client is largely involved with his time and convenience. How easy is it to judge if the library owns a copy of a book? How long does it take to find a report or journal on the shelf, or to discover that it is not available? Will there be a long wait while the library obtains the wanted material from another source? We can deduce quality criteria from these client requirements as follows:

| Value to client | Quality criteria |
|---|---|
| Minimise time to make use of the service | Coverage of the collection |
| | Adequacy of finding aids |
| Minimise frustration | Availability of material owned |
| | Speed of inter-library loan arrangements |
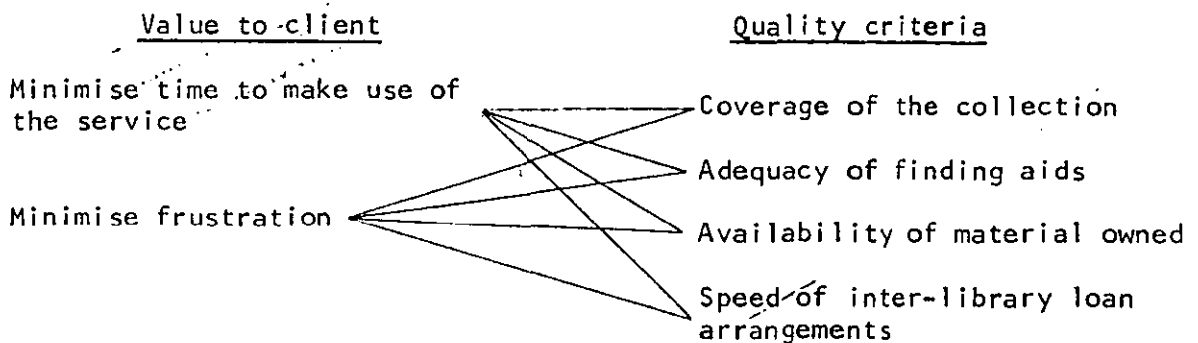
Table 11 shows control aspects for these criteria, and how feedback from the clients could be used in control of quality.

Coverage of relevant subjects or authors by the collection: An important control feature related to library acquisitions is to keep informed about potentially useful material which becomes available. Publishers' lists and requests from clients are a useful supplement to published current bibliographies. The accessions lists of other large libraries in relevant subject areas can certainly be helpful in building a technical collection. When a comprehensive collection is required in a few specialised areas, work has to be put in to identify as many as possible of the organisations likely to be publishing in these areas.

Table 11. Quality control of document provision service

| Criterion | Control | Feedback required |
|---|---|---|
| Coverage of collection. | Knowledge of new material.<br><br>Knowledge of publishers in the area.<br><br>Awareness of clients' work and interests.<br><br>Subject knowledge.<br><br>Most cited, most useful material. | Check against booklists.<br><br>Critical examination by users.<br><br>Critical examination of shelves by librarian.<br><br>Comparison with users' interest profiles.<br><br>Knowledge of information inputs to clients' work.<br><br>Reliance on inter-library loan.<br><br>Material cited or considered relevant by clients.<br><br>Use of books in a class. |
| Adequacy of finding aids. | Cataloguing conventions known to clients.<br><br>Conventions consistently applied.<br><br>All stock to be title or name catalogued.<br><br>Liberal attitude to name cataloguing.<br><br>Divided catalogues. | Check inter-library loan requests against catalogue.<br><br>Requests for material known to be in the library, but whose location cannot be discovered.<br><br>Failure analysis for items "not in library". |
| Availability of material owned. | Loan period short enough.<br><br>Number of copies sufficient.<br><br>Repurchase lost materials in demand.<br><br>Speedy, accurate reshelving. Shelf checks.<br><br>Speedy binding, or no binding. | Check against shelflist for availability.<br>- "Collection status"<br>- "Availability of books owned"<br>- "Collection bias" - the proportion of the 10% most popular books not on the shelves<br><br>Check against shelflist for misfiling.<br><br>Failure analysis for books not found.<br><br>- "immediate availability". |
| Adequacy of inter-library loan arrangements. | Identify areas where library is dependent<br><br>Identify outside sources of material in these areas.<br><br>Operate speedy system for ILL. | Elapsed time between request and notification that material has arrived<br><br>Whether client still needs material requested ● |

In many libraries a choice has to be made, because funds do not allow blanket purchase in a subject area, or, as is common in technical subjects, because many books may be published on the same topic at a time when there is much interest - the microcomputer is a good topical example. Awareness of the work and interests of the clients can help immensely in book selection (Maizell 1960). Knowledge of the subject can help the librarian to discriminate - also a knowledge of the need for texts at different levels of detail or difficulty. Some way of examining books prior to purchase should be available to client and librarian if at all possible. As regards selection of serials, it has been suggested that the most cited or most popular journals should be obtained for the collection, the remainder being available as title publications for current awareness, and as abstracts for retrospective search needs (Maizell 1960).

Feedback on coverage of the collection may be obtained in a number of ways. Maizell suggests a periodic check of the fraction of books the library has acquired from those that appear on booklists for various subjects. Bonn (1974) suggests obtaining feedback from regular users. As he puts it, "the users are the experts". Clients help should be invited to grade the collection from points of view other than subject coverage - for instance, as suitable for staff or postgraduate research, or for courses at different levels. Bonn also recommends "looking at the shelves" to get obtain feedback on out-of-date materials, completeness of journal runs, material which has had hard use, empty or overfull shelves in some subject areas.

Dougherty and Blomquist (1974) used the "classed interest profile" to compare holdings of various campus libraries. This is a

profile of individual teaching or research interests, expressed as class numbers. In this connection, libraries which give a current awareness service to some of their clients find the information about their work which is obtained useful in knowing what types of material to acquire.

Clients' requests for material not in the library is an obvious form of feedback on the coverage of the collection. It can be collected from failure analyses for wanted titles. As a measure of a library's self-sufficiency Bonn (1974) suggests the degree of reliance on inter-library loan. A library which aims for a comprehensive collection in one or two subject areas might find it worthwhile examining such feedback. Line (1973) asked academic staff to record all references to material found in a particular time period which they felt they would like to look at. Then he found what percentage of it was in the library. A similar approach is taken by Orr's document delivery test. As originally reported (Orr 1968b), lists of material cited by researchers at medical school in their recent articles are sought by librarians on the library shelves. (For details of Orr's test, see page 16.)

The amount of use received by materials in different subject classes has been used to predict the further use of materials in these classes (Morse 1968, Chen 1976). It has been suggested that predicted use of books in different classes be used to advise allocation of book funds across subject classes (Spurlock 1978).

Adequacy of finding aids: Control features associated with quality of name and title indexes that libraries provide for clients to locate

known items are that clients should know the rules that cataloguers apply in constructing records, that all material should have at least one entry in the catalogue to indicate its location, that name cataloguing should be extended to names other than author and editor for difficult items, and that records of different types should not be presented in the same array. Lipetz (1970) found that of 2000 catalogue users interviewed, 1120 were looking for a specific, known document. Fifty-six of these clients did not find an entry that was there - presumably because they did not know how the title and name indexes worked, or because of inconsistent cataloguing. Another problem was that although the library held material like conferences, dissertations and reports, there was neither a title nor a name entry for them in the catalogue. Both Lipetz and Swanson (1972) found that often a document was known by a name other than a personal name (author, editor) so that the inclusion of other prominent names from the document description in the catalogue was desirable. Jackson (1958) found that clients were twice as likely to miss items in catalogues where title/ author/subject entries were interfiled - suggesting that separate files should be provided for the different types of entry.

Feedback on name and title catalogue quality is difficult to come by, since users may conclude that since they cannot find an entry for it, the library does not hold the item they are seeking. Inter-library loan requests, checked against the catalogue before dispatch, will supply some indication. Clients' requests for the whereabouts of documents they know to be in the library, but which are not traceable through the catalogue, are another source of feedback. The failure analysis described by Schofield et al. (1975) can also be used to

investigate problems with the catalogue. Clients complete a failure

slip for items they cannot find in the library. A librarian sub-

sequently checks the shelf and the catalogue. The blanket assumption

that "failure at the catalogue" is due to readers' stupidity or lack

of knowledge has to be discarded. Many such failures have been shown

to be due to poor quality catalogues (Quigley 1944, Jackson 1958,

Perrine 1968, Lipetz 1970, Swanson 1972, Needham 1974, Pryor 1975,

Lancaster 1977a, Atherton 1980).

Availability of material owned: Control of availability involves

a number of factors, some of which are inter-related. The loan period,

the popularity of the item, the number of copies of a text in stock,

repurchase of lost materials, speed and accuracy of reshelving, and

binding are some of the most critical. Availability of popular books

is increased by shortening the loan period or purchasing duplicate

copies of them. Buckland (1975) has devised a mathematical model which

connects availability with loan period and number of copies, assuming

that one knows the average request rate for a title. Hoffman (1978)

calculates the number of times a book from a particular class must

circulate before it is worth considering a second copy, using Chen's

(1976) loan model. However, Buckland's equations show that doubling

the number of copies of a title does not double the probability that a

copy will be available when sought. In fact, the increase in avail-

ability that comes with each successive copy purchased falls off

steadily. There is a marked tendency for borrowed books to be returned

when they are due back, regardless of the length of the loan period.

This makes shortening the loan period a much cheaper way of controlling

availability than buying extra copies - if the clients can accommodate
to a shorter loan period. The binding of paperbacks and cased books
for durability, and the issues of a volume of periodicals to preserve
file integrity are important in a library where material receives
high usage. However, binding reduces the availability of an item con-
siderably at a time when it is in high demand. Buckland justifies
the cost of an in-library bindery in terms of the reduction in user
frustration, and the staff work associated with sending materials away
for binding. Materials may not be available because they have been
mis-shelved in the wrong place. Bookstein and Swanson (1973) have
provided a mathematical model which indicates how frequently to make
checks to see whether books have been shelved in their designated order.
The frequency of checking depends on the use expected, and on the
ratio of the number of books in a section to the number of books on
loan in that section.

A number of tests or measures of availability have been
proposed, mainly as a result of work in academic libraries, which have
to be able to supply the same text to large numbers of students each
year. Kaske's (1973) "collection status" calls for the librarian to
take a sample from the shelflist, and calculate the proportion of
documents which are  (a) on the shelf in the correct place;  (b) awaiting
shelving;  (c) checked out;  (d) mis-shelved, and (e) stolen. DeProspo
(1973) in his "availability of books owned" measure, calls for 200 books
from the shelflist list to be checked against the shelves. If seventy-
five of the books are available on the shelf, then the "availability of
books owned probability" is $75/200 = 0.375$. Schofield et al (1975) asked
readers to complete a failure slip for an item they could not find in the

library.   The slip is later checked against the catalogue and the
shelf.   Perhaps the best-known diagnostic test of book availability
is Orr's (1968b) Document Delivery Test, which supplies a Capability
Index based on the time it takes to find an item (see page 16 for
details).

Speed of inter-library loan arrangement:   The adequacy of the
arrangements for obtaining material wanted by users but not in the
library stock is critical to the quality of a document-supply service.
Even when a library aims to be self-sufficient, there are always some
items which have to be obtained from elsewhere.   However, Bonn (1974)
suggests that a librarian should decide whether his library is aiming
at self-sufficiency in a particular area, or whether it is for that
area a desk from which the library system can be accessed.   This is a
good idea because it encourages the collection of information about
sources for documents which are needed occasionally in the areas not
well covered by the collection.   In other words, one should know what
areas one is going to cover in depth, and ensure easy access to
outside sources in those areas.

        Feedback on the quality of inter-library loan arrangements
could be as simple as measuring the elapsed time between the client's
request and the issue of a notification that the item is ready for
collection.   Stradling (1966) adds a further dimension of user frustra-
tion by suggesting that when material arrives from outside, the client
should be asked whether the need for it has disappeared.

# CHAPTER    6

## Choice between alternatives for service

Within the context of an individual library service, quite different approaches are possible.  For example, a current awareness service from a library could be given by sending the same information bulletin to all clients, or by sending separate notifications to individuals.  Also there are choices within the idea of a bulletin service - contents pages of journals, selected titles or annotated titles or abstracts.  But current awareness service does not have to be prepared within the library at all.  A service might be bought in from outside the library.  An example is the bulletin used by engineers at the ITT library, which comes from a search through the INSPEC database, and is printed and distributed by INSPEC to the laboratories. Another example is the bulletin on higher education prepared at Aston University library, but sold to other university and polytechnic libraries for use by their readers.

The available evidence suggests that librarians make choices between such alternatives for service in ways that do not take note of the impact of the service on its clients.  For instance, an alternative is often selected because it is <u>available</u>.  One thinks of Cleverdon's amazement that computerised searching of abstracting and indexing services should become so popular, despite the demonstrably poor performance of the early searches compared with the manual approach via printed abstracts.

* *(personal communication)*

Another common reason for selecting a particular alternative is that it is <u>cheaper</u> than the present approach. Changes in the sequence of processes to cheapen the production of a service - an attempt to increase efficiency - may affect adversely the quality of a service (Orr 1970). The purchase of a ready-made service from outside at less than the cost of producing it in the library - SDI or a catalogue, for example - is an option that is increasingly available to librarians. Armstrong (1972) points out that it may be a serious mistake to rely on cost comparison in making such a choice, since the service from outside may not do as much for the clients as would an in-house service produced with them in mind, and that such services are often sold at below their true cost, at least for a time. Getz (1980) feels one of the principal advantages of service from a library to be that "the inputs are bundled together in ways that make a service available to patrons more valuable than the sum of its parts". Part of the value of libraries is that they can arrange the inputs in ways that exactly suit their clients, so that he has what he needs, not what the producer of a commercial service can sell to a wide market. The notion of a library as a desk from which the world's literature can be accessed (Orr 1968a, Bonn 1974) needs to be examined in terms of the effect on the client as well as the cost saving associated with purchase and processing of an item for stock.

An alternative for service may be selected because it fits better into the library's system for doing things. Hall (1976) finds that in choosing a bought-in service an information officer will first consider its reliability and its suitability to fit into his way of doing things. Then he will consider the cost. Last of all, when

unreliable and too costly services have been ruled out, what Hall
calls the "qualitative dimensions" of the service will be considered
- convenience in use, suitability for different types of search,
availability of documents, etc.

The point at issue is that availability, cheapness and con-
venience are all perfectly acceptable reasons for change, but not on
their own, since they ignore quality. Choice between alternatives
for giving service has to be done using techniques which allow com-
bination of the manager's orientation towards cost and efficiency with
the client's value system. An example of a "cost-effectiveness"
comparison which ignores this requirement is reported by Flynn et al
(1979). ICI's expenditure on the use of on-line database searches
had risen tenfold to £47,000 per annum in the three years from 1975.
A working party was set up to justify this alarming increase to senior
management. They compared reference retrieval from printed abstracts
with retrieval from the database on-line by subtracting average estimated
on-line search costs from average estimated manual search costs, and
expressing the difference as a percentage of on-line costs:

$$100 \ (C_m - C_o) \ / \ C_o$$

This was called the "cost-effectiveness of on-line search". However, no
assessment of relative effectiveness is mentioned in Flynn's paper, and
the costs were of all searches made in 1977, not of the same searches
made by the alternative techniques.

A method which attempts to take into consideration the change
in effectiveness which might result from introducing a new approach to
service is Wessel's (1969) SCORE analysis. Wessel's technique is based

on the view of a service as a sequence of "events", and it compares
the cost of alternative approaches with the probability of each
event's being completed in each approach. For example, reference
service is broken up into four events:

1.  The client communicates an information need;

2.  The need is considered within the scope of the library;

3.  Some candidate documents are located;

4.  Some of the retrieved documents contain relevant information.

Statistics are kept on every incidence of enquiry service to
see which events are passed successfully, and to collect labour times
for each event. Figure 11 is the SCORE sheet used for a single enquiry.
The percentage of needs which pass each event in say a month is cal-
culated, and from this the probability of occurrence of each event
( = 0.01 X percent occurrence). The average cost per need for the
period is calculated. Now the altered procedure for the service is
introduced, and after a time the measurements are made again for a
similar period. Cost per need which reached and passed event four is
calculated for enquiry service under the new and old procedures:

$$\frac{E_2 - E_1}{C_2 - C_1}$$

Wessel calls this the "delta index or cost-effectiveness" $\dfrac{\triangle E}{\triangle C}$ .

This technique, by equating effectiveness with the success of
the enquiry service, enables one to obtain figures by which alternative
procedures may be compared for their impact as well as their cost.
However, since the ratio is not expressed in terms of quality criteria,

Figure 11. Operator's score analysis data sheet (Wessel 1969)

1.  Did the user communicate his need adequately to process the need further, that is, did the user give the librarian enough information to determine if the need was within the mission and to begin a search?

    _____

    _____

2.  Did the librarian begin a search?          /__/ Yes     /__/ No

    (a)  If No in 2, why not?

    _____

    _____

3.  Were any candidate documents identified by the librarian? /__/Yes /__/No

    (a)  How many identified?_____

    (b)  Located through what reference source? _____ _____

    _____

    _____

4.  Were any of the candidate documents retrieved within the required time?
    /__/ Yes /__/ No

    (a)  From what source? _____

    _____

    _____

    (b)  How many? _____

5.  Did any of the retrieved documents contain relevant information?/__/Yes
    /__/ No

    How many? _____

6.  How much time was spent:

    (a)  In communication? _____

    (b)  In reviewing the need to determine if a search will be conducted?

    _____

    (c)  In 1st search? _____

    (d)  In providing a bibliography? _____

    (e)  In recommunication and 2nd search? _____

    (f)  In retrieval? _____

    (g)  In reviewing the document to determine relevance? _____

it tells us nothing about why one approach may be better or worse than another.

Flowerdew and Whitehead (1974) introduce cost-effectiveness analysis as the same ratio $\frac{E}{C}$, where the numerator is not a probability of success, but is a sum of effectiveness ratings, thus:

$$E = aE_1 + bE_2 + cE_3 + \dots$$

where $E_1$, $E_2$, $E_3$ are each measures of various aspects of effectiveness, and a,b,c,are weights which reflect the relative importance of the different aspects. High values of the measures correspond to a more desirable state of affairs. Zero would imply that the service is totally inneffective with regard to this aspect. However, Flowerdew and Whitehead do not say what are the aspects of effectiveness for library services. They do make the helpful statement that the effectiveness of a system is "an index of the valuable outputs produced by the system", however.

Blick (1977) shows how a cost-effectiveness analysis of this type can be used to advise on the choice between alternative approaches to giving a current awareness service from an information section in a large pharmaceutical research laboratory. (Figure 12). The alternatives, along the top of the table, are scored for each of "the essential features of a current awareness service for the scientists". Blick gives reasons for his scores. For example, a bulletin with titles only scores higher on "timeliness" than one with abstracts, because of its much shorter production time.

Figure 12.    Five alternative approaches to current awareness
notification (Blick 1977).

| Feature | Titles-only Bulletin | Abstracts Bulletin | SDI Titles-only | SDI Abstracts | SDI On-line Titles-only |
|---|---|---|---|---|---|
| Timeliness | 8 | 4 | 4 | 4 | 6 |
| Relevance | 7 | 7 | 4 | 4 | 6 |
| Cost | 6 | 3 | 8 | 7 | 6 |
| Customer convenience | 4 | 10 | 3 | 8 | 3 |
| Suitability for large No. of customers | 7 | 7 | 3 | 3 | 3 |
| Total | 32 | 31 | 22 | 26 | 24 |

It might seem that Blick's technique is essentially the same
as Flowerdew and Whitehead's conception of cost-effectiveness analysis.
What Blick has contributed is the realisation that the beneficial
aspects of alternatives to the provider of the service can be included
in the analysis as well as the "valuable output" to the client.   Thus
Blick has included "suitability for large numbers of customers" as an
aspect, and in other analyses he includes "skilled labour commitment"
and the amount of control the information officer has over the policy.
of the service.

