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Sinikka Koskiala
Helsinki University of Technology

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Measuring the performance of academic libraries in Finland

Sinikka Koskiala

Helsinki University of Technology Library

Espoo, Finland

At the request of the Finnish Ministry of Education and with its grant money, a research project was carried out to test and develop measures which could be applied for performance measuring in all university libraries in the country.

What is presented here is an interim report of an ongoing project in the sense that the recommended measures, tested by three libraries during the project, will be subjected to a wider field testing by most university libraries and further changes and refinement will follow.

1. Background

At the beginning of the 1990's the publicly-funded institutions in Finland were required to change over from the traditional line budgeting to the result-based, or performance, budgeting. This change brought in its wake the need to measure clearly the productivity in the universities and thus also the university libraries. The methods developed for the evaluation of the teaching and research functions at the universities did not seem suitable for measuring library performance. Though the ultimate result of a good library performance is part of the good overall performance of the university's teaching and research functions, we are not able to pinpoint the particular share which is the library's contribution to the university performance, and thus have to develop separate measures.

In any case, when looking for suitable performance measures at the university libraries, we need to identify such criteria which can be related to the achievements of the respective university.

In defining the measures for performance evaluation the main purpose is to develop reliable tools with which to evaluate the performance in regard to the objectives set for the library. The use of standardized methods in measuring our results over time will give us the means to develop the library's operation

to match more closely the goals we have established.

Another aim, though more difficult to achieve, is to develop indicators for comparing the performance across all the university libraries. Due to the variations in the weighting of the range of goals set by the different libraries, as well as the different orientations of the universities themselves, it is extremely hard to arrive at a common indicator of library performance. As in the past, we still rely largely on the extensive statistics gathered about the activities of the libraries and their funding.

2. Performance measures development project

Initially set up in the summer of 1992, the project consists of a researcher, a steering group and three test libraries. Oili Kokkonen, director of the Jyväskylä University Library, is the chairperson of the steering group and Riitta Ikonen has functioned as the researcher, under the guidance of the steering group. The test sites are the Jyväskylä and Oulu University libraries and the Helsinki University of Technology Library.

In defining the aim of the project the steering group stated that the measures to be chosen should be such that they would be important from the point of view of the library users and give an indication of the productivity and service quality of the libraries. It was not considered feasible to develop overall benefit measures in this case.

The starting point for the work was a careful overview of the existing extensive statistics, collected annually, relating to the operations of all Finnish research libraries. It was felt that as many as possible of the measures should be based on the data already being gathered regularly in the libraries. It was realized that if extensive special surveys and studies were initiated to gather the performance data, an unbearable burden would be placed on the libraries.

Yet there are necessary measures which cannot be based on the statistics as such. In particular the measures of performance quality have to be gathered by special studies. An obvious one would be a survey on the satisfaction rates

of the library users. Other studies needed would include the calculation of the delivery times of library materials to the requester and finding ways to count the remote use of the library.

The remote use is defined as utilizing the library services without visiting the premises. The possibilities for remote use are increasing rapidly with the improved services available on the data networks.

In the context of this project both the measures of library outputs as well as indexes for productivity were considered important. A large number of publications on library output measures were examined and the most useful turned out to be the ALA Handbook *Measuring academic library performance* (Van House & al., 1990). To measure productivity we need to define both the inputs, i.e. the resources used in the library operations, and the outputs. To arrive at an index of productivity an objective matrix was applied. This matrix was described in an article about productivity measurement in an industrial information service (Nel & Le Roux, 1992). The steering group and the researcher also met with Mr. Le Roux during his visit to Finland, to discuss the application to university library environment of his matrix model.

3. Recommended performance measures

Early in 1993 the project group arranged a seminar for the directors of university libraries, to describe the suggested measures and the matrix model. Based on the feedback given in the seminar, several modifications were made to the list of performance measures. As this is an interim report there may still be some changes before the final recommendation is released.

For the most part the chosen output measures are modelled according to those presented in the previously mentioned ALA Handbook. The project group examined about twenty different output measures but came to the conclusion that only about ten measures, describing the most important library service aspects, should be recommended. According to the ALA, these measures were divided into four main groups:

1. User satisfaction
2. Materials availability and use
3. Use of the library
4. Information service

Most of the measures are based on the nationally collected annual library and university statistics. Some measures, such as user satisfaction, follow very closely the example in the ALA Handbook. The specific measures will be briefly introduced here.

