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Author

Armstrong, Philip A.

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PROGRAM ANALYSIS: PATTERNS OF
COST, OUTPUT AND PRODUCTIVITY AMONG DISTRICTS
IN A STATE REHABILITATION AGENCY

by

Philip A. Armstrong

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Frederick C. Collignon, Project Director - Michael B. Teitz, Principal Investigator

Project for Cost Benefit Analysis and Evaluation of Rehabilitation Services

FOREWORD

If the delivery of services by government is to be effective, the issues of management and control cannot be ignored. But it is by no means clear how an agency can best understand the complex process by which services are delivered to the client so as to monitor the effectiveness and improve the quality of services delivered. One source of such information is the detailed management audit, but it is time consuming and costly. Another approach is to use observational techniques that provide insight into the subtle and complex social relationships that exist in an organization. A third approach examines the operating data generated by the agency or local office in the course of its operations, and attempts to distill from that data useful information for program analysis, comparison of performance, and suggestions for improvement.

In this paper, Mr. Philip Armstrong, a doctoral candidate in the Department of City and Regional Planning at the University of California, Berkeley, has pursued the third approach using data on local district office performance for the California State Department of Rehabilitation. We believe that he has been able to develop significant findings on the operations of the program. In that process, he has demonstrated a number of approaches to the use of routinely developed data that might be incorporated in analyses of district operations. Finally, the inability of the models employed here to explain all the variations of district performance has led to further hypotheses about determinants of district variation. These are now being pursued and the results will be published in a later paper.

Michael B. Teitz
Frederick C. Collignon

ACKNOWLEDGMENTS

I would like to thank the staff of the Department of Rehabilitation of the State of California for their generous cooperation in my analysis of the operations of the Department. In particular Ms. Betty J. Dieckman, Regional Administrator, Central Valley Region, and Dr. Paul F.C. Mueller, Chief, Research and Statistics Section, met with me several times to explain the rehabilitation program, discuss current problems and criticize my analysis of the program. Takao Iwasa of the Research and Statistics Section furnished the data on which this study was based from the computer printout for the year analyzed. The staff of the Program Review and Development Section invited me to attend two of their review sessions during the final stages of preparation of a major study. Those opportunities to interact with Department personnel as they dealt with real problems was a valuable educational experience for which I am grateful to the staff of that section and Ms. Dieckman who was section Head at the time.

At the University of California, Berkeley, Professors Frederick C. Collignon and Michael B. Teitz of the Department of City and Regional Planning have directed my work on the Human Rehabilitation Research Project. I thank them both for the opportunity to learn from their experience and work independently on their research project. Professor Teitz has acted as editor of this paper in the fullest sense, and it is to him that I credit my understanding that science is communication.

SUMMARY

This report is an application of indexes of cost, output and productivity to the operations of the California state rehabilitation program adjusted to account for the mixture of disabilities represented in the groups of clients served by the program. The indexes are used to analyze the performance of individual districts, to compare districts on a uniform basis and to inspect the structure of the rehabilitation process represented by various types of case service expenditure. The application of these simple measures to large masses of routinely collected program information yeilds significant insights into the operations of the program.

The indexes are ratios of actual activity levels to predicted levels; the ratio of the total number of rehabilitations in a district for a year or the total yearly case service expenditure in a district, to a value predicted from statewide average client characteristics and the local number and type of clients served. The data is taken from the records of the state's Department of Rehabilitation for fiscal year 1970-71.

The major conclusions that come from this analysis are:

1. For each disability group, the success rate and the cost rate per client are very nearly proportional to each other. However, when disability groups are merged and total success rates and costs are measured district by district, the relationship between cost and success becomes very weak. Evidently, the underlying relationship between cost and success is disability specific.

2. When adjustments are made for the number and type of clients served by each district, variations in cost, output, productivity and expenditures for specific case services remain essentially the same over the districts of the state's rehabilitation program. This strongly contradicts the hypothesis that variations in the mixture of disabilities served by each district account for variations in district performance.

3. District expenditure levels for all case services except physical restoration are directly related to each other. Where one is high, the others are high. The exception is physical restoration which varies independently from the other case service expenditure levels.

4. Most districts are quite similar in the proportional distribution of case service expenditures. Comparison of absolute expenditure levels, adjusted for each local case-mix, reveals distinct groups of like districts and unlike districts. Because the index measures, i.e., the activity levels, are adjusted for the number and type of clients served by each district, they provide a uniform basis for the comparison of districts and are a legitimate, effective tool for making relative comparisons.