It is clear that cost-effectiveness analysis, either in the
classical format described by Flowerdew and Whitehead or in Blick's
comparison table, can be used with the quality criteria listed for
various services in Chapter 5 to advise decisions between alternative
ways of giving a service, and to check the effectiveness of services

which have been altered to cheapen their production. Here is a tool which can be used to resolve uncertainty about the introduction of new approaches to library services, mechanised techniques of data processing and communication. Commercially-available alternatives to in-house library service can be compared and assessed in the same way.

Given that criteria for effectiveness are selected on the grounds that they relate to what the clients value, it would seem necessary to be able to weight them for client preference - the scores for effectiveness or alternative approaches must be sensitive to how the clients see each aspect of effectiveness. Different types of client will see, say, timeliness of current awareness service as more or less important to the benefit they stand to derive from the service. (Flowerdew and Whitehead allow for weighting the effectiveness measures that add up to make the effectiveness index). How are the weights to be found? A survey of clients' attitudes might be a safer approach than the library manager's trying to rate criteria by himself.

As part of a recent project (Whitehall 1979) some work was done in an attempt to see if any user concensus existed on the criteria for quality control of SDI service. A number of SDI services from libraries were investigated in detail, and part of the investigation involved interviews with the users of the services. During the interview each client was asked how he saw six named aspects of the service he received as contributing to its value to him. The clients were asked for a score rather than a ranking of the criteria.

Figure 13 shows the spread of attitude for each candidate criterion. One can see that size of batch is generally regarded as irrelevant to the value of an SDI service by the recipients, and that

Figure 13. The degree of relevance of some features of an SDI
service to its value to clients of the service - how
the clients voted.

```
5                          5    XXXXXXX

4    X                     4    XXXX

3    XXX                   3

2                          2
           SIZE OF BATCH              COVERAGE
1    XX                    1
     X
0    XXXXXXXXXXXXXXX       0
```

```
5  . XXXXXXXXXXXXXX        5    XXXXXXXXXX

4    XX                    4    XXXXX

3    X                     3    XXXXX

2    XXX      RECALL       2    X       TIMELINESS

1    X                     1    X

0                          0
```

```
5    XXXXXX                5    XXXX

4    XXX                   4    XXXX

3    XX                    3    XXX

2    XXX    NOVELTY RATIO  2    XX      PRECISION
                               X
1    X                     1    X

0    XXXXXX                0    XXXXXXX
```
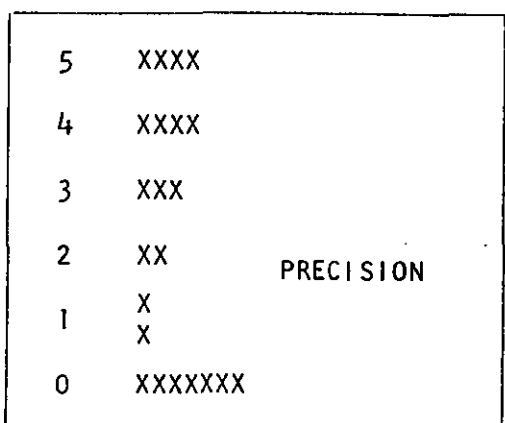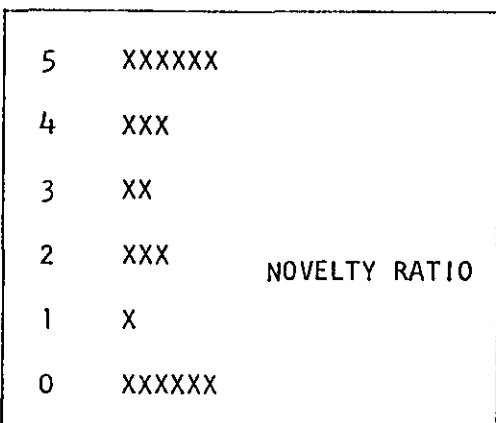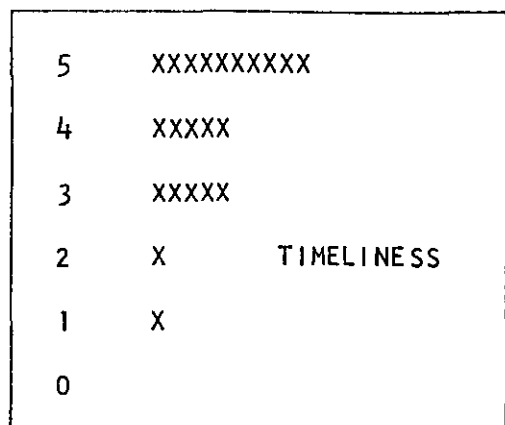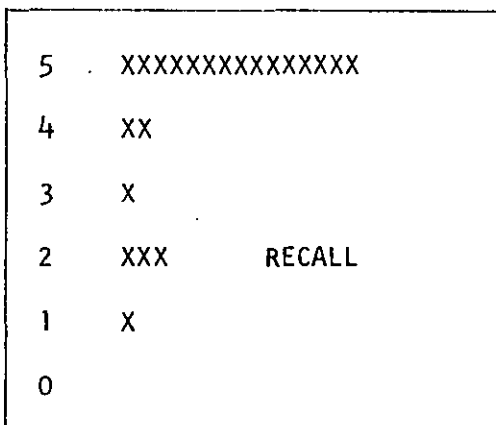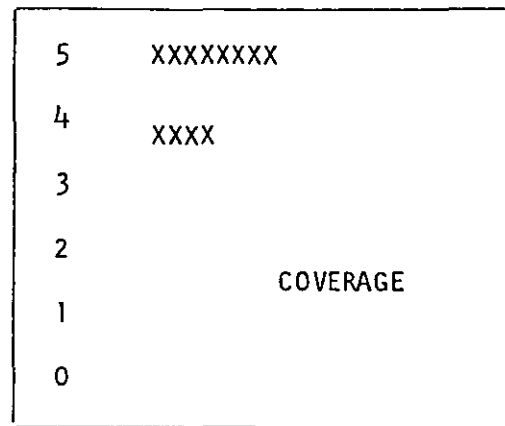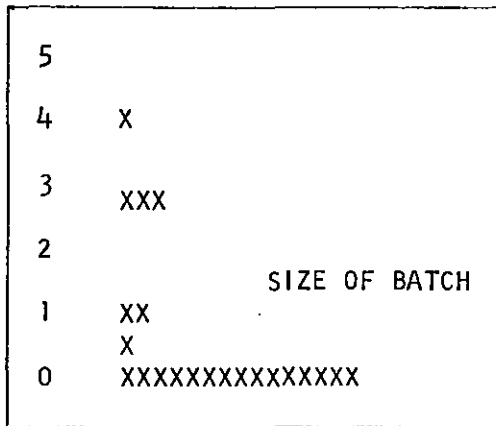
coverage of the literature and recall are both regarded as important.
But what are we to make of the spread of responses for the other
candidate criteria? It would be interesting to know whether the
type of work or information-processing behaviour of different prof-
essionals affected their attitude to what was important about SDI
services, or whether there is a random distribution of attitude. The
information in Figure 13 is from workers in research and development -
scientists or engineers working on project work or basic research.

Information about how different client groups see the relevance
of effectiveness criteria to the value of library services would
enable cost-effectiveness analysis to become a more useful tool in
the selection between alternatives for library service.

## Chapter 7

## EVALUATION OF CURRENT AWARENESS SERVICE AT HARWELL

Some of the techniques described in the thesis were applied
in two separate evaluations of information bulletins: one produced at
U.K.A.E.A., Harwell and one at Trent Polytechnic, Nottingham. At
Harwell the information officer was producing a very costly bulletin and
so wanted some idea of how it was valued by the clients. Also analysis
of photocopy requests had shown a low use of the more "serious" material
put into the bulletin. At Trent a comparatively young bulletin had been
questioned by the chief executive as to its cost and benefit.

The Harwell evaluation will be described in this chapter and
the Trent evaluation in chapter 8 in terms of the report to the sponsor.
In chapter 9 will be discussed what was learned about the application of
methods.

## BACKGROUND INFORMATION

Harwell is no longer exclusively a laboratory for nuclear
science and engineering. A large number of sponsored projects are under-
taken there in a wide variety of subject areas. Also Harwell supports
a number of specialised information centres - on heat transport and
fluid flow, for instance.

The information section at Harwell is organised under a
separate manager, and occupies different premises to the library, although
both are in the same building. Current awareness services from the
information section are of three kinds: a bulletin, manual SDI for the
project teams, and computerised SDI from INIS tapes. The information

bulletin contains material on a range of topics calculated to be of
interest widely around the site.  Subject coverage is indicated on the
front cover of the bulletin, reproduced in Fig.14.  The bulletin is
compiled weekly, from information officers' scanning, and includes items
from journals, patents, books and conference proceedings. The items
are keyboarded during the week,and at week's end the bulletin is comp-
uter typeset, printed and distributed by a separate reprographics section.
A page from the Harwell bulletin is reproduced as Fig.15.   The bulletin
goes to 500 workers at Harwell.  A photocopy service is supplied by the
library in response to request forms included with the bulletin.
Seven information officers scan for the bulletin, for manual SDI, for
Harwell's contribution to the International Nuclear Information Service
database, and for items to contribute towards information bulletins
produced by the specialist information centres.

In June 1983 an evaluation of the bulletin was already under-
way at Harwell, with the aim of attempting to justify the cost of the
bulletin and resolving the question of an apparently low use of a prop-
ortion of material put into the bulletin.  On-line use of the bulletin
database was being tried experimentally and the possibility of SDI
bulletins produced as printouts from the database was under consideration.
(These two methods of current awareness provision avoid the cost of
setting and printing the bulletin, which at the moment amounts .to half
the annual cost of its production.)   The Information Officer at Harwell
had already made an analysis of photocopy requests, and sent a question-
naire to all recipients of the bulletin (Figure 16).   It was agreed that
I could usefully contribute to the evaluation in the following ways:

- collect evidence to enable a benefit for the bulletin to be calculated, which could be compared with its cost for the purposes of justifying the high cost

- discover how effective was the present printed bulletin in supplying references of current material to its clients

- collect reactions to the idea of an on-line bulletin in place of the printed one, and to the idea of SDI bulletins

- enquire about the need for notification of U.S.Government reports

- ask any questions needed to clarify the information from the returns to the Information Officer's questionnaire.

Figure 14. Front cover of Harwell Information Bulletin

# Harwell Information Bulletin

No. 1882                                                    1st July, 1983.

This Bulletin is compiled weekly by the Information Office, Harwell, and the items listed are selected from journals, patents, books, and conference proceedings recently received in the Library. Unless otherwise stated they may be borrowed by A.E.R.E. or attached staff who should apply personally, or in writing quoting full details of the publication required. A request form is provided.

Other recipients should consult their local library. The letters in the left hand of each column indicate the subject interest of the articles marked.

| | | | | | |
|---|---|---|---|---|---|
| A | Accelerators | EN | Energy | R | Reactor Technology |
| AC | Analytical Chemistry | HPM | Health Physics and Medical | S | Safety |
| C | Chemistry | I | Isotope Technology | SP | Solid State Physics |
| CE | Chemical Engineering | IC | Industrial Chemistry | TP | Theoretical Physics |
| CP | Computers | M | Materials Technology | X | R & D (general papers); |
| DC | Direct Conversion | MR | Marine Technology | | long range planning; |
| E | Engineering | NP | Nuclear Physics | | marketing; papers of |
| EL | Electronics | P | Physics (general interest) | | general interest. |

Enquiries about content or distribution:—Information Officer, Building 465. Extensions 2029/2000: P. J. Jones

Enquiries about loans:—A.E.R.E. Library, Reading Room, Building 465. Ext: 2849: Librarian C. W. J. Wilson

## Figure 15. Page from Harwell Information Bulletin

R  Weighted dynamics scheme for thermalization in heavy water. M O Caceres et al. p277

**Automotive Engineer** 8(3) Jun–Jul 1983

CE
M  CFRP–for-steel substitution in a car rear axle (carbon fibre). P E R Mucci. p40

**Jaderna Energie** 29(5) 1983 In Czech: English Abstracts

CE  Some results of measuring heat contact resistance of double wall tube with gas detection system of lead heated by liquid metal. K Lochman et al. p161

HPM  Radiation physics, dosimetry, chemistry and biology – II. J Bednar. p167

IC  Dry cleaning of polypropylene fabrics. J Severa et al. p171

M  The role of the electrode potential control in corrosion research of stress corrosion crack growth propagation in austenitic stainless steels for nuclear reactor components. B Eremias. p180

R  Experimental verification of steam into sodium leak detection methods at the Czechoslovak modular steam generator 30 MV working at BOR 60. O Matal et al. p183

**Physical Review B. Condensed Matter** 27(12) 15 Jun 1983

M  Cellular patterns produced by the directional solidification of a binary alloy. G Dee et al. p7073

SP  Bragg diffraction and surface reflection of neutrons from perfect crystals at grazing incidence. A Zeilinger et al. p7239

**Journal of Magnetism and Magnetic Materials** 37(2) Jun 1983

SP  Magnetic properties of Eu–Sc–Fe garnets studied with the Mossbauer effect. Z M Stadnik. p138

**Health and Safety at Work** 5(11) Jul 1983

X  Prestel and HSELINE – help or hindrance?. A Dangerfield. p32

S  Workers are at risk in the laboratory. T Waldron. p39

**Materials Performance** 22(6) Jun 1983

M  Crevice corrosion behavior of molybdenum-containing stainless steel in seawater. H P Hack. p24

M  Crevice corrosion of stainless steel welds in chloride environments. L S Redmerski et al. p31

MR
M  Current density requirements for cathodic protection of steel structures in the North Sea. P O Gartland et al. p40

M  Corrosion resistance and response to cathodic protection of advanced alloys in seawater. T J Lennox et al. p49

**Journal of Physical Chemistry** 87(11) 26 May 1983

C  Rate constants and products of the reactions of $e_{aq}^-$, $O_2^-$, and H with ozone in aqueous solutions. K Sehested et al. p1951

**Journal of the Air Pollution Control Association** 33(6) Jun 1983

HPM  Interregional exchanges of air pollution: model types and applications. W B Johnson. p563

Figure 16.    Relevant questions and responses from the Information
Officer's questionnaire already circulated at Harwell

1.  Which of these statements best describes your use
    of the Information Bulletin?

    Regularly scan each issue                    182

    Scan some issues as time permits              77

    Seldom scan any issues                         -        Total 259

2.  When you examine the Bulletin do you:

    Scan the entire issue                        109

    Scan under one or more subject markings      119

    Scan specific journals                        70

    Other                                          -        Total 298

3.  Number 1882 is the most recent issue of the
    Bulletin.

    (a) Has it drawn your attention to items
        you have decided to read?

        Yes                                      415

        No                                        85

    (b) Has it drawn your attention to any other
        items of which you would want to be aware?

        Yes                                      226

        No                                       146

5.  Which of these statements best describes the
    value of the Bulletin as a tool for keeping
    you      informed of new publications relevant
    to your interests?

    Indispensable                                 34

    Very valuable                                107

    Valuable                                      95

    Not very valuable                             24

    Of little value                                7        Total 277

6.  Is the bulletin:

    Very easy to use                              87

    Easy to use                                  134

    Fairly easy to use                            40

    Difficult to use                               5        Total 266

## METHOD OF EVALUATION

It was possible to spend one week at Harwell interviewing bulletin recipients. Thirty interviews were arranged with people who made use of the bulletin (as shown by the answer to question one in Figure 16.) The first consideration was to select respondents who represented the range of valuations indicated by question five.

| Valuation | No. of replies | Interviews |
|---|---|---|
| Indispensable | 34 | 5 |
| Very valuable | 107 | 15 |
| Valuable | 95 | 13 |
| Not very valuable | 24 | 3 |
| Of little value | 7 | 1 |

Next an attempt was made to select interviewees across the thirteen technical and scientific divisions of the laboratory:

| | | | | | |
|---|---|---|---|---|---|
| Research Reactors | 2 | Instrumentation | 1 | Theoret. Physics. | 3 |
| Materials Physics | 3 | Energy Technol. | 1 | Engng. Projects | 2 |
| Fuel Processing | 3 | Engng. Sciences | 1 | Nuclear Physics | 1 |
| Chemical Technol. | 2 | Materials Devel. | 5 | | |
| Chemical Engng. | 1 | Metallurgy | 1 | | |

The design of the site and the availability of people for interview in the week of my visit inevitably played a small part in the selection. A full list of interviewees is given in Table 12 (page 205).

From the interviews it was hoped to obtain information which could be used to illustrate the value of the bulletin, and which the Information Officer could use to assess the effectiveness of the bulletin.

## Value of the bulletin

The bulletin could be said to have value as a service (in that it performs scanning of the current literature for its clients), and separately as a source of references which may lead to useful information.

(a) Value as a service:

A number of different approaches were tried out as follows:

- the alternative cost of the bulletin: the cost the users would incur in the absence of the bulletin, by substituting for it by their own efforts.

- the cost of obtaining an alternative to the bulletin from a commercial source.

- the cost that clients would be prepared to pay for their copy of the bulletin.

- the time the clients spend in making use of the bulletin.

(b) Value as a source of information:

Two approaches were tried to obtain an idea of the value to individual users of items they had seen via the bulletin and which they had put to good use:

- getting them to report instances of useful items seen in the bulletin, and to estimate if possible the value of these items applied to their work.

- getting them to state the imagined cash value of the bulletin to their work.

## Effectiveness of the bulletin

An attempt was made to discover what clients felt about certain aspects of the bulletin known or suspected to be critical to its value: size, range of subjects covered, types of material scanned by the information officers, type of item selected by them, amount of information included with each item, arrangement and subject indication, format, timeliness, recall, and whether there were any other aspects of the bulletin that the clients did not like.

The interview schedule for Harwell is given as Table 13 (page 206).

### SUMMARY OF FINDINGS

#### A. Cost of the Harwell bulletin

The cost of producing and distributing the Harwell Information Bulletin is £40,000 per annum, or £1.60 per copy, or £80 per annum per copy. The costing was carried out by the Information Officer, and the details supplied are given in Table 14 (page 208).

#### B. Value of the bulletin

(i) Alternative cost of the bulletin service

Clients who scanned the bulletin, and who admitted that in its absence they would spend time keeping up with the literature were asked to say how they would do this. Where they admitted that they would spend time looking at the current literature, this time was converted into cash at the appropriate Harwell "tariff" rate - their salary plus overheads. Where they admitted that they would scan journals, but gave no time to be spent on scanning, it was assumed

that 1-6 journals were equivalent to one hour per week of scanning,
and 7-12 journals to two hours per week. Details are given in
Table 15 (page 209).

| | |
|---|---|
| Total alternative cost to 22 clients | £22,500 p.a. |
| Cost of bulletin for 22 clients | £1,760 p.a. |
| Cost of bulletin *in toto* | £40,000 p.a. |

(ii) Cost of an alternative from a commercial source

Some respondents were asked to say what they imagined a
bulletin like this would cost from a commercial source - like a
professional institute or a database producer. Details are given
below, compared with the annual cost of one copy of the Harwell
bulletin.

```
        | £80 p.a.
        |x
   xx   |x
    x   |x    x
   ―――――┴――――――――――――――――  · £100s p.a.
    0   | 2   4   6   8   10
```
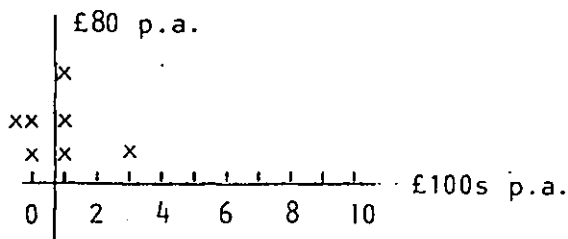
(iii) Prepared to pay

Some clients were asked what was the most they would pay
for their regular copy of the Information Bulletin if they had to buy
it with money from their department funds (thus having less to spend
on other things). Details are shown below.

```
        | £80 p.a.
        |
        |    x
        |    x
        |    x
        |    x
    x   |x   x
   ―――――┴――――――――――――――――  £100s p.a.
    0   | 2   4   6   8   10
```
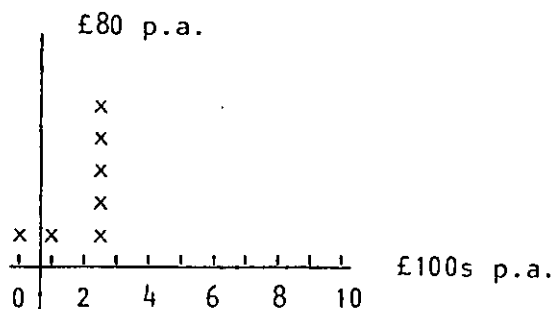
| | |
|---|---|
| Total offers from 9 clients | £1,950 p.a. |
| Cost of the bulletin for 9 clients | £720 p.a. |

(iv)   Time spent using the bulletin

Clients can be said to value the bulletin according to the amount of their time they are willing to spend in making use of it. *

Clients who admitted to using their bulletin were questioned as to the sort of use they made of it, and the time spent on each sort of use.   These times were converted into cash at the Harwell tariff rate for their grade.   Clients who used the bulletin over coffee or in the 'bus were not included in the time spent calculation. Details are in Table 16 (page 210).