Output measures:

1. General user satisfaction survey
- 2.1 Circulation (calculated as the number of loans annually, divided by the number of students and staff)
- 2.2 Requested materials delay: reserved materials
(eventually to be calculated from the VTLS statistics, but until that is available will be based on a random sample and manual calculation)
- 2.3 Interlibrary lending: percentage of external ILL requests fulfilled
- 2.4 Interlibrary lending: ratio of ILL supplied to ILL received
- 2.5 Opening hours of the library
(given as the total number of hours the main library is open annually. This is an indication of the accessibility of the library services)
- 3.1 Visits to the library
(calculated as the number of visits annually, divided by the number of students and staff. This is considered an indication of the use of the library premises)
- 3.2 Remote use of the library
(to be calculated on the basis of a random sample of the remote searches undertaken in the library databases)
- 3.3 User education
(calculated as the percentage of students having taken part in the user education courses annually, per hour of training)

4. Total use of information services
(given as the total number of requested information and literature searches annually).

As input measures it was decided to use the expenses incurred in operating the library services.

Input measures:

- general operating costs
- personnel costs
- acquisitions costs
- external services bought
- investments (divided evenly over a five year period).

This is probably not the final list of recommended input measures but it may be modified due to impending changes in the way the annual statistics are collected.

4. The matrix model

The objective matrix is a way to combine all of the library's important productivity criteria into one interrelated format. With the matrix model one can describe simultaneously both the inputs and the outputs of library operations and thus, also, the productivity, i.e. the ratio of the outputs to the inputs. The matrix was originally developed for the measurement of industrial productivity but it fits equally well the measurement of a public service function productivity (Felix & Riggs, 1983).

The strength of the matrix model is that it gives us the possibility of comparing the results of the library services with the stated objectives and of giving different weights to the various service functions, thus allowing the library to place more stress on those sectors which, by definition, are most important to its operation.

The productivity criteria in the matrix consist of the most important outputs or performance indicators and the defined inputs in terms of resources available. All performance indicators put together form the productivity index and all cost indicators the resource index. The productivity is obtained by dividing the productivity index by the resource index.

The important definitions needed for the objective matrix are:

- the productivity criteria
- the scores
- the weights
- the indexes and comparative indexes.

The success of the productivity measurement depends on how well the productivity criteria, i.e. the performance indicators, have been chosen and defined. These criteria and their measures really have to relate to the major service functions because the purpose is to measure those activities which are central to reaching the established goals of the library.

The definition of the numeric value of each explicitly stated objective is required before the performance measurement is started, so that the measures of each productivity criteria can be compared to the stated objective value.

A scale of scores from 0 to 10 is used to indicate the different levels of output regarding each productivity criteria. The first time the performance is measured the values are placed on the score level of 3: this is the starting level. The stated objective values are placed on level 10. Any subsequent measurement value of a performance indicator between 4 and 10 means that the performance in the respective area has improved. At score level 3 there has been no change, but score levels 0 to 2 indicate deterioration in the performance.

The scores on the objective matrix form the frame where the scales for each performance indicator then have to be defined. Each indicator gets a stepwise range of values between the starting value (score 3) and the objective value

(score 10). Any subsequent measured value gets the scores of the closest scale value of the respective indicator.

The weights are divided so that the sum of the weights of the output measures is 100 and similarly the sum of the weights of the input measures is 100. The distribution of the weights amongst the productivity criteria is an important decision and has to be done according to the goals and stated importance and prioritization of the library's activities.

The productivity index is calculated by summing up all the weighted scores of each productivity criteria. Similarly the resource index is arrived at by summing up the weighted scores of each input criteria. Dividing the productivity index by the resource index gives us the productivity. If the value is larger than 1 the overall productivity has improved, if it is smaller than 1 the productivity has decreased.

Figure 1. is an explanation, by Felix & Riggs, of the use of the objective matrix in its original form.

5. Use of the objective matrix - test case

During the testing phase of the project the Helsinki University of Technology Library experimented with the objective matrix (the assumptions, the definitions, the procedure and the results are pictured in Figure 2 and in Table 1). To reduce the extensive calculations a scale of scores from 1 to 5 (instead of 0 to 10) was used on the test matrix. The starting measurements are at the score 3 level and indicate the library performance in 1992. The defined objective values are on score level 5. The performance of the library and the resources used in 1993 are then placed onto the matrix (the values in the "performance" row). The 1993 values are, in this case, estimates, since the tests were done in the middle of the year. Some of the productivity criteria have since been changed or left out of the recommended set.