Value of time spent by 23 clients        £3,068 p.a.

Cost of bulletin for 23 clients          £1,840 p.a.


(v) Value of the bulletin as a source of information

Twenty-two clients who scanned the bulletin were asked to recall any items which they had seen in the bulletin, read, and which had been useful to them in connection with their work.   Only six clients were able to indicate a cash value, or how they thought a value might be calculated:

Cash value of five remembered useful items     £40,515

Total cost of the bulletin production for      £40,000
   one year

Details of the calculations are in Table 17 (page211).Contributions to clients' work remembered as coming from the bulletin are listed below:

1. I wrote a program based on the article I read.   It saved me three months work.

3. When starting work on reliable computing, an article on what other people were doing gave me a quicker understanding of what the problems were.

7. There was a 2 month delay on the delivery of some equipment. An article showed how to use existing equipment to do the job.

* Because peoples' work time is "valuable" to them in a similar sense to the value of their money (see items 3, 22, 25, for example, on pages 195-6).

8. A coating you could use in connection with Hydrogen diffusion

9. Information about competitors and the market for a product.

13. I read an article concerned with the mechanical degradation of
    constructional materials by liquid metal. Shortly afterwards
    a telephoned enquiry described a problem the answer to which
    I had just read.

15. A phase diagram which helped us decide on an annealing temperature.

19. An article which told us about a computational method program
    which was going to take us 2 years to develop.

22. Two articles on shielding equipment from EM radiation.

22. An article on improving the efficiency of a corrosion test
    saved four or five days work trying out various ideas.

25. A paper on adsorption and other effects of ground rocks on
    solute showed me how to explain some adsorption data we had
    obtained (the time it saved me in working this out).

(vi)   Imagined cash value to clients' work

        Clients were asked what they would say was the annual cash

value of the contribution that the information bulletin made to their

work. Eleven clients answered the question. Two gave a lump sum,

seven interpreted the value as the alternative cost of doing their

own current awareness, and the remainder gave explanations of how

the bulletin made a contribution, without giving a cash value. The

list of responses is in Table 18 (page 211).

        Total Annual Cash Contribution        £17,360.


Conclusions on value of the bulletin

        It is not possible to estimate a total value to Harwell staff

for the Information Bulletin, because information about its value is

available from only thirty bulletin users. However, this sample is about

one tenth of the users, and represents fairly accurately their stated

relative valuations on a scale:

Indispensable - V.valuable - Valuable - Not vv. - Of little v.

so that although the estimates cannot simply be multiplied by ten,

they do give a fairly reliable idea of how the Information Bulletin

is valued by its users.  For example:

(a) If the bulletin service was not available, twenty-two clients

would undertake extra literature scanning, at an annual cost of  £22,500

The cash value of five remembered items seen in the bulletin

and put to use in project work was                            £40,000

Thus a valuation for the bulletin of one and a half times

its cost is obtained from one tenth of its recipients.  (There

is no guarantee that clients who say they will do extra scanning

will actually undertake it, of course.  The value of items seen

in the bulletin and put to use in project work was not necess-

arily over one year - on the other hand many clients admitted

to regularly benefiting from the bulletin in this way.)

(b) The value of the working time clients put aside to spend in

reading the bulletin is about £3,000 per annum.  However, the

cost of the bulletins supplied to these same clients is only

£1,840 per annum.

(c) A qualitative confirmation of the value of the bulletin items

to the work at Harwell can be obtained from the list of useful

inputs on page 195.  Please remember that these are the few epi-

sodes remembered by one tenth of the users, and also that many

of the interviewees admitted to regularly benefiting from the

bulletin in this way.

## C. Effectiveness of the Harwell Bulletin

In order to get an idea how effective was the bulletin from the clients' point of view, they were asked to say how they went about scanning it, what they regarded as its good and bad points, and how it measured up to their requirements on a number of aspects of content and production.

(i) How the bulletin is scanned by the clients:

Twenty out of twenty-eight respondents look first at a journal title heading (these are the headings in bold in the bulletin), then at items under this heading, using codes or looking for words in the title. The list of journals involved in an issue is used by only two out of the twenty-eight respondents. Seven respondents said they looked first for subject codes. Three clients look at every item when they have time. Eight clients cut down on scanning by rejecting certain journals. Reasons given for not using subject codes are that clients' interests cut across them or that they are interested in too many of them.

(ii) What clients see as the bulletin's good and bad points:

Before going through a check-list of aspects with each interviewee, clients were asked to report on any aspect of the bulletin which came to mind each time they used it. Nine users said they did not like being made to fill in a separate request slip for each loan or copy they require. Other comments are listed in Table 19 (page 212).

(iii)  Clients comments on named aspects of the bulletin:

| | |
|---|---|
| No.of items per issue | Five clients commented adversely on the size of the bulletin.  One suggested that some of the journals could be left out.  Another said that his ideal bulletin would be 2 pages long. |
| Subject coverage | Four of the respondents see the bulletin as useful for covering topics outside their specialist area. On the other hand nine see it as supplying references on their specialist topics, and complained about short-falls in this respect.  Three clients complained that the bulletin contains a lot of material they do not need.  Details of the comments are in Table 20 (page 212). |
| Type of material scanned | Three respondents. liked the inclusion of books and conference proceedings added to the library.  Two would like to hear about forthcoming conferences. Two clients would like to see technical articles from newspapers included in the bulletin. Detailed comment is in Table 21 (page 213). |
| U.S.Govt. Reports? | Thirteen out of nineteen clients who answered the question about inclusion of U.S.Government research reports in the bulletin were in favour of this. There was a feeling that it should not increase their bulletin scanning load too much. |
| Type of item selected | There were sixteen comments on the sort of thing selected by the information officers.  Four were complimentary.  Two people mentioned articles which drew one's attention to something without giving any useful information about it.  People find things by their own efforts which they feel should be in section X.  There were two comments about the importance of keeping up with changes in clients' interests.  Details of views are given in Table 22 (page 213). |
| Amount of description given with each item | Clients are afraid that if more is added about each item, there will be more of the bulletin to read through.  However fifteen out of twenty-six clients who answered the question indicated that the titles were not sufficiently informative.  From 20 to 50% of material sent for, they say, turns out not to be what the title suggested.  Inclusive pagination would save clients ordering copies of very long papers which they did not then read.  Comments, and some suggestions from clients on how to deal with the problem are in Table 23 (page 213). |

| | |
|---|---|
| Bulletin arrangement | Most clients seem satisfied with how items are arranged in the bulletin. Four people wanted an arrangement based on subject, not journal title. Seven clients were bothered by the apparently random arrangement of journals, and wanted journals to be arranged in subject groups. As regards a highlighted section of the bulletin (an idea of the Information Officer's for improving the bulletin) most clients could not think of a suggestion. "Items on my special interests", items of general interest, and Section X were three suggestions. |
| Subject codes | Most of the comments were about code M (Materials Technology). Suggestions are listed in Table 24 (page 214). |
| Page format | Clients prefer the new layout with bold journal titles. They say it is much clearer than the previous "computer printout" which was difficult to read. One client mentioned that with a 2-column layout it is difficult to remember where you left off scanning. |
| Back-up service of copies | Eleven clients mentioned that having to fill in request slips separately for each item needed on loan or as a copy was a chore that could be avoided. The system was designed for the convenience of the library, it was alleged, not the clients. Useful comments are listed in Table 25 (page 214). |
| Items already seen | Sixteen clients admitted to seeing items in the bulletin which they had already seen elsewhere, mostly during their own journal scanning, sometimes because other people told them of an item. "It doesn't matter", said one client. However there is some batching of bulletins which would partly explain the prior discovery of bulletin items. |

Conclusions on effectiveness of the bulletin

1. The need to fill in a request form for each photocopy or loan is a chore which most of the clients interviewed resent having to perform, especially since at one time there was a much simpler way of requesting material. In view of the considerable value that

Harwell obtains through clients' using inputs from items seen
in the bulletin, means should be put in hand to make it easier
for them to apply for copies.

If the present policy is an attempt to reduce demand on
the photocopy service, then it must be said that, on the figures
we have, the cost of an extra clerical officer in the library
would be balanced many times over by the existing benefits to
project work from bulletin items.

2. Preferably the bulletin should not be made any longer than it is
at present. However the amount of information given with each
item causes problems to many clients,because they send for copies
which sometimes do not contain what the title suggests. The
addition of a few words to the titles of some articles would be
a help, without increasing too much the reading load represented
by each copy of the bulletin. This would apply mainly to articles
other than papers in learned journals. Another solution might
be to encourage clients to telephone their information officer to
check on the content of an article s/he had scanned and included
in the bulletin. Many clients do some scanning themselves.
Where this is done in the library, they could check bulletin
items for relevance if the system makes this possible.

3. The bulletin is seen by some of the clients as containing refer-
ences in their specialist areas, and by others as covering topics
outside their specialisms. In both cases clients appear to be
scanning material themselves. This may help to explain the low up-
take of serious scientific articles from the bulletin.

4. The new page format, with journal title headings in bold, is much preferred to the old format.

5. There is some batching of bulletins, and some clients save bulletins to read when they have time to spare. This probably explains why so many clients report that they already know of some of the items they see in the bulletin. Clients seem to accept this situation, however. If there is a lesson here, it is that issues of the bulletin should not be allowed to grow any larger.

D. Preference for SDI bulletin

Clients were asked if they would prefer to receive a bulletin that just covered the journals or subjects for which they would normally be on the look-out. Twelve said they would prefer an SDI bulletin, fourteen would prefer the existing bulletin, three would like both. People are afraid that if they have a listing of references that covers just their main interest, it will not include items from peripheral journals, and separately that they will miss items of general interest which they see in the present bulletin.

E. An on-line bulletin

Clients were asked how they would react to there being no printed bulletin, but the bulletin being available on-line. The method of using such a bulletin was explained briefly.

There were thirteen affirmative answers, ten of them qualified. Clients would need their own terminal, and tuition must be provided. The computer file should be comprehensive, not a selection of items.

The computer file could contain abstracts, which could be referred to if necessary after scanning a printed bulletin. A more specific scan could be done by computer.

Seventeen respondents presented reasons why a printed bulletin was more suitable for them. Several clients read the bulletin in snatched time, often on the 'bus. They would not look so regularly at an on-line bulletin as at a bulletin which appeared each week in their in-tray. On-line you would see only what you asked for, and so would miss more than at present. It would be more time-consuming. Keywords are no substitute for reading to find things. One man admitted to being from the punched card era, and not feeling happy with computer retrieval.

## Revision of current awareness service at Harwell

A letter received from the Information Officer in the last month indicates that pressure for staff reductions may make necessary a revision of the method of giving current awareness service at Harwell.

The first reaction to this situation is that one could point to the very favourable cost-benefit picture from the present arrange-ments, summarised on pages 196-7. . On the basis of the alternative cost figures and those for value of inputs obtained via the bulletin, the present cost of the bulletin is amply justified. In fact it is clear that more could be spent on supplying copies from the library, if necessary, without upsetting the cost and benefit balance.

The table below contains a comparison of alternative provisions rated for their costs and for the extent to which they satisfy the

effectiveness criteria which have been seen to be important to the
clients at Harwell. Ideally the Information Officer should complete
this sort of analysis for himself, rating the alternatives for the
other constraints of which he is aware. If the analysis is correct,
of the four alternatives, the option of current contents bulletins
from outside reduces internal costs sufficiently to make up for a
corresponding fall in effectiveness. It does rather hang on whether
an external current contents bulletin is available which would sub-
stitute for the bulletin. A mixture of external current contents bulletin
and internal manual SDI would seem to be an alternative that should be
considered to replace the bulletin.

|  | Bulletin | SDI Manual | SDI outside | CC inside | CC outside |
|---|---|---|---|---|---|
| Coverage | 8 | 8 | 6 | 6 | 6 |
| Reading load | 7 | 4 | 4 | 7 | 7 |
| Timeliness | 8 | 8 | 5 | 9 | 9 |
| Selectivity | 8 | 10 | 6 | 0 | 0 |
| Recall | 5 | 8 | 6 | 7 | 8 |
| Back-up service | 9 | 9 | 4 | 6 | 6 |
| I.O.Staff costs | 3 | 3 | 8 | 9 | 10 |
| Clerical staff costs | 6 | 4 | 3 | 2 | 10 |
| Copying costs | 4 | 4 | 2 | 2 | 2 |
|  | 58 | 58 | 44 | 48 | 58 |

Table    12

Evaluation of Harwell Information Bulletin - interviewees

| No. | Scientist/Technologist | Grade | Division |
|---|---|---|---|
| 1 | C.J.Gardner | PTO | RRD |
| 2 | Dr.R.H.Flowers | | FPD |
| 3 | C.J.Kenward | PSO | MPD |
| 4 | N.A.Lavender | SO | MPD |
| 5 | M.R.Hughes | PPTO | RRD |
| 6 | K.D.Rouse | SSO | MPD |
| 7 | B.A.Phillips | HSO | CTD |
| 8 | P.J.Silver | HSO | CEM |
| 9 | Dr.R.C.Asher | PSO | IAPD |
| 10 | Dr.F.A.Johnson | SSO | CTD |
| 11 | Dr.J.H.Harding | HSO | TPD |
| 12 | Dr.D.P.Hodgkinson | PSO | TPD |
| 13 | Dr.M.G.Nicholas | PSO | ·MDD |
| 14 | H.Bavister | SO | MDD |
| 15 | J.W.Henney | PSO | MDD |
| 16 | D.H.Day | PSO | FPD |
| 17 | N.R.Williams | SSO | FPD |
| 18 | Dr.R.A.Allen | PSO | ETD |
| 19 | Dr.M.D.Mathews | SSO | ESD |
| 20 | Dr.K.T.Scott | PSO | MDD |
| 21 | Dr.J.P.Coad | SSO | MDD |
| 22 | C.Westcott | SO | MDD |
| 23 | R.C.Piller | HSO | MD |
| 24 | C.C.Naish | HSO | MDD |
| 25 | Dr.J.Rae | Band | TPD |
| 26 | Mrs.K.George | PTO | EPD |
| 27 | C.W.Thompson | PTO | EPD |
| 28 | Dr.T.D.Hodgson | PSO | CTD |
| 29 | Dr.J.B.Lewis | Band | CTD |
| 30 | T.J.Dix | SSO | CTD |

## Table 13

Harwell Information Bulletin Evaluation - Interview Schedule

1a.  How do you make use of the bulletin?  How long does each process take per issue?

1b.  Exactly how do you scan the bulletin?

1c.  Would you prefer a bulletin that just covered the journals/ subjects you look for?

1d.  How would you react to there being no printed bulletin, but the bulletin being available on-line?  (explained method of use briefly).

2a.  From your point of view, what are the good and bad points about the bulletin?

How do you feel about the following aspects of the bulletin?

- Number of items in each issue
- Subject coverage
- Type of material scanned for the bulletin
- The inclusion of U.S.Government reports
- Type of item selected by the information officers
- Amount of description given with each item
- The arrangement of the bulletin
- The subject codes
- The page format
- The back-up service of copies

2b.  Have you recently found any material of interest which you felt should have been mentioned in the bulletin?  What material?

2c.  Do you find items in the bulletin which you have already seen? How?

3a.  If you did not have the bulletin, how would you go about keeping up with new material on the topics it covers?

3b.  Either

What do you imagine it would cost to buy a bulletin like this from a commercial source - a professional institute or a database producer, for instance?

Or

If you had to buy this bulletin with money from your project or section funds (thus having less to spend on other things) what would you be prepared to pay?

3c. Can you recall any items which you have seen in the bulletin, read, and that were also useful to you in connection with your work? How were they useful?

3d. (If the answer to question 3c is positive)

Can you put a cash value on the contribution it made to your work?

3e. What would you say is the annual cash value of the contribution that the information bulletin makes to your work?

## Table   14

### Harwell Bulletin Costing

#### Scanning

|  |  |  |  |
|---|---|---|---|
| Time: | 270,000 m.p.a. | | |
| Av.cost per scanner: | | £21,000 | |
| Total cost (x 2.7) : | | £56,700 | |
| Bulletin scanning cost: | | £8,100 | 8,100 |

Total cost has been divided by 7, as INIS is excluded

#### Keyboarding

|  |  |  |  |
|---|---|---|---|
| Time: | 60,000 m.p.a. | | |
| Av.cost per keyboarder | | £15,100 | |
| Total cost: | | £9,100 | |
| Bulletin keyboarding cost | | £4,600 | 4,600 |

#### Proof-reading/Editing

|  |  |  |  |
|---|---|---|---|
| Time: | .31,000 m.p.a. | | |
| Av.cost per proofreader: | | £14,700 | |
| Total cost: | | £4,600 | |
| Bulletin proofreading cost: | | £2,300 | 2,300 |

#### Reprographic cost:                                         21,000

#### Computer costs:                                             4,000

|  |  |
|---|---|
| Total cost: | £40,000 |

m.p.a.  =  minutes per annum.

## Table  15

Alternative cost to readers of Harwell    Information Bulletin

|  |  | £ |
|---|---|---|
| 1. | No time to do the scanning involved | |
| 3. | I would look at some magazines | |
| 4. | I would scan in my specialised subject area as at present, but would not keep up in other fields | |
| 5. | I would phone the Information Office when I had a problem. | |
| 6. | I would scan the journals involved. | 1173 |
| 7. | I haven't the time. | |
| 8. | Spend 5 hrs/week scanning | 2535 |
| 9. | Scan 12 journals in the library | 1383 |
| 10. | Scan 10 journals | 1173 |
| 11. | Scan 9 journals and some abstracts. Spend ½ hr./week. | 253.50 |
| 12. | Scan 20-30 journals.  Spent 2 hrs./week. | 1383 |
| 13. | Spend 2 hrs/week scanning in the library | 1383 |
| 14. | Scan 6 journals on my subject and 6 other general ones | 240 |
| 15. | Scan 12 journals. | 1383 |
| 16. | Scan 10 journals. | 1383 |
| 17. | Scan the journals it covers | 1173 |
| 18. | Scan 6 journals. | 691.50 |
| 19. | Scan 6 journals. | 586.50 |
| 20. | Scan 12 journals. | 1383 |
| 22. | Scan 10 journals and the new books | 840 |
| 23. | Scan 10 journals I know deal with my subject. 1 hr/week. | 507 |
| 24. | Scan 10 journals. Spend 20 hrs/year. | 253.50 |
| 25. | Set up a periodic library scan of a database | |
| 26. | Scan 8 journals | 1173 |
| 27. | Look at a small number of magazines that cover those items important to me. | 1173 |
| 28. | Spent 2 hrs/week scanning | 1383 |
| 29. | Browse in the library | 1839 |
| 30. | Scan in the divisional library | 1173 |

Total admitted alternative cost, per annum    £24965

## Table    16

### Time spent using the Harwell Information Bulletin

Scanning times for those who read the bulletin, converted into
cash at the tariff rate for their grade.  Where clients said they
scanned the bulletin in non-working time, no calculation is made
for value of time spent on the service.

| | | £ | £/min |
|---|---|---|---|
| 1. | 10 min. over coffee | | |
| 3. | 2 min. sometimes | 9.78 | 4·89 |
| 4. | 30 min. | 210.00 | 7·10 |
| 5. | 30 min. at lunchtime | | |
| 6. | 2 hrs.at home | | |
| 7. | 15 min. | 126.75 | 8·45 |
| 8. | 25 min. | 211.25 | 8·45 |
| 9. | 15 min. | 172.87 | 11·52 |
| 10. | 10 min. sometimes | 48.87 | 4·89 |
| 11. | 10 min. scanning and 10 min. adding to index | 169.40 | |
| 12. | 15 min. on the bus. | | |
| 13. | 12 min. on the bus. | | |
| 14. | 12 min. | 84.00 | 7·00 |
| 15. | 20 min. | 230.50 | 11·53 |
| 16. | 4 min. | 36.10 | 9·03 |
| 17. | 45 min. | 439.88 | 9·78 |
| 18. | 15 min. | 172.87 | 11·52 |
| 19. | 10 min. | 97.75 | 9·78 |
| 20. | 10 min. | 115.25 | 11·53 |
| 22. | 5 min. | 35.00 | 7·00 |
| 23. | 15 min. | 126.75 | 8·45 |
| 24. | 5 min. | 42.25 | 8·45 |
| 25. | 15 min. | 230.00 | 15·33 |
| 26. | 5 min. | 48.88 | 9·78 |
| 27. | 20 min. | 195.50 | 9·78 |
| 28. | 15 min. | 172.87 | 11·52 |
| 29. | 10 min. | 153.27 | 15·33 |
| 30. | 3 min. | 29.33 | 9·71 |

Total admitted time spent using the bulletin, per annum £3068.21

## Table    17

### Cash value of bulletin items useful in clients' work

|  |  | £ |
|---|---|---|
| 1. | I wrote a program based on an article I read. It saved me three months work. | 4400.00 |
| 6. | An item from Computer and Graphics saved time by forming the basis of new work: the time of five senior people meeting three or four times to work out what to do about a problem | 470.00 |
| 19. | An article which told us about a computational method/ program which was going to take us 2 yrs.to develop. (Used HSO rate) | 33800.00 |
| 22. | An article on improving the efficiency of a corrosion test saved 4 or 5 days work trying out various ideas | 2555.00 |
| 25. | A paper on adsorption and other effects of ground rocks on solute showed me how to explain some adsorption data we had obtained: the time it saved me working this out (say five hours work) | 90.00 |
| | Total cash value of remembered contributions to clients' work which resulted from use of items seen in the bulletin | £40515.00 |

## Table 18

### Contribution made to the work of clients by the Harwell Bulletin

|  |  | £ |
|---|---|---|
| 1. | 30 - 40 hrs.p.a. in scanning journals, etc. | 469.00 |
| 5. | Not so much work saved, but an effect on the quality of work. | |
| 7. | Not all the value is directly related to my work, but I do find papers that I would not pick up myself. | |
| 8. | £2,000 per annum | 2000.00 |
| 9. | Time I'd have to spend in the library (½ day/week) | 2074.00 |
| 12. | Cost of my scanning in the library | 1383.00 |
| 13. | £5,000 per annum | 5000.00 |
| 16. | Cost of my own scanning | 1383.00 |
| 22. | Ways of doing your work better. The other is hard to quantify: say £800.p.a. in scanning time (½ hr/week) | 210.00 |
| 25. | 3 or 4 hrs/week scanning | 3678.00 |
| 30. | 2 to 3 hrs/week in doing my own scanning | 1173.00 |
| | Total annual cash contribution (9 clients/28) | £17360.00 |

## Table 19.

### Good and bad points about the bulletin (unprompted)

Good points:

The clarity of printing has improved - 3
It tells me about fringe topics - 2
It tells me about things I would not otherwise find - 1
The arrangement is good now

Bad points:

Do not like the arrangements for copies of articles etc - 9
A subject arrangement would be better - 3
There is too much to read - 3
Not enough detail on my subject (Catalysis, Scientific aspects of
 mechanical engineering)
Too much nuclear work - 2
I have got used to it now - 1
Hard to remember where I left off scanning, to go back to it.
Has it done a thorough job?
Three or four arrive in a week sometimes.
Not enough request slips for the number of items I need.
Would like to hear about all papers, not just a selection.
Does not cover every issue of journals in which I am interested.
The title does not tell you what the article includes.
Use colour on-line
Chemical keywords, please.

## Table 20

### Comments on the subject coverage of the bulletin

It tells me about things I would not otherwise find
I need to keep informed on articles outside the mainstream.
In my own field I do not rely on the bulletin.
There are a few journals I like to scan myself.
This is not the only alerting service I use.
I get INIS abstracts as well.  The bulletin is far more general and
 comes out more quickly, so I pick up things months before I perhaps
 see them in INIS.
The bulletin should be broad.
My interests are as wide as the bulletin coverage.
There is far too much nuclear work in the bulletin.
There are lots of things that do not interest me.
There are lots of things I do not want. Ideally I would like to see
 the title pages from a certain number of journals.
Does not cover good sponsored work in the States.
Not good enough to keep me informed about catalysis.
Not enough articles on the scientific aspects of mechanical engineering.
Several journals of interest to me are not covered.
The journals are not covered well on the applications of lasars to
 experimental work.
Coverage is not quite complete in the non-technical area (for instance
 on the nuclear debate).
I need fluid mechanics outside the mechanical engineering context.
Petroleum engineering (in a journal I see anyway, probably).
Theoretical physics (for which I browse in other journals).

Table 21.   Comments on types of material scanned by the information
            section for the bulletin

The section on books and conferences could be expanded.
More on conference proceedings.
I am glad that books have been added, because getting to the library
            to see the latest purchases was difficult.
Nice to hear about  forthcoming conferences.
I like to see symposia.
Technical articles from newspapers please.
Patents are valuable, as they are good for technical details.
Patents are not a rewarding way of obtaining information.
Reports: on my subject, yes. Not a lot, please. Could be a lot to scan.
            Internal reports as well, please.  I see them by citation
            in other papers read.  Stanford Research Institute Reports
            would be useful.
Culham reports on computer graphics work.

Table 22.   Comments on the type of item selected for the bulletin

They have got it about right.
They are aware of my interests.
They do not miss much.
Quite good.
A lot of elementary things are included, but this is alright.
The selection is not comprehensive.
The selection of papers by other people is bad.
I would like all papers please.
They seem to be things that the group was interested in four or five
            years ago.
Sometimes things in which I am interested have not been included.
A pity there is no more immediate way of letting the scanners know about
            my changes in interest.
I find things that might have gone in X.
It does not seem to cover every issue of all the journals I am
            interested in.
It tells you what someone has done, but not how they have done it.
Some papers are selling a product.

Table 23.   Comments on amount of information given with each
            bulletin item

More detail needed, especially for patent titles.
You could add keywords.
A few words expanding on the contents.
The item when it comes is not what the title had suggested.
Abstracts would make the bulletin too bulky to read.
Could an abstract be provided on the computer terminal?
A photocopy of the first page in response to a request.
Inclusive pagination, to save us ordering large photocopies.
Mention more than one author for multi-author articles.
Include more on X-category items, please.

Table 24.   Comments on the subject codes provided in the bulletin

Not a very good guide to the interests of a chemist or metallurgist (FPD).
Invaluable (MPD).
I like the general "M" code (MDD).
"M" is too wide (MDD).
NDT is included in "M", but is not of interest.
Separate materials science from metallurgy, please.
Chemical Engineering (CE) is too general (ESD).
Separate out fluids from "CE" (TPD).
Separate metallic and ceramic materials (MDD).
Metallurgy items can be found also under Engineering (EPD).
Please have a code for radiation waste management (FPD).
The choice is not suitable for me (CEM).

Table 25.   Comments on the availability of items seen in the bulletin

Filling in the  request slips is a chore, and a way that is easier
            for people should be devised.
This is for the convenience of the library, not the user.
Request slips have to be filled in for each item.
You have to put your name on each slip.
We have to write out journal references.
How do I order more copies than there are slips?
If it has to be done this way, print the forms so that the user
            can put carbon papers in-between two sheets.
Provide a tear-out sheet with items I can circle to request them.

Chapter  8

Evaluation of "Education News" at Trent Polytechnic

Education News is one of several information bulletins

produced by the library at Trent Polytechnic.  It contains references

to articles in newspapers and journals on topics of interest in further

education, higher education and adult education.   DES press releases

are also included.  About fifty copies of the bulletin are produced

fortnightly.  It is intended as a current awareness service for the

senior people in the Polytechnic administration and the departments,

but it goes to people outside Trent Polytechnic as well, and half the

recipients are librarians or information officers involved in some way

with education.

The bulletin is compiled from an education librarian's scanning

of library materials at the Polytechnic.  Items are taken directly from

the bulletin produced at Hatfield Polytechnic, and this has the effect

of reducing the amount of scanning that needs to be done at Trent.

References are keyboarded into a computer at convenient times, each refer-

ence having subject headings added from the Coombe Lodge Educational

Thesaurus, 1978 Edition and additional keywords which describe aspects of

the article in more depth.  Each fortnight a printout is obtained of the

input material, sorted into alphabetical order of the rotated subject

headings.  At present the printout is photocopied doublesided onto A4

sheets, and a cover is added. Figure 17 shows a page from the bulletin.

As a back-up to the bulletin, a photocopy service is offered,

and also the references are accumulated to form a database which can be

used for retrospective searches.

The purpose of the evaluation is twofold:  to give the Librarian at Trent Polytechnic some information to enable him to judge how the bulletin is valued by its clients, and separately to investigate how effective it is from the clients' point of view.

## METHOD OF EVALUATION

In order to get some idea of how clients of Education News value it, and how effectively it provides for their needs, it was decided to interview all the recipients who could be shown to make some use of it. Non-users of the bulletin would be unable to supply useful information about its value and effectiveness.

The first approach was by means of a note from the librarian (Figure 18, page 226) which was sent to all recipients with a copy of the bulletin in July 1983.  The letter asked clients to examine and mark up 3 copies of Education News, and return them to the library. Sixteen out of forty-nine recipients returned one or more trial copies over the next six months.  Interviews were arranged with these respondents.

Interviews were arranged with a further five recipients of the bulletin who, although they had not returned trial copies, were known to be regular users.  At this point, brief questionnaires (Table 26, page 228) were sent to all remaining bulletin recipients who had not actually said no to an interview.  This resulted in eight more interviews. Of thirty-three  suspected users of the bulletin, twenty-nine in all were interviewed (Table 27, page 229).

Figure 17.   Page from "Education News"

```
..............................................................
ADULT BASIC EDUCATION:FINANCE
ALBSU.


ANON
ADULT LITERACY AND BASIC SKILLS UNIT
SEEKS 1990,S FUNDING
TES, P3                                              28035
Sep-09-1983


..............................................................
ADULT EDUCATION:CONTINUING EDUCATION
ACACE,BROOKE,P.


ANON
ADVISORY COUNCIL FOR ADULT & CONTINUING
EDUCATION STILL UNCERTAIN
THES, P3                                             28007
Sep-09-1983


..............................................................
ADULT EDUCATION:FINANCE
WEA,DES.


ANON
CLAWBACK "PUTS WORKERS EDUCATION
ASSOCIATION IN DIRE STRAITS"
THES, P3                                             28005
Sep-16-1983


..............................................................
ADULT NUMERACY
ALBSU.


ANON
MAKING THINGS COUNT FOR MILLIONS WHO
CAN,T ADD UP (NEW CAMPAIGN BY ADULT
LITERACY & BASIC SKILLS UNIT)
THES, P4                                             28006
Sep-09-1983


..............................................................
ADULTS:TRAINING:SCHOOL LEAVERS
ECA.


FRANCIS,T.
"ADULT JOB TRAINING OUT OF DATE"
(CONFERENCE OF EDUCATIONAL CENTRES
ASSOCIATION HAS BEEN TOLD)
THES, P5                                             28008
Sep-16-1983
```

The purpose of the interview with recipients who made some use of the bulletin was as follows:

To discover how users went about looking through the bulletin - was the arrangement of the bulletin matched to the scanning habits of the clients?

To obtain users' comments on those aspects of the bulletin relevant to its effectiveness - its frequency, length, age of items, coverage of the subject area, the sort of item selected by the bulletin compiler, the types of material scanned for the bulletin, the amount of description given with each item, the arrangement of the bulletin and the page format and appearance, items that should have been included but were not.

To obtain some idea of how clients valued the bulletin in their daily work. Several different approaches were used - how much of their valuable time were they prepared to spend on scanning the bulletin, and making use of it in other ways, what did they imagine its commercial cost would be, what would they pay from their department funds for such a service if it was not free, how much of their time would they spend to keep up with new material if the bulletin was not available. Clients were also asked to recall if bulletin items had in the past been useful in their work, and how they had been useful. Clients were asked to put a cash value on the contribution that the bulletin made to their work. The checklist used for interviews is given in Table 28, page 231.

The purpose of the trial copies that the client was asked to mark up and return to the library was to see what items from the bulletin clients had seen already in the course of their own reading, and to see what proportion of items did not carry enough information for clients to judge their relevance. It also served to make clients more aware of the bulletin prior to the interviews.

## SUMMARY OF FINDINGS

A. Cost of the bulletin

The cost of producing and distributing the bulletin is £1100 per annum, or £0.88 per copy, or £22 per annum per copy. The costs included are the costs which would be avoided by the library by not producing the bulletin. Details of the costing are in Table 29, page 232.
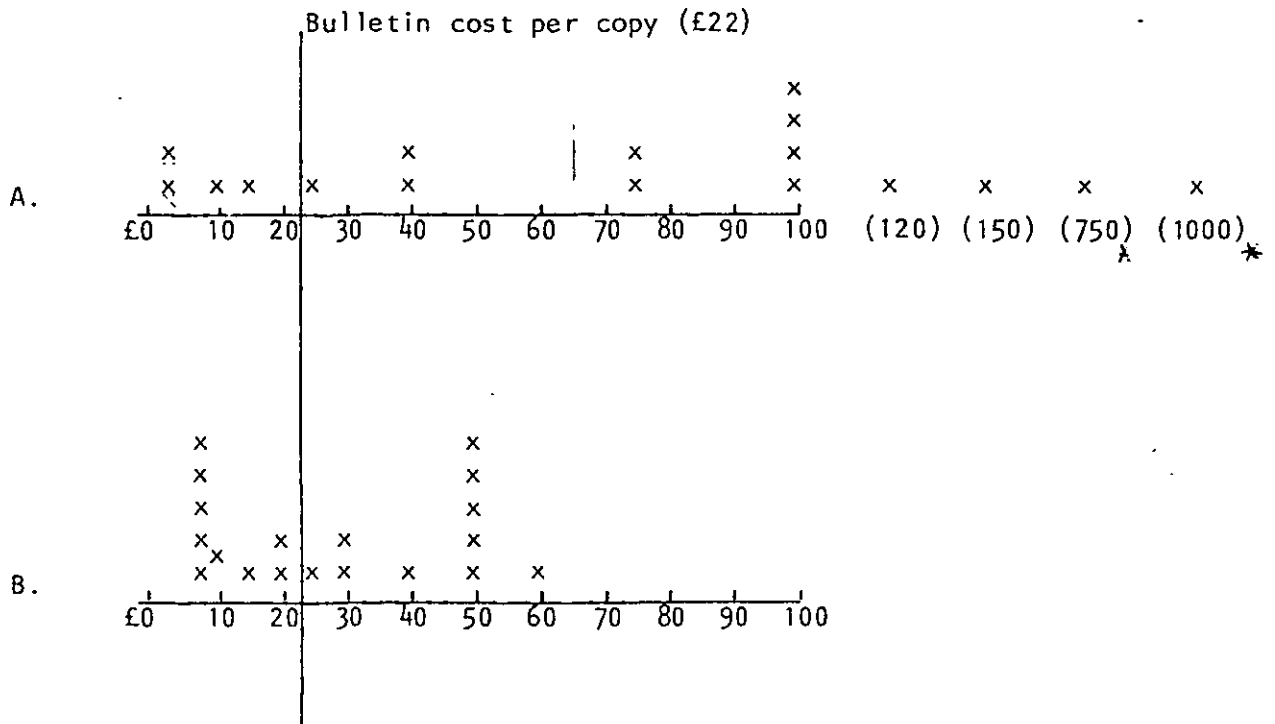
B. Value of the bulletin

(i) The value of a service can be calculated as its alternative cost: the cost of the next best alternative available to the clients if the service were not provided. Clients who scanned the bulletin, and who admitted that in its absence they would spend time keeping up with the literature, were asked to say how much time they would spend on keeping up with the topics it covered. This time was converted into cash at the individual's salary rate. Details in Table 30, page 233.

| | |
|---|---|
| Total alternative cost to twenty-two clients | £6,550 per annum |
| Cost of bulletin production | £1,100 per annum |

(ii) The value of a service can be seen as the amount of their time its clients are willing to spend in making use of it. Clients who admitted to using the bulletin were questioned as to the sort of use made of it, and the time spent on each type of use. These times were converted into cash at the client's salary rate (Table 31, page 234).

| | |
|---|---|
| Value of the time spent by thirty clients on the bulletin | £1,597 per annum |
| Cost of bulletin production | £1,100 per annum. |

(iii)  All clients were asked to say how much they imagined the

bulletin would cost if it was available from a commercial source,

like a professional institute or the producer of a database on

education.  Offers from eighteen clients are tabulated below at A.

Bulletin cost per copy (£22)

A.

```
                                                    x
                                                    x
                                                    x
      x              x              x               x
A.    x   x  x   |x   x           |  x               x     x     x     x     x
      └────┴────┼────┴────┴────┴────┼────┴────┴────┼────
      £0   10   20   30   40   50   60   70   80   90  100   (120) (150) (750) (1000)
```

(iv)  Clients who scanned the bulletin were asked what was the most

they would pay for their regular copy ∕ of the bulletin if they had to

buy it with money from their departmental funds (thus having less to

spend on other provisions).  Details are given above at B.

B.

```
      x              x
      x              x
      x              x
      x      x   x   x
      x  x   x   x   x
      x  x x |x  x   x   x   x
      └──┴───┼──┴───┴───┴───┴───┴───┴───┴───
      £0  10  20  30  40  50  60  70  80  90 100
```

Total offers from twenty-three clients          £792.50 per annum

Cost of a copy of the bulletin for 23           £506.00 per annum.
                        clients

(v)  Clients who scanned the bulletin for items for their own use

(as opposed to acting as agents for others) were asked to recall any

items which they had seen in the bulletin, read, and which had been

useful to them in connection with their work.  Ten users of the bulletin

* These very high values were questioned at the interview,
in case a respondent had quoted a cost over the wrong period
- per issue instead of per year.

were able to recall such items, and to explain how they had been useful. None felt able to put a cash value on the benefit to their work from knowing about the item. A summary of the ways in which items noted in the bulletin were useful in connection with clients' work is given below.

1.  Gave evidence which was used in discussions inside and outside the Polytechnic. Adds to the advice I could give the students.

2.  Provided a model for analysis of academics' time which helped me.

3.  Facts useful for argument at a conference.

    Enabled me to see how the wind is blowing.

    Helped me with the questions that are fired at me.

    Enabled me to understand the different points of view on an issue.

4.  The latest information on a changing topic.

    The information had some effect on my attitude.

    Information which was useful when we re-organised our course.

5.  An article completely changed the direction of the work we were doing (I would never have seen it without the bulletin).

    Information that was authoritative, explained ideas usefully.

6.  An article on vocational training was used in the course.

7.  An article on the student's perception of the role of the supervisor was most useful to me.

8.  Ideas on recruiting students.

    Projections for the future helped.

9.  Ideas to confirm or alter one's thinking, for example an article on YTS.

10. Article which helped with value judgements.

    A starting point for my paper at a conference.

    Help in re-informing my personal views on an issue.

(vi)  Clients who scanned the bulletin were asked to say what was the annual cash value of the contribution that the information bulletin made to their work.  Five clients offered the alternative cost in time taken by them to make up for the absence of the bulletin. One client offered £2.5m if a contract under negotiation was obtained. Most clients felt unable to answer the question.