At this point one can see from the matrix how the performance in each criteria has changed from 1992 to 1993 (see the explanations in Table 1). From the

matrix we can calculate the productivity index for 1993: 313 and the resource index: 266,4 (1992: both indexes were 300). The productivity ratio of 1,175 indicates a slight improvement on the previous year in the library's overall performance.

The main conclusion drawn from the test is that it is a useful tool in presenting the essential measurement information in a structured and informative way. One can easily see how the library has succeeded in those areas it has defined as important ones. Since 1993 was a year of substantial budget cuts in Finnish university libraries, which affected some of the operations, it was interesting to test the matrix in terms of diminishing resources and negative changes from 1992 regarding some performance measures. For any extensive testing of the full size matrix a computer program should be applied to do the calculations.

The testing of the objective matrix at the HUT library indicated that it is well-suited for use in one library. Since the prioritized activities and the objective levels of the performance have to be defined for the matrix, it requires advance decisions as to what the important services are and what can be achieved with the available resources. Thus the matrix model can be helpful also in planning library operations.

Further testing will show what are likely to be the problem areas if the matrix model should be used to compare the productivity of different university libraries, as the Ministry of Education would like to see done. The libraries would have to use the same performance indicators, agree on the objective level values and the distribution of the weights. All this does not seem feasible at the moment because of the different profiles and service structures of the various university libraries. The project researcher will also investigate the statistical ramifications concerning the use of the matrix model for comparative purposes between libraries.

References

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Nel, P.J. & Le Roux, H.S. Productivity measurement in an information service with the aid of the objective matrix *FID. News Bulletin*, v. 42(1992), issue 1: pp. 14-18.

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Figure 1
An Objective Matrix

Step 1. Major criteria impacting productivity in a given area are identified, appropriate measures determined for each, and the resultant monitors entered in the boxes slanted across the top.

Step 2. The current level of performance in the area is calculated for each criterion and the ensuing numerical results entered at a level corresponding to a score of 3. (Note the scores listed vertically at the right of the Matrix.)

Step 3. Based on broad organizational goals, productivity objectives are established for all criteria. These quantitative targets are entered at a level corresponding to a score of 10.

Step 4. Step-wise goals, or mini-objectives, are then determined and the squares from score levels 3 to 10 are filled in with these successive "hurdles."

Step 5. At the same time, flexibility to account for tradeoffs or occasional slack periods is recognized, and figures are inserted in the squares below score level 3. Quotients associated with anything less than minimum likely performance correspond to a score of 0.

Step 6. Since some criteria are more important than others, weightings are assigned to each. The sum of these weightings equals 100, and can be distributed in any informative fashion (see Weight row). This step defines the productivity mission of the area in question.

Step 7. At the conclusion of every monitoring period, the actual measure for each criterion is calculated and placed in the "performance" boxes on Row A. The level that these achievements represent is then circled in the body of the Matrix and associated with a score of from 0-10. Scores are entered in the appropriate box on Row B at the bottom of the Matrix. Each score is then multiplied by the weight for that same criterion, to obtain a value, listed on Row C. The sum of all values yields a productivity index for the period. Over time, the movement of this single index tracks the net results of productivity efforts in the area of interest.

Step 1		TIME- LI- NESS	EQUIP- MENT	WASTE	PRO- DUC- TION	SAFETY	QUAL- ITY	Productivity Criteria
		Sale Orders Total Orders	Machine Downtime Scheduled Hours	Pounds Wasted Pounds Recycled	Total Units Out Total Labor Hours	S x Frequency Plus Severity	Defective Units Total Units Out	
Row A	Performance	5.5%	16%	12.25%	605	120	9.5%	
Step 3	Scores	0	0	10	800	0	0	.. 10
		.2	2	11	770	50	3	.. 9
		.5	4	12	740	125	5	.. 8
		1	6	13	710	175	7	.. 7
		2	8	14	680	225	9	.. 6
		3	10	15	650	275	11	.. 5
		4	12	16	620	325	13	.. 4
		5	14	17	590	375	15	.. 3
		6	15	18	560	390	17	.. 2
		7	18	19	530	405	19	.. 1
Step 2	Step 4	8	20	20	500	420	21	.. 0
Step 5		2	2	4	3	4	5	Score
Row B	Weight	5	10	20	30	15	20	Step 6
Row C	Value	10	20	120	90	60	100	Step 7
								INDEX 400

Figure 2

Project: Measuring Finnish Academic Libraries. The Objective Matrix.