## Conclusions on Value

Education News is produced remarkably cheaply compared with the normal run of information bulletins from libraries (which as a rule, cost from £5000 to £20,000 per annum).  There is ample evidence that it is valued by its clients, twenty-two of whom would actually undertake extra scanning of the current literature if the bulletin was not provided.

## C. Effectiveness of the bulletin

To see how effective the bulletin was from the clients' point of view, they were asked to say how they went about scanning it, what they regarded as its bad points, and how it measured up to their requirements on a number of aspects of content and production.

(i) How the bulletin is scanned:

Nineteen out of twenty-eight respondents scan the bulletin from end to end, looking at each item for topics of interest.  Seven clients look for subject headings related to their interests, four of these being librarians.  Four direct users look for the titles of newspapers or journals known to them.  Some users merely glance through their copy of the bulletin. Details in Table 32, page 235.

(ii) What clients see as the bulletin's bad points:

Thirteen out of twenty-eight respondents find the repetition of items under different subject headings irritating or confusing. Nine do not like the page layout. Seven felt that the subject headings should stand out more - six of these were librarians. Several other aspects were commented upon by clients. Details are given in Table 33 , page 235.

(iii) Clients' comments on named aspects of the bulletin:

Frequency
Only four clients found the bulletin to be too frequent. Two others thought it frequent enough.

Number of items/issue
Six people altogether commented on the length of the bulletin. Two of these said that it would be better if the items were not repeated under different headings.

Age of the items
Nine clients had noticed some articles older than two weeks in a copy of the bulletin, but none of them felt that this was a disadvantage. One of these commented that the bulletin was up-to-date compared with published indexes.

Coverage of topics.
Five clients suggested that issues on the teaching of specific subjects should be covered. Two would have liked an indication of exactly which topics in education were covered. Topics mentioned by clients are listed in Table 34, page 235. They are very much tied to the individual interests of clients. Some of them may fall outside the declared subject coverage of the bulletin.

Type of item selected
One client liked the journalistic items, but eight clients (29%) of whom seven were direct users, are less interested in these than in more serious, reasoned, journal type articles. Details of clients' comments are in Table 35.

Types of material scanned
In addition to newspapers and journals, clients suggest that policy statements by pressure groups, anything from DES etc. book reviews and more of the more scholarly type of publication should be scanned for the bulletin.

Material scanned by clients
Clients were asked to scan a few trial bulletins, and to mark items in them that they had seen before. The responses mostly indicate that clients scan newspapers - but not all the papers.

| | |
|---|---|
| Amount of description given with each item | Eleven clients wanted more description with each item. Six of these are direct users. Detailed comments are reproduced in Table 36, page 236. |
| Arrangement of the bulletin | Fourteen clients do not like the repetition of items in an issue of the bulletin. Most clients look at every item while scanning the bulletin, and after a while they see items for the second or third time. Some clients feel that they have to check back to convince themselves of this. One result is that clients tend to give up scanning about $^2/_3$ of the way through the bulletin - this is obvious from the marking of the trial issues. Detailed comments are listed in Table 37, page 236. |
| Bulletin format | Sixteen people (57%) commented adversely on the format of the bulletin. Of these seven did not like the general impression, and nine thought that the identification of the parts of each reference could be more clear. Only five of the nine were direct users. Comments are listed in Table 38, page 237. |

## Conclusions on effectiveness

The arrangement of items in the bulletin does not suit the scanning habits of the majority of its users, who look through it from end to end, looking at each item. In fact they find the arrangement of the same item under different subject headings to be a disadvantage. A once-only list with a separate index would probably suit all users, and save up to half the cost of copying.

Over half the people interviewed do not like the appearance or layout of the bulletin page; a third of respondents made this comment unprompted. However eleven out of sixteen complainants are librarians. Of these eleven, nine do not appear to make much use of their copy of the bulletin.

Clients would prefer more serious, reasoned articles to be included as references in the bulletin. There is the fact that clients see newspaper articles during their own reading, but it seems that they also value them less than articles from journals.

If the subject coverage of the bulletin were extended, then it should be firstly to cover articles on the teaching of specific subjects.

Not all the clients have access to press releases by bodies connected with the economics and politics of education, and a listing of these from whatever source is felt to be a useful addition to bulletin coverage. People who do receive press releases might like to check that they have seen all the relevant announcements.

Where titles are not informative, it is suggested that one or two lines of explanation be added, if this is not done already. About equal numbers of librarians and direct users commented on this aspect of the bulletin.

Also in the absence of the Trent bulletin, none of the librarians said they would do any extra work to keep up with the material it covered - presumably because as librarians they regarded it as a back-up to the scanning they did at present, not as a primary source of information about articles potentially useful in their work.

Figure 18a - note to direct recipients of Education News

## ALL READERS OF EDUCATION NEWS

We would greatly appreciate your help in mounting an assessment of this service.

Education News has been developing in context, style and production method over several months and it is now considered desirable to gauge users' reactions to see whether we are offering a useful service in the most appropriate manner.

Will you help us by:-

      (i) looking critically at three issues, preferably between now and September, but to suit your convenience

     (ii) giving us the opportunity of a brief interview after the trial to collect your impressions and comments

If your are willing to help, please cut off and return the slip at the bottom of this page.

Any other comments or suggestions will be welcomed!

D. E. Bagley
Librarian.

Please cut off and send to:-

1st July 1983

John L. Makin,
Trent Polytechnic Library,
Dryden Street,
Nottingham.

I am willing to take part in an evaluation exercise of Education News in the period July - September 1983.

Name:

Address:

Figure 18b - note to librarians who receive Education News

**Trent Polytechnic Library Service**

Librarian D.E.Bagley MA FLA

**Central Library**

**Dryden Street**

**Nottingham NG1 4FZ**

Telephone 0602 418248 ext

Telex 377534 POL. NOT G

Our Reference
JM/GP

Your Reference

1st July 1983,

Dear Librarian,

We would appreciate your help in carrying out an evaluation of
Education News and would ask you to read the note in the editorial
to this issue and persuade your users to collaborate as far as
possible. If you only display the bulletin, can you identify regular
users and seek their comments?

We are anxious to carry out a full evaluation of costs and benefits,
believing that the service is useful but can possibly be improved in
various ways.

Thank you for your help!

D. E. Bagley
Librarian.

**TRENT**
**POLYTECHNIC**

Director E A Freeman, BSc
PhD DSc MA FIEE FIMA

## Table 26 - Brief questionnaires to direct users and librarians

"EDUCATION NEWS" EVALUATION

Please answer the questions below, and return this
sheet in the stamped envelope provided.

Do you regularly look through "Education News"?     YES/NO

Do you pass the bulletin to someone else?           YES/NO

Do you make use of the bulletin in some other way? YES/NO

Please add any comments on your use of the bulletin
and/or its good or bad points:

---

"EDUCATION NEWS"  EVALUATION

Please answer the following questions, and return this sheet in
the stamped envelope provided.

Does someone on the library staff regularly look
through the bulletin?                                YES/NO

Is the bulletin put on display in the library?       YES/NO

Is the bulletin regularly passed to someone
outside the library?                                 YES/NO

Is the bulletin used in some other way?              YES/NO
(if YES please report how below)

Table   27

Recipients of Education News, with basic information on survey

| Direct users | Scans? | Interview? | Trial Copies? | Postal survey |
|---|---|---|---|---|
| 1.  W.T. Hamilton, I.S.E. | * | * | * | |
| 2.  D. Fox, I.S.E. | * | * | * | |
| 3.  G. Shillitoe, N.C.S.T. | * | * | * | |
| 4.  Prof. Clarke | * | * | * | |
| 5.  J. Wright, C.A.S.T. | * | * | No | |
| 6.  C. Priddle, C.A.S.T. | * | * | No | |
| 7.  V. Weston, I.S.E. | * | * | No | No reply |
| 8.  Prof. Seneque | * | * | * | Scans |
| 9.  Prof. Hardern | * | * | * | |
| 10. J. Walsh | * | * | * | |
| 11. R. Hanna | * | * | * | |
| 12. Prof Butler | * | * | * | |
| 13. Prof. Middlebrook | * | * | * | Scans |
| 14. Prof. Burns | * | * | * | No reply |
| 15. Prof. O'Neill | No | No | No | No use made |
| 16. Prof. Neilson | ? | No | No | |
| 17. Dr. C. Rolfe | ? | No | No | |
| 18. Prof. Newton | * | No | No | Scans, considers useful |
| 19. J.D. Stancer | ? | No reply | No | No reply |
| 20. Prof. R. Stock | No | No | No | No reply |
| 21. R.J. Fielding | * | No | No | |
| 22. Dr. M. Bassey | No | No | No | |
| 23. T. Shaw | ? | No | No | |
| 24. T. Jones, Info Officer | * | * | No | |
| 25. F. Munday | * | * | No | |

Librarians

| | Scans? | Interview? | Trial Copies? | Postal survey |
|---|---|---|---|---|
| 26. D. Mingay, Basford Hall | * | * | * | |
| 27. J. Sutcliffe, Peoples' | * | * | No | Scans only |
| 28. P. Haywood, Nott Univ | No | * | * | |
| 29. H. Gascoigne, Clarendon | * | * | * | |
| 30. L. Knaggs, C.A.S.T. | * | * | * | |
| 31. Librarian, Arnold & C. | * | * | * | |
| 32. O. Reynard, Leic. Poly | * | * | No | No reply |
| 33. R. Kirk, Leic Univ | * | * | No | Scans & displays |
| 34. L. Kaczur, Broxtowe | No | * | No | |
| 35. Librarian, Newark FE | No | No | No | Displays |
| 36. Librarian, North Notts FE | No | No | No | Displays |
| 37. Nott Coll of Agriculture | No | No | No | Displays |
| 38. Librarian, South Notts FE | * | * | No | Scans & displays |
| 39. J.L. Davies, West Notts FE | * | * | * | Scans |

| | | | | |
|---|---|---|---|---|
| 40. S. Cumberpatch, County Hall | * | No | No | Scans, passes to Education Dept. |
| 41. Librarian, Grosseteste FE | No | No | No | No use made |
| 42. P. Verril, Derbyshire HE | * | * | No | Scans |
| 43. Librarian, Matlock HE | ? | No | No | No reply |
| 44. L. Hopkins, Angel Row | No | No | No | No use made |
| 45. Educat Lib, Lough Univ | ? | No | No | Cannot trace copy |
| 46. E. Pole, NIACE., Leicester | * | * | * | |
| 47. Librarian, Coombe Lodge | ? | No | No | No reply |
| 48. C. Walker, Local studies L. | * | No | No | Scans only |
| 49. County Librarian | No | No | No | No use made |

? means that no information is available

* means "yes"

## Table  28

Checklist for client interviews (to follow the trial in which the client has read and marked a couple of bulletins)

1. Your use of the bulletin

   (a) How do you use the bulletin?(Scan it, circulate it, file it, send for copies of items, extract and index it, read and file or index copies)

      How long does it take?    Do you receive any other bulletins?

   (b) Exactly how do you scan the bulletin?
(Look for subject headings, look at every item, look at titles, authors, items from particular publications, read the whole thing through).

2. How you see the bulletin (for clients who have actually scanned it at some time)

   (a) From your point of view, what are the good and bad things about the bulletin? (Frequency, number of items it contains, age of the items, the coverage of topics given, the sort of item selected, the amount of description given with each item, the types of material included, the arrangement, the page format).

   (b) How much do you think "Education News" would cost to buy from a commercial source, like a professional institution or the producer of a database on education?

   (c) Have you recently found any material of interest to you which you felt should have been mentioned in the bulletin? What material?

3. Its value to you

   (a) If you did not have the bulletin, how would you go about keeping up with new material on the topics it covers?

   (b) If you had to buy this bulletin with money from your section or department funds, (thus having less to spend on other things) what is the most you would be prepared to pay for it?

   (c) Can you recall any items which you have seen in the bulletin, read, and which have been useful to you in connection with your work? How were they useful?

   (d) Can you put a cash value on the contribution made to your work?

   (e) What would you say is the annual cash value of the contribution that the information bulletin makes to your work?

4. (a) If the client has put a "C" against any items in the trial copies, ask why. (Related to his work? Can't tell if related?)

   (b) If the client has marked "X" against any items, remind the client about the database.

   (c) Explain about the availability of back searches on the database.

      C = Photocopy please          X = For possible use in the future.

## Table 29

### Details of costing for "Education News"

The activities involved are scanning, keyboarding the references, and copying, collation and distribution. The cost of the photocopying service which results from the bulletin is included, as an avoidable cost.

Scanning and keyboarding also produce an in-house database, so only half of the cost of these can be ascribed to the bulletin.

Scanning

    Labour cost: 1375 mins. per annum @ £7650 = 1375/100000 x 7650
                                       = £105

    Materials cost: One copy of HERTIS bull = £ 10.50

    Total scanning cost               £115.50
    Scanning cost ascribed to bulletin                        £57.75

Keyboarding

    Labour cost: 10479 mins.per annum @ £7650 = 10479/100000 x 7650
                                         = £802

    Total keyboarding cost           £802
    Keyboarding cost ascribable to bulletin                  £401.00

Copying/collation/distribution

    Labour cost: 7909 mins.per annum @ £4960 = 7909/100000 x 4960
                                        = £392

    Materials cost: 1250 covers per annum
        @ £27.20 per 2000            = 1250/2000 x 27.20
                                    = £17

                copy paper 1820 sheets
       per annum @ £1.50 per 500    = 1820/500 x 1.5
                                    = £5

    Total processing cost            £414          £414.00

Photocopying in response to bulletin

    Labour cost: 600 copies per annum
        @ 7.5 mins.each = 4500 mins.
                     Cost    = 4500/100000 x 4960
                                    = £223

    Materials cost: 1500 sheets of copy
        paper per annum         = 1500/500 x 1.5
                                  = £4.50

    Total copying cost         = £227.50      £227.50

Total cost of bulletin service, per annum           £1100.25

Table 30

## Alternative cost to readers of the bulletin to keep up by their own efforts

Known scanners of the bulletin were asked how, in the absence of the bulletin, they would keep up with new material in their areas of interest. The cost of the extra time they would spend in scanning newspapers and journals, and the cost of purchase (if they said they would buy their own copies) was calculated. The cost of time spent scanning was at the salary rate, without overheads.

| | | |
|---|---|---|
| 1. | Buy and read TES etc. Spend 3 hrs/wk on YTS material | 1467 |
| 2. | Look at Higher Education Abstracts (15 mins/week) | 118 |
| 3. | I would not. The bulletin is a bonus | |
| 4. | This is additional to my professional reading - it's a bonus | |
| 5. | Go to the library each Friday, and to the staff library at the University. Spend 2 hrs/week skimming only | 473 |
| 7. | Buy TES, NATFE J, go once a month to both libraries, browse for 3/4 hr, get copies of relevant material and read them later. | 165 |
| 8. | Would try to keep up, haphazardly, when I went to the library (30 min/wk) | 274 |
| 9. | I read TES, Education already. Would probably do no extra. A large amount is duplicating what I do anyway, or if it isn't it's rather peripheral. | |
| 10. | Would go through the journals in the library by hand, and also go into the BL database - with a list of names only. 4 hrs scanning per week. | 947 |
| 11. | I would have to go through the journals. 4 hrs per week. | 1889 |
| 12. | Would not have time to do all this scanning | |
| 13. | It saves me time. 2 hrs/week scanning | 1099 |
| 25. | I would look at what I buy already. I would miss things, but I have no time to sit in libraries, and I'm not even near a library. | |
| 26. | I would do no scanning myself | |
| 27. | I would not | |
| 28. | Would read the Guardian and a journal (30 mins/week) | 116 |
| 29. | Would just scan the journals we take ourselves | |
| 31. | It's used as a checkup on existing scanning. I would do no extra | |
| 32. | I would look at HERTIS bulletin. I would not feel the gap | |
| 33. | No extra work | |
| 39. | As I did before - look at the newspapers. Some things I just would not see | |
| 46. | Its useful in showing me up material I havn't got. No extra. | |

### Total admitted alternative cost, per annum £6549

The alternative cost of £6549 does NOT account for the value of Education News to clients like 12, 25 etc who obviously value it as an input to their knowledge of what is published, but just would not have the time to increase their scanning in its absence.

Table   31

Time that users of Education News spend on processing their copy

Time spent on the bulletin per annum was calculated from admitted time
spent scanning, time spent processing items from the bulletin (librarians)
and time spent reading the copies that were ordered from the photocopy
service at 5 mins. per item.

In a few cases it was suspected that clients who said they scanned the
bulletin did not, in fact do so.  No calculation was made in these cases.

| | | | |
|---|---|---|---|
| 1. | 28 mins/copy | 118 photocopies per annum | 203.00 |
| 2. | 14 mins/copy | 1   photocopy | 55.10 |
| 3. | 18 mins/copy | 110 photocopies per annum | 126.50 |
| 4. | 12 mins/copy | 15 photocopies per annum | 72.70 |
| 5. | 10 mins/copy | 60 mins per issue in processing time | 98.70 |
| 7. | 7 mins/copy | 17 photocopies per annum | 34.90 |
| 8. | 10 mins/copy | 1 photocopy per annum | 45.80 |
| 9. | 5 mins/copy | for about half of them  3 Photocopies per annum | 14.50 |
| 10. | 10 mins/copy | 3 photocopies | 19.70 |
| 11. | 20 mins/copy | 7 photocopies | 84.20 |
| 12. | 20 mins/copy | 29 photocopies | 155.60 |
| 13. | 15 mins/copy | | 68.70 |
| 14. | 7 mins/copy | | 32.10 |
| 18. | 10 mins/copy | | 45.80 |
| 21. | 10 mins/copy | | 39.30 |
| 24. | 15 mins/copy | 16 photocopies | 26.00 |
| 25. | 15 mins/copy | 35 photocopies | 44.70 |
| | 10 mins/copy | (Two users of a circulated copy @ Broxtowe) | 42.70 |
| | 15 mins/copy | | 39.40 |
| 26. | 10 mins/copy | | 19.70 |
| 27. | 12 mins/copy | | 23.70 |
| 29. | 9 mins/copy | 10 mins processing time per issue | 37.50 |
| 30. | 15 mins/copy | 144 copies @ 6 mins processing time/copy | 97.80 |
| 31. | 15 mins/copy | | 29.60 |
| 32. | 10 mins/copy | | 19.70 |
| 33. | 10 mins/copy | | 29.00 |
| 34. | | 10 mins processing time/issue | 19.70 |
| 39. | 7 mins/copy | | 13.80 |
| 40. | 10 mins/copy | | 19.70 |
| 46. | 10 mins/copy | 6 copies @ 10 mins processing time/copy | 37.90 |

Total admitted time spent using          £1597.00
the bulletin, per annum

Table 32   Method used to scan the bulletin

From beginning to end, looking at every item for topics,
By subject headings.
Glance through a copy.
Look for titles of publications.


Table 33   Aspects of the bulletin which clients did not like (unprompted)

Repetition of items under different subject headings.
Page format.
The headings do not stand out.
Reproduction is poor.
A lot of articles contain one persons reaction to an ephemeral issue.
The bulletin could be sectionalised .
The coverage is not for me.
Which journals are searched?
What are the selection criteria?
An explanation of how to use it would be useful.
A title is not enough to check whether I have already seen an item
    during my scanning.
My copy comes folded.


Table 34   Topics which clients thought the bulletin could cover

Issues on the teaching of specific  subjects - art, technology, Science,
         maths.
Issues in the teaching of numeracy and in  environmental education.
Research coverage is not comprehensive.
Not much FE other than YTS.
Working conditions for students overseas.
Post-graduate training.
Counselling and guidance.
New assessment techniques.
Youth and the community.
Management skills and human relations for teachers.
Higher Education in other countries.
A listing of documents produced by government bodies.


Table 35   Comments on the sort of item selected for the bulletin

I like the journalistic items, because the staff are not interested in research.
More technical items, less ephemeral items, please.
I like the more serious-sounding titles.
Things from the papers can be overtaken tomorrow.  They are totally
          different from a journal paper, which is more carefully presented
          and leads to more references.
Leave out the journalistic reports, because academics should read them anyway.
Some of the items are peoples' opinions - I read the primary documents.
I scan the press myself, so the bulletin would ideally present material
          to which I do not have direct access.

## Table   36

__Comments-on·the amount of description given with each bulletin item__

I tend to take it no further when I see a non-informative title.
Sometimes I am not sure whether I have seen an item during my own
          scanning  -. a synopsis would help.
Sometimes when I get the article, it isn't relevant.
A short abstract of journal articles would be useful.
Does the article mention a person, a committee, a body, a company?
Does it make a statement, and what angle does it take?
Titles are written to be eye-catching - not always to be informative.
More on the items with cryptic titles, please.

## Table   37

If I knew what the keywords contained, I could use them.
Duplication of items is irritating.
Give a separate list of the subject headings.
Some of the subject headings confuse me - vocational guidance, vocational
          training, for instance.  Some useful things are under very
          general headings.
I would not want the headings to be any wider than they are.
I have to go back to check that I did not see a repeated item previously.
The duplication of items could be avoided from my point of view, because
          I am looking for keywords in the item.                 .
Might a broader classification be better?
What do the extra subject headings mean?
I do not trust "sections" made by other people.
The bulletin could consist of a once-only list with numbers.  Separately
          there could be an index to the topics, with the numbers of
          items attached - or a separate classified list of just numbers.
When you are doing a catalogue exercise you are bound to get duplication..
Sometimes you need to look at the words at the top.
I have to cover the whole of the bulletin to make sure I have picked up
          everything.                                           |
It could be in several large parts.
I get a bit fed up just past the middle of the alphabet because I am     .
          seeing items I have already looked at.

## Table   38

### Comments on the format of the bulletin

It is not easy to distinguish between the parts of each item.

Use a different typeface for the subject headings or underline them?

Format is not as stimulating as it could be.

The format is crude, not attractive.

It is done with a line-printer, not a typewriter.

It's the title that tells me the content - but where is the title?

The format is O.K.

Printout from a computer reproduces not so well.

It takes a while to notice the subject headings.

The headings do not grab your attention.

Unable to tell the difference between reference and headings.

Format could be more welcoming.

Poor quality paper.

Looks like photocopied catalogue entries.

## Chapter 9

### Cost, value and quality measurement

As a result of trying to apply them at Harwell and Trent Polytechnic, some useful things were learned about several of the methods discussed in the thesis.    These are discussed in this chapter.

### COST  MEASUREMENT

Costs for the purpose of a cost-benefit analysis need to be avoidable costs (costs that would not be incurred if a service was not provided).    The bulletin evaluations both gave interesting examples of this principle.

At Trent the chief executive of the Polytechnic was impressed by the analysis, but commented on the exclusion of the cost of the database.    (Costs for keyboarding and scanning had been halved for the analysis because two services were produced - the bulletin, and a database which is used separately for retrospective searches).  Now it is very likely that if the bulletin were not produced, neither would the database be produced, so the avoidable cost of the bulletin should include the cost of the database.

Recalculation shows the bulletin cost to be £1558 per annum (£1100), the cost per copy to be £1.24 (£0.88) and the cost per copy per annum to be £31 (£22).    However, the cost-benefit comparisons still come out in the bulletin's favour.

At Harwell the cost picture is complicated because the information officers scan for seven different services, and six of these would still continue if the bulletin was dropped.  One seventh of the total

labour cost of scanning was taken as the scanning cost of the bulletin.
This is an oversimplification, however    it is difficult to see
what else could be done, because many of the items scanned and chosen
for the bulletin also go into one or more of the other services.  The
most extreme argument would be that if there was no bulletin the
amount of scanning would be unaffected, putting the scanning costs for
the bulletin at zero.  This was discussed with the information officer,
who could see that there was not a total overlap. Hence the expedient
described above was adopted.

It will be noted that the cost-benefit analyses did not include
costs to the clients - for instance for the time it takes to fill out
request forms.  The inclusion of this sort of cost would be very import-
ant in an analysis which compared different approaches to a service,
or different services or provisions to advise choice or allocation decis-
ions, but in an analysis to justify a service it can be an unnecessary
complication.  It seems unlikely that clients would continue to use for
long a service which gave them more work to do than it gave them benefit.

## VALUE  MEASUREMENT

Eight approaches to value measurement were tried altogether and
it would be useful to compare them as methods and also to compare the way
in which they supported/contradicted each other for individual clients.
It is not intended to repeat here all the criticisms of methods that
have been made, except where my experience throws some light on the
problems others have indicated.  These criticisms can be seen in chapter 4.

The value indication methods that were used attempted to
measure either the value of the service given the client, or the value

s/he obtained by putting to use <u>information</u> obtained with the help
of the service. .

1.  Time spent using the service

This technique for justification has not been applied to
information bulletins before, possibly not to <u>any</u> library service.
It depends on the idea that if a client continues to spend valuable time'
on using a service, then the client must think that it is "worth it".
Hence a nod from the client to the value of the service is obtained.
At Trent clients were asked to record time spent on scanning several
copies of the bulletin.  At Harwell scanning time was estimated by the
client at an interview.  Time spent on other activities directly result-
ing from bulletin scanning should, I feel, be included - adding items to
an index, reading papers found through the bulletin - because all this
represents use of the service.  (If the service was not provided, these
specific activities would not be undertaken).  At Trent, information
was available that enabled this to be done.

In a figure for total time spent, it would be necessary to
include time spent on the 'bus or in the lunch hour or at home, since
it is all time spent on the activity whose value to a person is being
assessed.  The use of spare time for passive tasks like reading does
have the effect of releasing working time for more active uses.

A criticism of the method might be that although the total
time spent on a service may have some connection with its value to the
clients, it fails to convince since in a justification exercise there
is nothing with which to compare it.  The time spent can be made more
relevant to a funder by converting it into cash at salary rates, and this

also has the effect of including in the total time spent the different

valuations of time that come with increased involvement and responsi-

bility. (It is not an unreasonable assumption that the more highly

paid a professional person, the more responsibility he has to shoulder).

However there is a problem in converting spare time into cash, because

time in the lunch hour or on the 'bus at a workplace like Harwell could

scarcely be used profitably.  In the calculation of the cash value of

time spent using the bulletin, I have left out time spent other than

work time, to avoid this problem.

In support of this technique for justification I can say that

during my interviews several clients spoke as if scanning a bulletin

and reading other material was a personal cost-benefit decision, based

on what they were likely to obtain from the expenditure of their time.

2.  Alternative cost to the client of scanning for current awareness

This technique has been used quite widely under the name "time

saved the client".  The emphasis of studies has been either that the

library can perform a better service more quickly because of librarians'

facilities or expertise, or that an activity done once in the library

for a large number of clients saves each of them some time associated

with performing it themselves.  By these stratagems large alternative

costs are demonstrated.

I feel that to provide a convincing demonstration of value, the

emphasis should be more on obtaining an admission from the client that

s/he would actually spend time in the absence of a service on doing work

to replace it.  An alternative cost is then calculated individually for

each client, using if possible any indication that s/he gives as to

the amount of time or cash that would be spent. Clients who admitted

to scanning the bulletin were asked, "If you did not have the bulletin,

how would you go about keeping up with new material on the topics it

covers?"

Some respondents said they would do extra reading. Others

admitted that they would not do any extra work to make up for loss of

the bulletin. These respondents either described the bulletin as a

bonus, or admitted that they valued it but realised that in its absence

they would not have the time to do reading to make up for its loss.

At Harwell many of the bulletin clients already scan the literature in

their own specialist areas, and were able to say exactly what sort of

item they would miss if the bulletin was withdrawn. One admitted that

"browsing in the library could never be as effective as using the

bulletin".

A problem of an approach which does not lead clients too

closely is that if they reply in terms of journals they would scan, then

the evaluator has to decide on an average scan time for a journal - not

only this, but a decision has to be made about what is involved in "scan-

ning" in the library: is it looking at titles or reading papers or a

mixture of both? If it is a mixture, then in what proportions? Then

there are questions relating to the frequency of journals, and how many

of each frequency the respondent would scan. At Harwell, where the clients

are very "journal" oriented, a number gave replies in numbers of journals

scanned. All the clients at Trent, and some of the Harwell respondents

answered in terms of the time they would spend. This made the calcula-

tion of total value easier, and also I feel that it gave a more reliable

indication of value, because clients had to work out for themselves
just how much time they were prepared to set aside for keeping up-to-
date.

3. The cost of an alternative in the commercial sector

So far as we know there is no commercially-available alternative
to either the Trent or the Harwell bulletin which could substitute for
it entirely. This is why clients were asked to say what they thought
such an alternative would cost. It seems at first not a very satisfactory
technique for justification, because respondents are often at a loss to
know what to say. (Some of them looked around to see if there was any-
thing similar to the bulletin in their office, others asked questions
about the cost of production of this hypothetical publication, and its
circulation.) The evaluator must remember that it is the alternative
cost for which he is looking, so a national publication from a profess-
ional institute or database producer is the sort of thing clients should
be considering. Martyn (1980) had a similar experience with this technique,
but he liked it because, he said, it "avoided the emotional overtones and
other problems" associated with questions about what the bulletin was
worth and how much clients would pay for it. A few of my respondents re-
fused to answer the question: "oh, what a question", "don't know", "I
couldn't guess", but eleven out of fourteen replies were obtained at
Harwell, and ten out of sixteen at Trent. Furthermore most of the replies
in each location fell into a narrow range near to the annual production
cost of one copy of the bulletin.

4. Prepared to pay

Clients were asked : "if you had to buy this bulletin with money
from your section or department funds (thus having less to spend on other

things) what is the most you would be prepared to pay for it?"

At Harwell a wide range of subscriptions from £100 to £500 per annum was offered. Five out of nine clients offered £250 per annum. This was for a bulletin which costs £80 per annum per copy to produce. At Trent the smaller, less frequent bulletin attracted smaller offers in a range £10 to £60 for a bulletin which costs about £30 per annum per copy. It is difficult to understand why the offers at Trent approach the cost of the bulletin so closely, while those at Harwell imply that it is a bargain.

Previous attempts to justify a service in this way have compared the total subscription offer with the entire cost of the bulletin. I would say that justification is best attempted on the basis of a comparison of what people are prepared to pay per copy with the cost of a single copy. There is no reason why the offers from just those people who use the bulletin and value it should be expected to "pay for" the entire bulletin production.

5. Useful items reported as seen through the bulletin

Clients were asked to recall items they had seen in the bulletin, read, and which had been useful to them in connection with their work, and to say how they had been useful.

This question relates to the value of information from a service, rather than to the value of the service itself in saving the clients having to do their own current awareness work. The question was in preparation for the next question which asked clients to put a cash value on the contribution made to their work by the item. However it is in my opinion a useful justification question in its own right, because the answers show different ways in which clients have benefited from a current aware-ness service. Clients mentioned diverse reasons why information

received via the bulletin had contributed to their work: Market infor-

mation, ideas for new research, help with problem-solving, updating

or clarifying their understanding of an issue, collection of references

to material on a project not yet begun, ideas to apply in teaching and

administrative duties.

6.  Cash value of useful inputs from the bulletin

It is entirely possible to put a value on information, in

terms of the effect that useful information can have on someone's work.

Several examples of how a value can be calculated came out of the inter-

views:

(a)  Working time saved by the use of information can be calculated.

For instance developing a program or an experimental method, working

out an idea, trying out a new approach can all take time, but when a

ready-made answer can be seen in the literature, that time is saved

or at least greatly reduced.  When interviewing a professional s/he

can be asked to estimate the working time saved on the basis of

experience.

(b)  When delay in a project has been prevented, the cost of this delay

can be calculated.  Where the delay is waiting time, the cost of this

time for the project workers can be used.  But a delayed project may have

other repercussions – a contract or an opportunity may be lost, and

this has financial consequences which are part of the cost avoided.

(c)  The time that a client would spend in looking for specific informa-

tion which he found through his bulletin scanning can be estimated and

used as the value of that information.

(d)  Materials found and used in a course whose validation by CNAA requires that the students are kept up-to-date on the issues involved can be valued in terms of what would happen if the validation was withdrawn - the financial consequences of loss of students and re-deployment of staff.

The benefits mentioned above are all consumption benefits. Several of my respondents said that the items they found were valuable, but could not suggest how a cash value could be calculated because the information "aids my thinking" or "goes into the sponge of knowledge". Investment benefits such as these are very difficult to express in terms of advantage because at the time that advantage is felt, the connection between the useful input and its valuable effect is lost. However the value of just a few consumption benefits is so great that the evaluator could ignore investment benefits in a cba calculation for justification purposes, it seems to me.

7.  Cash value of the contribution to work performance

Clients were asked what they would say was the annual cash value of the contribution that the bulletin made to their work.

Martyn (1980) used this question (substituting "work performance" for "work"), asking clients to pick a value from the scale:

nil - £5 p.a. - £10 p.a. - £20 p.a. - £50 p.a. - more

Although he admitted surprise that so many bulletin users were able to give an estimate of value, he used this measure to calculate benefit for a bulletin service.

I found in my own interviews that this question did not on the whole make respondents think about the value of information got via

the bulletin, which was the intention. Most of the respondents offered the alternative cost of their scanning for current awareness. That is, they gave a value for the service, not for information obtained via the service. Most of the estimates given by users of the bulletins at Trent and Harwell were far in excess of the values which Martyn obtained - seldom below £200, and up to £5000 per annum.

I would say that the question is not a useful one, and that there are better ways to calculate an alternative cost and a value for information obtained.

8.  Value of the service rated on a scale.

Both Martyn (1980) and Frances et al (1981) asked clients of an information bulletin to rate it on a scale according to its "usefulness". Frances et al comment that asking people how the service was useful gives a great deal of information on how the service is used, but in using a similar question the Information Officer at Harwell was keen to obtain some idea of how the bulletin was valued among the clients.

All bulletin recipients were asked to comment on the value of the bulletin on a five point scale:

| | |
|---|---|
| Of little value | 3% |
| Not very valuable | 9% |
| Valuable | 35% |
| Very valuable | 40% |
| Indispensable | 13% |

Over half the bulletin recipients answered the question, and their answers were distributed across the ratings in the proportions indicated. One could say that approximately a quarter of the recipients of the bulletin, or one half of the readers of the bulletin, find it significantly valuable.

I wondered whether there was any correlation between this rating of value and any of the other measures of value which I had attempted with a sub-set of the same group of users.

My conclusions are based on using the very scanty evidence available to draw scatter-graphs shown in Figure 19. (I made the assumption that the rating is a continuous variable, which may be untrue). It seems that time spent on using the service may be related to valuation rating, as may the alternative cost of keeping up that clients admitted to. "Prepared to pay" seems to be related to valuation, but not the estimated cost of an alternative in the commercial sector. As regards the declaration of useful items remembered as coming from the bulletin the relationship (if there is one) appears to be between value rating given by a respondent and the sort of use to which remembered items were put. This is a very interesting finding, since it suggests that the value got from the bulletin is as much to do with how the professional sees information as with what goes into the bulletin (Table 39).

Figure 19 . Value rating by Harwell clients and other measures of value
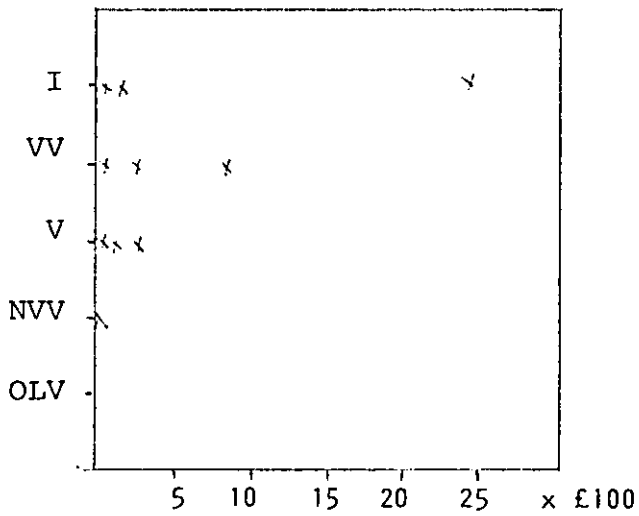
(a) Time spent on use
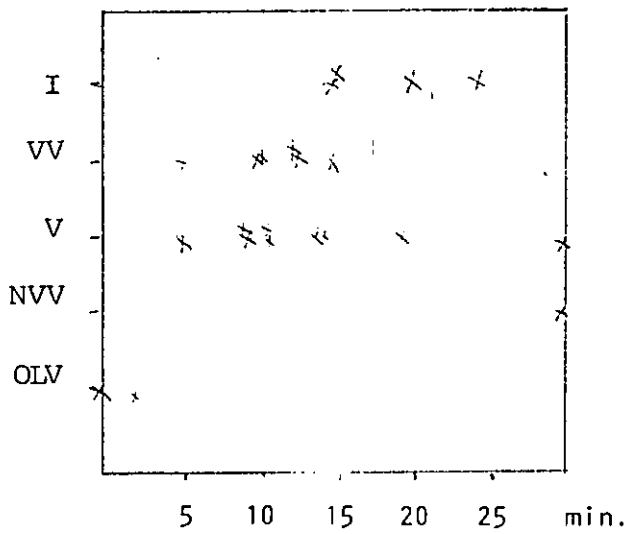
(b) Alternative scanning time.
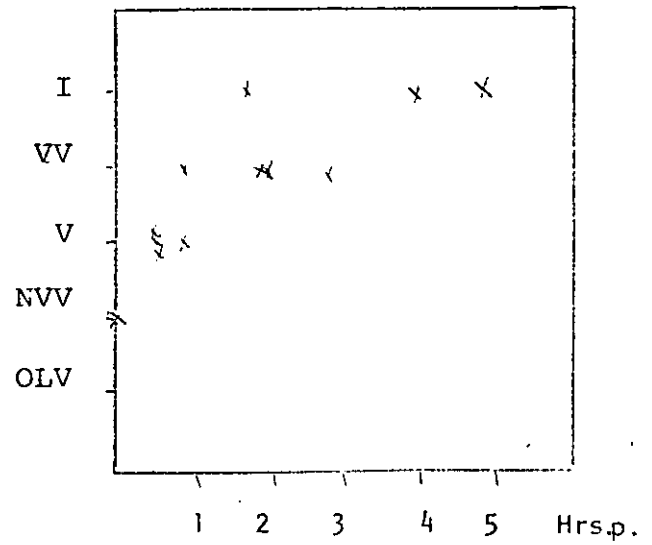


(c) Cost of an alternative in commercial sector.
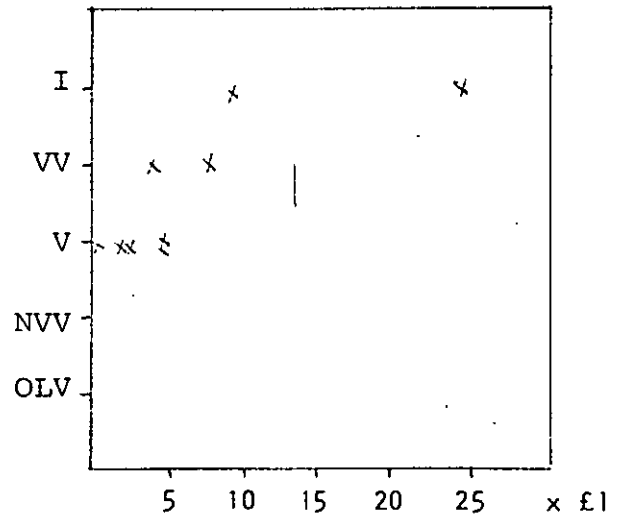
(d) Prepared to pay.