PRODUCTIVITY CRITERIA	PRODUCTIVITY										RESOURCES		
	General User Satisfaction	Loans / Students + Staff	Circulation ratios (N/A)	Outgoing ILL / Requests received	Outgoing ILL / Incoming ILL	Opening Hours	Library Visits / Students + Staff	User Training Participation / Students + Staff	Online Searches and Reference Transactions	Activity Expenses / Prev. Year	Capital Expenses / Prev. Year	Income / Prev. Year	
PERFORMANCE	4,4	19		71	4,0	2908	23	17,9	2708	0,85	1,5	1,0	
SCORES	5	5	25	75	5	3050	25	20	2800	1,15	2,0	1,15	
4	4,5	20		72,5	4,5	3000	23	19	2700	1,145	1,9	1,0	
3	4,2	18,3		70,8	4,1	2954	21	18,6	2582	1,14	1,8	0,9	
2	2,5	17		67,5	3,5	2900	19	18	2450	1,0	1,5	0,85	
1	1	15		65	3	2800	17	15	2400	0,5	1,0	0,8	
	PRODUCTIVITY INDEX										RESOURCE INDEX		
SCORE	4	3	3	3	3	3	2	4	2	4	2	2	4
WEIGHT	10	11	8	8	10	12	10	10	9	12	33,3	33,3	33,3
VALUE	40	33	24	24	30	36	20	40	18	48	66,6	66,6	133,2

$$\text{PRODUCTIVITY} = \frac{\text{PRODUCTIVITY INDEX}}{\text{RESOURCE INDEX}} = \frac{313}{266,4} = 1,175$$

"Annual report 1993" (fictional)

Table 1

Criteria	Aim	Performance	Score
General User Satisfaction	All users should be fully satisfied	- doors and ventilation and heating were repaired - still too little space for reading rooms	4
Loans	For every student and staff there should be 25 registered loans. The collections must be efficiently used.	- some progress was made but no significant change. The number of students rose by 200 in the fall; there was a rise in the absolute figures of registered loans but not enough to affect the ratio.	3
Circulation	There is no information available yet. The score is assumed to be neutral = 3 for purposes related to the counting of productivity index.		3
Outgoing ILL/ requests received	LINDA database was expected to promote the use of the collections by other libraries	The charging for domestic ILL resulted in fewer outgoing loans and LINDA was postponed to the fall. No change in the figures	3
Outgoing ILL/ Incoming ILL	LINDA database was expected to promote the use of the collections by other libraries	The charging for domestic ILL resulted in fewer outgoing loans and LINDA was postponed to the fall. No change in the figures	3
Opening hours	The summertime opening hours were to be prolonged.	Due to the budget cuts the whole university was laid off for two weeks. We managed to keep the library open all summer with small cuts in the early morning hours.	2
Library visits	For every student and staff there should be 25 visits to the library annually	The absolute number of visits rose somewhat but the 200 extra new enrolled students in the fall affected the ratio.	4

Criteria	Aim	Performance	Score
User training	20 % of the annual enrollment of students and staff should receive library user education	The extra enrolled new students all participated in the training programme but the revised training programme for senior students that allows the choice of participation all year around, resulted in fewer registered credits during the fall term. The participants will get the credits in the spring instead.	2
Online searches and reference queries	In promoting the use of the collections the information service is marketing its services	There is an evident need for a reliable service and we have good collections and staff to fulfill the daily needs	4
RESOURCES Activity costs	The aim was to keep the costs down. The growth in costs results from the escalating prices of serials	There was a rather surprising cut in the budgetary funding, due to sudden decisions made by the Finnish Government	2
Capital costs	The self-service loan terminal was included in the budget plans.	The terminal arrived later than expected (will be in next year's capital costs)	2
Income	The income was moderately estimated with no radical changes. However, the aim was to earn more money than in 1992.	We broke even when the income is compared with the previous year. Need more marketing. However, we did better than in 1991-1992.	4