Table 39. Ratings of value for the Harwell bulletin from nineteen
respondents and how they saw information from the bulletin as valuable

| How information was seen by respondent | Ratings awarded by respondents who saw it as useful in this way |
|---|---|
| Strategic information about markets etc. | I |
| Information used in problem-solving | VV.VV.I.VV.I.V.VV.VV. |
| Information giving ideas for new work | VV.V |
| Information which influenced my thinking | OLV.V.NVV |
| Information for feeding to others | VV.V |
| As references only | V.V.V |

It is difficult to conclude from the limited experience of using these methods for value measurement which are the most indicative of value. Part of the problem is the feeling that measures have to be respectable to be valid. I am not sure that this is a feeling that should be given much elbow room. I am inclined to agree with Flowerdew and Whitehead that the main purpose of measures of value is to inform decisions, and they should be judged on their ability to do this. Another part of the problem of assessing the measures is that there is no measure that can be used as a yardstick. (The fact that some measures appear to go along with the client's rating of value on a scale and some do not is of little value in assessing measures if we are not sure of the validity of the client's rating).

In order to show the extent to which the different measures support each other, Tables 40 and 41 list responses to value questions from clients from Trent and Harwell respectively. Clients are represented by the numbers on the left of each table, and have been ranked in order of apparent valuation.

How convenient it would be to have a measure of value that was a routine measure - in the sense that an interview with each and every client, or at least with each member of a representative sample of clients, was not required in order to take it. Alternative cost is such a measure for many library services, but since it does not involve a nod from the client, there will always be the need for surveys to support alternative cost calculations.

Table 40. Trent direct users : responds to "value" questions
(12 best responses out of 16)

| Respondent No. | Useful items described | Scan time ≯ 10mins. | Would keep up or no time | Good things to say | Annual cash value | Prepared to pay > £30 | Cost of commercial service > £100 | Value of useful items |
|---|---|---|---|---|---|---|---|---|
| T1 | * | * | * | * | * | * | | |
| T5 | * | * | * | * | * | | * | |
| T7 | * | | * | * | * | * | * | |
| T10 | * | * | * | * | * | | | |
| T11 | * | * | * | * | * | | * | |
| T8 | * | * | * | * | * | | | |
| T13 | * | * | * | * | * | | | |
| T4 | * | * | | * | | * | | |
| T3 | * | * | | * | | | | |
| T12 | * | * | * | | | | | |
| T2 | * | * | | | | | | |
| T9 | | * | | | | * | | |

Table 41. Harwell users : responses to "value" questions

(best 18 responses out of 28)

| Respondent No. | Valuation on a scale (top 2 choices) | Useful items described | Scan time ≥ 15 mins. | Would keep up or too busy | Good things to say | Annual cash value | Prepared to pay > £250 | Cost of commercial service > £100 | Value of useful items |
|---|---|---|---|---|---|---|---|---|---|
| H9 | * | * | * | * | * | * | * | * | * |
| H6 | * | * | * | * | * | | | * | * |
| H8 | * | * | * | * | | * | | * | |
| H13 | * | * | * | * | | * | * | | |
| H15 | * | * | * | * | * | | * | | |
| H25 | * | * | * | * | * | | | | * |
| H1 | * | * | | * | * | | | * | |
| H7 | * | | * | * | * | | | * | |
| H17 | * | * | | * | * | | | | |
| H12 | * | | * | * | | * | | | |
| H14 | * | | * | * | | (*) | * | | |
| H20 | | * | | * | | * | * | | |
| H22 | | * | | * | | * | | | * |
| H23 | | | * | * | | | * | * | |
| H30 | * | * | | * | | | | | |
| H19 | | * | | | | | | | * |
| H28 | * | | * | * | | | | | |
| H29 | * | | | * | * | | | | |

## QUALITY MEASUREMENT

The studies at Trent and at Harwell indicate that <u>certain</u> aspects of a bulletin service are impor,tant to the clients. I have listed in Table 9 (page 160)the generally-accepted quality criteria for a current awareness service, and we may add to these that if the service is a bulletin it must not represent too much of a reading load, and that the arrangement should not confuse or frustrate the recipient.
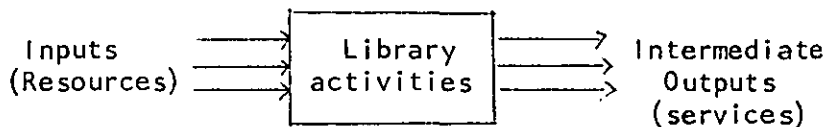
The other useful thing to come out of the survey work is the value of the question about "<u>the good and bad things about the bulletin</u>". The things that come to mind before the client has read the checklist of aspects on which he is invited to comment are important to the evaluator, because they are the aspects of the service which the client sees as regularly causing disbenefit.

<u>Quality of service is a separate concept from value, but it is related to value by their both being related to final output.</u> Whereas value measurement needs a nod from the client to confirm the fact of value each time it is measured, quality can be described once in terms of criteria which need to be satisfied however the service is given, and thereafter quality control rests on the application of standards, goals, minimum inputs and so on <u>to these criteria</u>. Quality criteria for some services, like current awareness service and the catalogue, are already well known. For other services they still need to be discovered, and this can be done by studying those aspects of the service which are vital to the user's benefit.

# APPENDIX

## Costing library and information services

The costs of a library may be considered from two separate points of view. A simple economic model of a library will show materials and labour and cash (the inputs) to be consumed in various library activities, in order to produce library services (the output to the clients).

```
Inputs        ─────→  Library     ─────→  Intermediate
(Resources)   ─────→  activities  ─────→  Outputs
                                          (services)
```

The traditional approach to costs is to obtain the cost of each type of input so that a library resource budget can be shown, categorised by staff salaries, books, serials, and so on. We could call this resource budgeting. An alternative point of view is to consider the output services produced by the library, and to calculate the cost of each. In this case the cost of the library is being categorised by the purposes for which it is spent. We could call this analytical costing.

## Resource budgeting

As the only method of financial control for a service industry, resource budgeting has a number of important drawbacks:

(a) It leave policy to be largely dictated by the person who provides the funds (Brutcher 1944 ).

(b) The provision of so much per annum for staff, so much for books, so much for serials and so on, can fix a pattern of service which may be quite out of touch with the real requirements of clients, if it is the only means of management control.

(c) With such an approach there is no incentive to react to increases in the cost of resources by altering the nature of the service given. It appears more natural to match an increase in the cost of a resource by reducing the amount of that resource consumed by the service.

(d) Looking at library resources in terms of so much for staff, so much for materials can restrict reactions to a financial crisis just when some flexibility in resource management is called for. For example, an extra member of staff might be substituted for the cost equivalent in materials in a situation where an enforced general restriction on staff hiring is putting the library service in jeopardy. Similarly, traditional approaches to staffing in an academic or public library may mean that a full hierarchy of staff positions is provided even when the public or the academic staff are crying out for more funds to be spent on book provision.

Resource budgeting is useful to assess the effect of inflation on the price of materials, and in connection with formula budgeting, where for instance, so many books may be purchased per head of user population. Keller (1969) sees formula budgeting as an easily understood way of explaining the need for an overall increase in funding to an administrator who holds the purse strings, but may not understand the "subtleties and intricacies" of library management!

Librarians will presumably continue to calculate resource budgets each year in connection with an application for funds, but where real management control is to be exercised over library resources, calculating the cost of output services is necessary for several reasons:

It can be shown how funds are distributed between services;

The efficiency of library operations can be examined;

Decisions between alternative methods for provision of a service can be advised;

Evaluation of library services in terms of their costs and their benefits can be attempted;
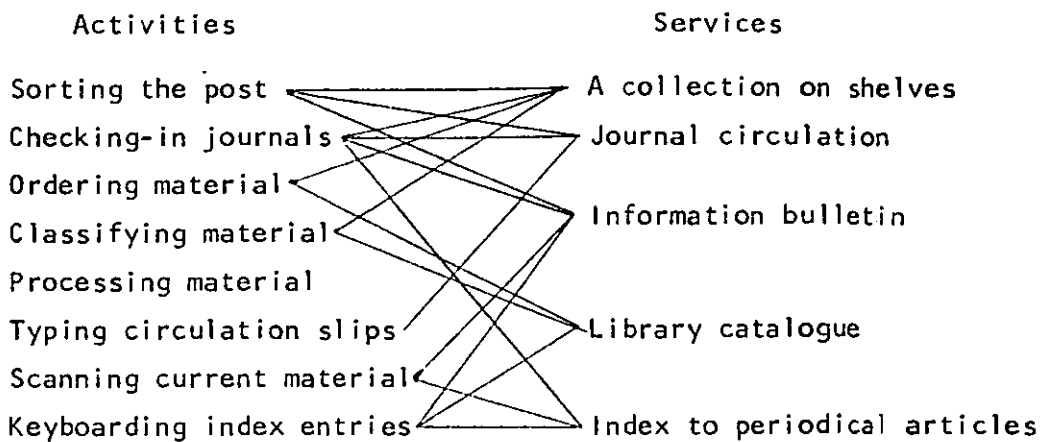
Those library operations which are increasing most rapidly in cost can be discovered;

When services are to be charged to the recipients, a price can be set if the cost is known for a service.

## Costing library services

Various approaches to costing have been described (Price 1971, Cochran et al 1970, Marron 1969, Vickery 1973, Mason 1973, Magson 1973). Most are based on the idea of allocating the costs of materials and labour via the activities performed by library staff to the services produced. The scheme detailed by Vickery et al (1973) will be described here.

Examples of library activities are sorting the post, checking-in periodicals, ordering a book, classifying a book, keyboarding a catalogue entry, typing a loan request, scanning current material, writing an abstract, printing the bulletin, and so on. A service is something the clients can use directly, and examples are a collection of material on the shelves, finding aids like a classified catalogue and indexes of various sorts, the loan service, the interlibrary loan service, production of a printed index to periodical articles, the enquiry service, an information bulletin or accessions list. It is obvious that activities contribute to services, but also an activity can contribute to more than one service (see below).

```
Activities                              Services

Sorting the post                     A collection on shelves

Checking-in journals                 Journal circulation

Ordering material

Classifying material                 Information bulletin

Processing material

Typing circulation slips             Library catalogue

Scanning current material

Keyboarding index entries            Index to periodical articles
```

When the services have been identified, and the activities that con-
tribute to them have been sorted out, costing of services proceeds
as follows:

> (a) Cost each activity in terms of labour, machine costs,
> materials costs and overheads,

> (b) Decide what proportion of each of its constituent
> activities goes to make up the service

> (c) Sum the activity costs to produce a service cost in
> terms of labour, machine costs and overhead.

The annual cost of an activity can be obtained as follows:

> (1) Labour cost
>
> The proportion of a worker's time spent on the activity is
> multiplied by the gross annual salary. The technique described
> by Vickery in connection with costing carried out by the
> Aslib Research Department assumes 435 available minutes in a
> full working day, and that each member of staff works for
> 230 working days per year (the remainder being taken off for
> holidays, sickness, training or attendance at conferences,
> etc.). This amounts to just over 100,000 minutes per year –
> a convenient denominator.
>
> If it takes 20 minutes per day to check-in periodicals, the
> proportion of annual working time spent on this activity is
>
> $$\frac{20 \times 230}{100,000}$$

By gross salary is meant the employee's actual salary before deductions, plus employer's contributions to social security, pensions etc. Overheads can be accounted to the salary if this is required by the cost analysis. Overheads are of two kinds : administrative overheads, which are the administration costs of the library - salary of library manager, the doorman, the teaboy, and any non-specific consumption of materials, for example - are allocated evenly among library activities. General or "service" overheads are the costs of running the organisation the library inhabits which are difficult to account to any one department - rent, rates, light, heat, power, repairs, cleaning, furniture, building insurance, telephone, postage, the gardener, the canteen etc. - and are usually allocated to departments in proportion to their staff costs. They can be accounted to the gross annual salary used in calculating labour costs.

(2) Materials cost

If the activity being costed consumes materials, the materials cost for one year is added.

(3) Machine costs

The original cost of equipment, like typewriters, copiers, microfilm equipment is normally written off over a period of five years. A proportion of this amortized cost, plus any annual maintenance cost, is added to the cost of the activity which makes use of the machinery. More expensive equipment (computers?) is normally amortized over a longer period.

Measurement of labour time

Vickery(1972) gives a summary of techniques for obtaining time spent. These include the use of existing records, interviewing staff, persuading staff to fill in times against a list of their tasks

as a sort of work diary, sampling what people are doing at random
times, and timing jobs with a stopwatch.

Stopwatch timing is most suited to clerical tasks, where
there is a visible start and finish to each activity. Use of existing
records can be complicated by the likelihood that they may not cover
exactly the task required or may not be detailed enough. Asking
people for times is a fairly common technique in survey work generally,
but applied to costing exercises it is only useful when the people
interviewed work on one or two clearly defined tasks.

The work diary technique is popular. Wilkin et al (1972)
supplied workers with diaries having "scope notes" which gave hints
on when to start and stop timing, and how much to include in terms of
the library sub-system being analysed.

Several authors mention the problem of 'pure time' to perform
a task, which excludes relaxation time, interruptions, and time
associated with activities like sorting things in preparation for the
task. Wilkin et al, noticed that pure time differed from total time
spent on a task by 33 per cent. Smith and Schofield (1971) mention
using the diary technique to record work done other than on the main
task (the remainder being the pure time). It is significant that
the measurements made in the above cases were to obtain unit costs for
activities, when there is some point in isolating pure time. Where
the cost of an output service is being measured in a particular insti-
tution, would not pure time give unrealistically low labour cost
figures, since people do pause, go to the toilet, and talk or day-
dream on the job?

## Differences in terminology and approach

Vickery's approach seems to be to identify a minimum of output services, decide how the library activities contribute to them, and sum the costs. Price (1971) uses the same costing technique, but refers to activities as 'products'. A product is "a coherent activity or set of activities contributing to a specific goal or output". Cohen (1970) calls his services "output centres". Mason (1973) calls them activities! He distinguishes between "operational activities" such as selection, purchasing and indexing, and "service activities" by which he means output services like loans, the reference service, information retrieval, and the current awareness service.

Apart from individual differences in terminology, there are two main complications in the practice of analytical costing. One is to be able to decide what are the output services (is the library catalogue and index a service?). Another arises in situations where there is no obvious logical connection between the input and its processing on the one hand, and the output services on the other. It has to do with alternative ways of allocating the costs of materials, machinery and overheads to the outputs.

Identification of output services is a simple matter for the manager of a commercial system : they are the products which the public buys. The user orientation involved in the work of an information unit similarly helps to identify outputs. In a library which neither sells material nor gives a user-directed service, identification becomes more difficult. A definition of output services which could be applied to any sort of library might be "what the customer can use directly". This rubric could effectively isolate the output of any library from the

simplest, which merely collected and displayed material, to the
most evolved, where information was extracted and new information
synthesised.

The second problem is most obvious in a system such as the
Education Resources Information Centre (ERIC) organisation, where the
logical connection between the input and the output services is
obscured by temporal and geographic separations. "There appears to
be no fair or proportional way to assign input costs (the money that
goes into collecting, indexing and storing documentary material) to
the output products and services" (Marron 1969). Marron's answer is
to add an equal percentage of input costs to the production costs of all
output services. The problem cannot be ignored in a commercial system
because "input costs are roughly two thirds of the overall budget of
an information centre". Price (1973) writing about the ERIC processing
and reference facility, recommends flow charting a complex system from
input to output services in order to arrive at an equitable distribu-
tion of operational costs to services. In another paper he illustrates
the sort of categorisation that can be done in a service like the
NASA Scitech information facility, where several output services are
produced from the same set of activities (Price 1971).

# R E F E R E N C E S

AGUILAR, F.J.   Scanning the business environment.  Macmillan,  1967.

ALLRED, J.   The measurement of library services : an appraisal of
     current problems and possibilities.   Library Management,
     Vol.1,  No.2,  1979.

AMERICAN CHEMICAL SOCIETY.   Cost effectiveness of information
     systems.   2 May, 1969.   ED 047 753.

AMERICAN LIBRARY ASSOCIATION.   Minimum standards for public
     library systems.   1966.

ARMSTRONG, A.   Analysing industrial information service costs;  a
     simple check list.  Aslib Proceedings, Nov.1972,   pp.635-40.

ARNOLD, D.V.   The management of the information department.
     Andre Deutsche,   1976.

ARNONE, G.A.   Jackson, M.E.  An information system as a cost
     reduction tool in the transfer of knowledge.  Proc American
     Soc. for Information Science,  Vol.10,  pp.3-4, (1973).

ASHMOLE, et al.   Cost-effectiveness of current awareness sources
     in the pharmaceutical industry.   J.American Society for Information
     Science,  Jan.-Feb.1973,   pp.29-39.

ASLIB.  Inter-library co-operation and standards of public library
     service.  Aslib Proceedings, August 1963,   pp.229-233.

ASSOCIATION OF RESEARCH LIBRARIES.   Review of the formulation and
     use of objectives in academic and research libraries.  ARL
     Management Supplement, Vol.2, No.1, Jan.1974 (ED 089 768).

ATHERTON, P.   Catalog users' access from the researchers viewpoint:
     past and present research which could affect library catalog
     design.  IN:  Closing the Catalog.  D.K.Gapen and B.Jurgens
     (Editors), Oryx Press, 1980,   pp.105-122.

BALLS, H.R.   New techniques in government budgeting  4 :  Planning
     programming and budgeting in Canada.  Public Administration,
     Autumn 1970,   pp.289-305.

BECKER, G.S.   The economic approach to human behaviour.   University
     of Chicago Press, 1976.

BEVAN, G.  et al.  Health care priorities and management.
     Croom Helm,  1980.

BICKNER, R.E.   Concepts of economic cost   IN:  G.H.Fisher (Editor)
     Cost considerations in systems analysis.   Elsevier, 1971,
     pp.24-63.

BIRD, J.  Assessing effectiveness : a preliminary study of the views
     of public librarians.  Polytechnic of North London, 1981.
     (British Library Research and Development Report 5632).

BLICK, A.R.  Magrill, D.S.   The value of a weekly in-house current
     awareness bulletin serving pharmaceutical research scientists.
     The Information Scientist,  March 1975,   pp.19-28.

BLICK, A.R.   Evaluating an in-house or bought-in service.  Aslib
     Proceedings,  Sept.1977,   pp.310-319.

BLOSS, M.   Research, and standards for public libraries.  Library
     Research,  Winter 1980,   pp.285-325.

BONN, G.S.  Evaluation of the collection.  Library Trends, Jan.1974,
     pp.205-304.

BOOKSTEIN, A.   Swanson D.C.   Models for shelf-reading.  Library
     Quarterly,  Vol.43,   pp.136-41,  1973.

BOURDILLON.   Standards of public Library Service in England and Wales.
     Report of the working party appointed by the Minster of Education
     in March 1961.  HMSO,  1962.

BOURNE, C.P.   Some user requirements stated quantitatively in terms
     of the 90% library.   IN:  Electronic Information handling.
     A.Kent (Editor),  Spartan Books, 1965,   pp.93-110.

BOW, E.   Library measurement and evaluation.   Ontario Library
     Review, Dec.1971,   pp.249-251.

BOWERMAN, C.M.   Brown, M.T.   The development, cost and impact of a
     current awareness service in an industrial organisation.
     J. Chemical Documentation, February 1971,   pp.72-75.

BROMBERG, E.   Simplified PPBS for the librarian.   Educational Resources
     Information Centre,   1971,   (ED 047 751).

BROPHY, P. et al.   A library management game.  University of Lancaster
     Library, 1972.

BROWN, R. (Editor).   Output measurement : Proceedings of a seminar
     in output measurement for Public Libraries.   Public Libraries
     Research Group,   1974.

BRUTCHER, C. et al.   Cost accounting for the library.   Library
     Resources and Technical Services,   Fall 1964,   pp.413-431.

BRYANT, D.J.   Objective management.   IN:  P.A.Thomas,  V.Ward,
   (Editors).   The corporate approach to library management.
   Aslib 1974.   pp.17-33.

BUCKLAND, M.K.   et al.   Systems analysis of a university library.
   Lancaster University,   1970.

BUCKLAND, M.K.   Book availability and the library user.  Pergamon, 1975.

BUNGE, C.A.   Approaches to the evaluation of library reference
   services.  IN:  Lancaster, F.W. (Editor).   Evaluation and
   scientific management of libraries and information centres.
   Noordhoff-Leyden,   1977.

BURKHALTER, B.R.   Cast studies in systems analysis in a university
   library.   Scarecrow Press,   1968.

CAWKELL, K.C.  Cost-effectiveness and benefits of SDI  systems.
   Information Scientist,  Vol.6,  No.4.   pp.143-8.  (1972).

CHADDOCK, D.H.   Information used in design.   Engineering Materials
   and Design, April 1970,   pp.471-2.

CHARTERED INSTITUTE OF PUBLIC FINANCE AND ACCOUNTING.  Output measure-
   ment discussion papers No.5.   Leisure.  August 1974.

CHEN, C.C.   Applications of operations research models to libraries.
   MIT Press,   1976.

CHILDERS, T.   Managing the quality of reference/information service.
   Library Quarterly,  April 1972,   pp.212-217.

CLAY, M.J.   Cost benefit analysis.  Work Study and Management Services,
   July 1970,   pp.557-560.

CLEVERDON, C.W.   Aslib Cranfield research project.  Cranfield, Oct.1962.

CLEVERDON, C.W. et al.  Factors determining the performance of indexing
   systems.  Cranfield, 1966. (2 volumes).

COALE, R.P.  Evaluation of a research library collection.   Library
   quarterly,  Vol.35,  pp.173-84.  (1965).

COOK, J.   Financing a library/information service by operating a cost
   recovery system.  Aslib Proceedings,  June 1972,  pp.342-349.

CROWLEY, T.   Childers, T.   Information service in public libraries:
   two studies.  Scarecrow Press,  1971.

CULYER, A.J.   Social policy and government spending. Local Government
   Finance, October 1972,  pp.353-357.

CUNNINGHAM, J.  Ferguson, D.   Some perspectives on cost-benefit
   analysis.  Proceedings of the American Society for Information
   Science, Vol.10,  1973.

DAMMERS, H.F. Economic evaluation of current awareness systems. Eurim Conference, Paris, 1973.

DAVIES, J.L. The refinement of the conceptual treatment of output measurement. IN: Output measurement and education, Chartered Institute of Public Finance and Accounting, 1973, pp.51-67.

DEPARTMENT OF EDUCATION AND SCIENCE. Output budgeting for the Department of Education and Science. HMSO, 1970.

DEPARTMENT OF EDUCATION AND SCIENCE. Aspects of public library management. HMSO, 1973.

DePROSPO, E.R. et al. Performance measures for public libraries. Public Libraries Association. Chicago, 1973.

DOUGHERTY, R.M. Blomquist, L.L. Improving access to library resources. Scarecrow Press, 1974.

DRAKE, J. Corporate planning and libraries - where are we now? MCB Publications, 1979.

ELTON, M. Vickery, B. Scope for operations research in the library and information field. Aslib Proceedings, August 1973, pp.305-319.

ETNYRE, V.A. A case study of improper conclusions drawn from an insufficient analysis of information costs and benefits. Proceedings of the American Society for Information Science, Vol.10, 1973, pp.58-9.

EVANS, E. et al. Review of criteria used to measure library effectiveness. Bulletin of the Medical Library Association, Jan.1972, pp.102-110 (ED 057 813).

FEARN, R.A.C. Kovalik, G. Cost/benefit analysis of a computer-based agricultural information system. Proceedings of the American Society for Information Science, Vol.10, 1973, pp.62-3.

FISHER, G.E. Cost considerations in systems analysis. Elsevier, 1971, Chapter 8.

FLOWERDEW, A.D.J. Whitehead, C.M.E. Cost-effectiveness and cost/benefit analysis in information science. OSTI Report 5206, October 1974.

GETZ, M. Public Libraries - an economic view. John Hopkins University Press, 1980.

GRIFFIN, M. Putting a price on information. Aslib Proceedings, Jan.1980, pp.26-34.

HALL, A. et al. The effect of the use of an SDI service on the information-gathering habits of scientists and technologists. Institution of Electrical Engineers, 1972, (R/72/11).

HALL, H.J. Which service to buy, and why? Proceedings of the American Society of Information Science, Vol.13, (1976), p.47.

HAMBURG, M. et al. Library planning and decision-making systems. MIT Press, 1974.

HANSON, C.W. Slater, M. Does your firm need its own information service? OECD, 1963. (OECD Publication 15101).

HARMON, G. The information system as a capital investment. IN: Cost reduction for special libraries and information centres. F.Slater (Editor), American Society for Information Science, 1973, pp.23-6.

HAWGOOD, J. Morley, R. Project for evaluating the benefits from university libraries, Final Report. University of Durham, 1969. (OSTI Report 5056).

HAWGOOD, J. Morris, W. Benefit assessment for systems change in libraries and information services. British Library R & D Report 5443, June 1978.

HESS, E.J. Towards the measurement of benefits from the use of information services. Proceedings of the American Society for Information Science, Vol.10, p.91 (1973).

HOFFMAN, A.C. Monograph duplication in the Kresge Center for teaching resources at Lesley College. IN: Quantitative Measurement and Dynamic Library Service, C.C.Chen (Editor), Oryx Press, 1978.

HOUSER, L. A pilot project toward the evaluation of the reference collection. New Jersey Library Association, 1968.

INSTITUTE OF MUNICIPAL TREASURERS AND ACCOUNTANTS. Output measurement discussion papers no.2 : Personal social services. December 1972.

JACKSON, S.L. Catalog use study. American Library Association, 1958.

JOHNSTONE, S.M. Choosing between manual and on-line searching - practical experience in the Ministry of Agriculture. Aslib Proceedings, October/November 1978, pp.383-393.

JONES, H. Preparing company plans : a workbook for effective corporate planning. Gower Press, 1974, pp.56-97, 121-150.

KASKE, N.K. Effectiveness of library operations : a management information systems approach and application. University of Oklahoma, 1973.

KEEN, E.M.   The Aberystwyth indexing language tests.   J.Documentation, March 1973,  pp.1-35.

KELLER, J.E.   Program budgeting and cost-benefit analysis in libraries. College and Research Libraries, March 1969,   p.156.

KENT, A.   The information retrieval game.   IN:  A.Kent (Editor), Electronic information handling.   Spartan Books, 1965,  pp.311-348.

KENT, A.  Use of library materials.  Marcel Dekker,  1979.

KIEWITT, E.L.   Evaluation of IR systems. The PROBE program. Greenwood,  1979.

KING, G.B.  Evaluation of the University of Minnesota library's reference department telephone information service.  Library School,  University of Minnesota, 1973. (ED 077 517).

KLINTOE, K.   Cost analysis of a technical information unit. Aslib Proceedings,  July 1971,  pp.362-71.

KOCH, H.W.   Marketing the products and services of information analysis centres.  IN:  W.A.Smith (Editor).  The management of information analysis centres,  COSATI,  1972,  (ED 059 412.).

KOCHEN, M.   Information for the community,  American Library Association, 1976,  Chapter 10.

KRAMER, J.   How to survive in industry : cost justifying library services.  Special Libraries, November 1971,  pp.487-489.

KUEHL, P.G.   Marketing viewpoints for user need studies.  IN:  Economics of information dissemination : a symposium, R.S.Taylor (Editor), School of Library Science, Syracuse University,  1973.

LADENDORF, J.   Information service evaluation : the gap between the ideal and the possible.  Special Libraries, July 1973,   pp.273-279.

LANCASTER, F.W.   MEDLARS:  Report on the evaluation of its operating efficiency.   American Documentation,  April 1969,  pp.19-142.

LANCASTER, F.W.  The measurement and evaluation of library services. Information Resources Press,  1977a.

LANCASTER, F.W.   The evaluation of machine-readable data bases and of information services derived from these data bases.  IN: Evaluation and scientific management of libraries and information centres, F.W.Lancaster (Editor),  Noordhof-Leyden,  1977b,  pp.73-100.

LEIMKUHLER, F.F.  Analytical models for library planning.  J.American Society for Information Science,  Nov/Dec. 1971,  pp.390-398.

LIBRARY ASSOCIATION. Guidelines for reference and information
    service.to public libraries. 1981.

LINE, M.B. The ability of a university library to provide books
    wanted by researchers. J.Librarianship, Jan.1973, pp.37-51.

LIPETZ, B. User requirements in identifying desired works in a large
    library. Yale University Library, June 1970.

LJUNGBERG, S. and Tullgren, A. Investigation on the use of
    information in R & D at a research-intensive company. II Possibilities
    of economic evaluation. Proceedings, Eurim II, pp.86-90.

LONG, F.R. The effects of reduced support for technical libraries
    and information centres services. IN: Cost reduction for special
    libraries and information centres, F.Slater (Editor), American
    Society for Information Science, 1973.

LOPEZ, M.D. and Rubacher, R. Interpersonal psychology : librarians
    and patrons. Catholic Library World, April 1969, pp.483-487.

MACKENZIE, A.G. Systems analysis of a university library. Program,
    April 1968, pp.7-14.

MAGSON, M.S. Techniques for the measurement of cost-benefit in
    information centres. Aslib Proceedings, May 1973, pp.164-85.

MAIZELL, R.E. Standards for measuring the effectiveness of technical
    library performance. Inst.Radio Engnrs.Transactions on Engineering
    Management EM-7, pp.69-72 (1960).

MARRON, H. On costing information services. Proceedings of the
    American Society for Information Science, Vol.6, pp.515-20, (1969).

MARTIN, L.A. (Commentary on papers at a symposium on evaluation of
    library services) Library Trends, January 1974, pp.403-413.

MARTYN, J. Unintentional duplication of research. New Scientist,
    6 Feb.1964, p.338.

MARTYN, J. Library and information services provided to local
    government officials and others in Leicestershire : a study of
    costs and benefits. Aslib 1980.

MASON, D. Programmed budgeting and cost effectiveness. Aslib
    Proceedings, March 1973, pp.100-110.

McCONKEY, D.D. MBO for non-profit organisations. American
    Management Association, 1975.

MEIER, R.L. Efficiency criteria for the operation of large libraries.
    Library Quarterly, Vol.31, pp.215-34, 1961.

MOISSE, E.   Costing information in an independent research association.
Information Scientist,   June 1967,   pp.57-68.

MOORE, N.   Too many books?   An economic view of library operations.
IN:  Survival '76.   V.Whibley (Editor),  Library Association 1976,
pp.30-42.

MORRIS, W.E.M.   Benefit assessment for systems change.  J.Librarianship,
January 1979a,  pp.15-24.

MORRIS, W.E.M.   ALA planning process for public libraries - UK test.
University of Durham,  November 1979b.   (British Library R & D
Report 5540).

MORSE, P.M.   Library Effectiveness : a systems approach.  MIT Press  1968.

MORSE, P.M.   Measures of library effectiveness.  Library Quarterly,
Vol.42,   pp.15-30,  1972.

MOSTECKY, V.   Catalog use study.  American Library Association,  1958.

MUELLER, M.W.   Time, cost and value factors in information retrieval.
IBM information retrieval systems conference, New York,  1959.

NEEDHAM, A.   User reactions to various forms and orders of catalogue.
Bath University Library,  November 1974.

NEWHOUSE, J.P. and Alexander, A.J.   An economic analysis of library
services.  Rand Corporation,  February 1972.   (R 848 BH).

NIGHTINGALE, R.A.   A cost-benefit study of a manually-produced current
awareness bulletin.  Aslib Proceedings,  April 1973,  pp.153-157.

NORTON, J.   Information analysis centres and the private sector.   IN:
The management of information analysis centres.  W.A.Smith (Editor).
Committee on Scientific and Technical Information,  1972,  pp.187-192.
(ED 059 412).

OLDMAN, C.   The value of information.   Management Consultants
(Bradford) Ltd.,  1976.

ORR, R.H. et al.   Development of methodological tools for planning and
managing library services : I: Project goals and approach.
Bulletin of the Medical Library Association,  Vol.56,  pp.235-240.
(1968a).

ORR, R.H. et al.  Development of methodological tools for planning and
managing library services II:  Measuring a library's capability
for providing documents.  Bulletin of the Medical Library Association,
Vol.56,  pp.241-267,  (1968b).

ORR, R.H.  Development of methodological tools for planning and managing
library services.  Bulletin of the Medical Library Association,
Vol.56,  pp.380-403,  (1968c).

ORR, R.H.   The scientist as an information processor.   IN:
      Communication among scientists and engineers,  C.E.Nelson,
      D.K.Pollock (Editors),  Heath Lexington 1970,  pp.143-189.

✓  ORR, R.H.  Measuring the goodness of library services : a general
      framework for considering quantitative measures.  J.Documentation,
      Vol.29,  pp.315-32,  (1973).

PARKER, S.  A conceptual framework for the performance measurement of
      a Canadian Federal Government health sciences library network.
      IN:  Quantitative measurement and dynamic library service,
      C.C.Chen (Editor),  Oryx Press,  1978,   pp.245-262.

PENNER, R.J.   Measuring a library's capability.  J.Education for
      Librarianship,  Vol.13,  pp.17-30,  (1972).

PIGOU, A.   The economics of welfare.  Fourth Edition,  Macmillan 1962.

PITERNICK, A.B.   Measurement of journal availability in a biomedical
      library.  Bulletin of the Medical Library Association,  Vol.60,
      pp.534-542,  1972.

PIZER, I.H. and Cain, A.M.   Objective tests of library performance.
      Special Libraries, Vol.59,  pp.704-711,   1968.

PRENTICE, R.   The determination of worth : macrorationality in urban
      and regional planning.  Department of Geography,  University of
      Reading,  1977.

PRICE, D.S.   Collecting and reporting real costs of information systems.
      American Society for Information Science, Nov.1971.  (ED 055 592).

PRICE, D.S.   The cost of information : a prerequisite for other analyses.
      IN:  Economics of information dissemination.  R.S.Taylor (Editor),
      School of Library Science, Syracuse University, N.Y.  1973.  pp.21-48.

PRYOR, H.E.   An evaluation of the NASA scientific and technical
      information service.  Special Libraries,  November 1975,  pp.515-519.

PUBLIC LIBRARIES RESEARCH GROUP.   Public library aims and objectives.
      Library Association Record,  Vol.73,  pp.233-4.

QUIGLEY, H.   An investigation of the possible relationship of inter-
      branch loan to cataloguing.   Library Quarterly Vol.14,  333-338,
      (1944).

RADLEY, G.W.   Management information systems. Intertext,  1973,
      pp.14-31.

RAFFEL, J.R.   From economic to political analysis of library decision
      making.   College and Research Libraries,  Vol.35,  pp.412-423 (1974).

RAFFEL, J.A., Shishko, R.   Systematic analysis of university libraries.
      MIT Press 1969.

REES, A. Economics. IN: International encyclopedia of the social sciences, D.Sills (Editor), Macmillan & Free Press, 1968.

REVILL, D.H. Unit times in studies of academic library operations. Aslib Proceedings, October 1977, pp.363-80.

REYNOLDS, M. et al. A study of library network alternatives for the State of Washington. Washington State Library 1971.

ROUSE, W.B. Optimal resources allocation in library systems. J.American Society for Information Science, May-June 1975, pp.157-65.

ROBERTSON, S.E. et al. Standard costing for information systems. Aslib Proceedings, September 1970, pp.452-457.

ROTHSTEIN, S. The measurement and evaluation of reference service Library Trends, Vol.12, pp.456-472, (1964).

RZASA, P., Baker, N.R. Measures of effectiveness for a university library. J.American Society for Information Science, Vol.23, pp.248-53, (1972).

SCHOFIELD, J.L. et al. Evaluation of an academic library's stock effectiveness. J.Librarianship, July 1975, pp.207-227.

SCHONER, B. Marketing research. Wiley 1975, pp.130, 173-8, 194-8.

SMITH, G.C.K., Schofield, J.L. Administrative effectiveness: times and costs of library operations. J.Librarianship, September 1971, pp.245-266.

SLATER, M. Use made of technical libraries, Aslib 1969, pp.72-81.

SPURLOCK, S. A study of life science book use in the MIT science library. In: Quantitative measurement and dynamic library service, C.C.Chen (Editor), Oryx Press 1978, pp.200-224.

STAYER, M. A creative approach to library evaluation. IPLO Quarterly, July 1971, pp.21-28.

STRABLE, G. (Editor), Special Libraries : a guide for management. Special Libraries Association 1975, 74pp.

STRADLING, B. The qualitative evaluation of public library service : a survey of the Southend-on-sea central library. FLA Thesis, September 1966.

STUART, I.M. Some effects on library users of delays in supplying publications. Aslib Proceedings, January 1977, pp.35-45.

SULLIVAN, C., Oliver D. The impact of Prestel on public library reference activity. Aslib, 1981, 98pp.

SWANSON, D.R.   Requirements study for future catalogues.   Library
    Quarterly,  July 1972,   pp.302-315.

TERRY, M.W.   Voluntary charges : experience on the middle road.
    Proceedings of the fourth ASIS half-yearly meeting, 1975,
    pp.171-175.

TOTTERDELL, B.,  Bird, J.   The effective library.   Report of the
    Hillingdon project on public library effectiveness.   Library
    Association,  1976,   206pp.

URQUHART, D.J.   A note on service standards for university libraries.
    IN:  Report of the committee on libraries, University Grants
    Committee,  HMSO,  1967,  pp.280-281.

URQUHART, D.J.   Economic analysis of information services.
    J.Documentation,  June 1976,   pp.123-125.

VEAZIE, W.H.   The marketing of information analysis centre products.
    American Association of Information Science, 1971.   (ED 050 772).

VICKERY, B.   Research by Aslib into costing information services.
    Aslib Proceedings,  June 1972,  pp.337-341.

VICKERY, B.C.   Costing and budgeting in information and library
    service.  Aslib, 16-18 April, 1973.

WAGER, C.   Care of the elderly,  IMTA,  1972.

WATSON, P., Mansfield, N.   The valuation of time in cost-benefit
    studies.  IN:  J.N.Wolfe (Editor).  Cost benefit and cost
    effectiveness,  Allen & Unwin,  1973,   pp.222-232.

WEECH, T.L.  Evaluation of adult reference service.  Library Trends,
    January 1974,  pp.315-335.

WESSELL, C.J., Moore, K.L.   Criteria for evaluating the effectiveness
    of library operations III:  Recommended criteria and methods for their
    utilisation.   A.D. 682 758,  January 1969.

WHITE, G.T.   Quantitative measures of library effectiveness.
    J.Academic Librarianship,  Vol.3,  pp.128-36,  (1977).

WHITEHALL, T.  Personal current awareness service:  a handbook of
    techniques for manual SDI.   British  Library R&D Report 5502,  1979.

WILKIN, A. et al.   Standard times for information systems :  a method
    for data collection and analysis.  J.Documentation,  June 1972,
    pp.131-150.

WILLS, G., Christopher, M.   Cost-benefit analysis of company information
    needs.   Unesco Bulletin for Libraries, Jan/Feb, 1970,  pp.9-22.

WILLS, G., Oldman, C. The beneficial library. Cranfield School of Management, July 1977.

WILSON, J.H. Costing for libraries. A summary review of the recent literature. IN: Cost reduction for special libraries and information centres, F.Slater (Editor), American Society for Information Science, 1973, pp.2-21.

WILSON, T.D. Document delivery tests for the evaluation of basic reader service. Proceedings, Eurim Conference, Paris, Nov.1973, Aslib, 1974.

WOLFE, J.N. et al. The economics of technical information systems : a study in cost-effectiveness. OSTI Report 5103, 1971, 391 pp.

WOLFE, J.N. et al. The economics of technical information systems. Praeger, 1974.

ZAIS, H.W. Economic modelling. J.American Society for Information Science, March 1977, pp.89-95.

VAN HOUSE, N.  Public library user fees.  Greenwood Press, 1983, 140 pp.

WAGNER, L.  The economics of educational media.  Macmillan Press, 1982, pp.38-41.

WHITE, L.  The sensible economists guide to the economics of information.  IN:  The economics of information.  J.J. Varlejs (Editor), McFarland & Co. 1982, pp.17-29.

WOLEK, F.W.  The engineer:  his work and need for information. Proceedings of the American Society for Information Science, Vol 6, pp. 471-476, (1969).