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I. INTRODUCTION

The manager of the rehabilitation program of any state is faced
with an overwhelming supply of information for evaluating the operations
of district offices. Each office is staffed with various types of
counselors, serves a wide range of clients, purchases numerous goods
and services and operates under complex budgetary restrictions. The
wealth of information about each district available in routine reports
of most state rehabilitation agencies obscures the essential character-
istics of the districts. Because of variations in operating conditions
between districts, particularly in the number and type of clients served,
it is difficult to compare them. If a measure could be developed that
would allow a relative comparison between districts within a state, then
it would be possible to distinguish between differences in performance
due to the local environment (the local disabled population and all of
the factors affecting it), and differences due to the local system
(the district office).

The purpose of this paper is to develop such measures and apply
them. It is a first effort to look at the operations of the rehabili-
tation program of California using routine data reported by the state's
Department of Rehabilitation. Some measures are derived and applied to
client and expenditure data. From these measures various types of
expenditures may be compared to each other and to rehabilitation rates.
Likewise, districts can be compared to each other by their profiles of
expenditure and rehabilitation. These comparisons suggest that there

are "essential characteristics" which may be estimated from the mass of routine information.

Two types of measure are used in this analysis: (1) Percent of the total amount of some district activity; and (2) An activity index which is the ratio of the observed value of an activity to a value predicted from the local mixture of clients and the statewide average characteristics of clients. The activities considered here are the number of clients rehabilitated, total case service expenditure and case service expenditures by type of service. For a group of expenditures in one district, the percentage of the total represented by a particular expenditure is a measure of its size relative to the other expenditures in the group. The index of that expenditure is a measure of its size relative to the expected expenditure level, and it is independent of the other indexes of the group. It will be shown that the index measure is more sensitive than the percent measure to variations in the basic activities. Both types of measure can be applied to rehabilitation rates as well as to expenditure information.

The data used consist of: (1) Numbers of clients, by disability type and by closure status for all cases closed during FY 1971; (2) Case service expenditure by type of service by district; and (3) Case service expenditures by both service type and disability type at the state level. Because the data sample is entire, i.e., it is a record of all cases closed during the year rather than a partial sample, there is no sampling error in the usual sense. However, there may be arbitrariness and inconsistency in the assignment of closure status so that the statistics computed have to be regarded carefully.

This report is directed toward administrators responsible for the operation and evaluation of large rehabilitation programs. I hope that this work will contribute to the development of program evaluation tools utilizing operating information routinely available from data processing units. At the same time it provides a basis for measures of comparison between districts within the state. Such an approach to program evaluation and monitoring does not conflict with other tools and approaches; it is an effort to extract knowledge from large collections of information and should be used in conjunction with informed judgment and other forms of analysis.

II. INDEXES OF PROGRAM PERFORMANCE

Three indexes of program performance will be used in this paper to evaluate the operations of separate rehabilitation units, i.e., states or districts. They are based on the formulations by Serot[1] in a recent paper which describes them in detail. Here, we shall simply define them and review their characteristics.

The indexes are designed to reflect three dimensions of program performance, namely, output, cost and productivity. A measure of output of a rehabilitation unit should reflect its principal operational objective, to help clients achieve the ability to be self-supporting and functionally effective. In order to achieve this objective, resources are employed. A cost measure should incorporate the quantity and value of such resources, including counselor time, rehabilitative services, management and fixed costs, and research. Being measured in dollar terms, it allows us to aggregate physically non-commensurable quantities A productivity measure relates outputs to cost in a way that measures efficiency in the use of resources and the effectiveness of their allocation.

Simple measures of output and cost, for example, number of clients rehabilitated in a district or total costs incurred, are

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[1]David Serot, <u>Indices of Cost, Output and Productivity for Use in Evaluating Rehabilitation Services Programs</u>, Working Paper No. 187/RS013 (Berkeley: Institute of Urban and Regional Development, University of California). Serot's work is partially based on the work of Martin Feldstein, <u>Economic Analysis for Health Service Efficiency</u>, Chicago: Markham Publishing Company, 1968.

deficient for comparison among districts. They fail to take account of
the social environment of the district, local operating policies and
type of clients served. These factors are reflected to some extent in
the disability mix among districts. Thus, we would like output and
cost measures to adjust for disability mix so that districts may be
compared against a common base. The same applies to a productivity
measure which should incorporate both cost and output, adjusted for dis-
ability mix.

The measures used in this paper are indexes. An index is a pure
number, that is, a quantity not expressed in some unit of measure. Such
a measure is usually designed to express compactly a complex variable.
It is computed as a ratio of two numbers, expressed in the same units, of
which the denominator is a basis for comparison or adjustment. These
points may be illustrated by a widely used example. The cost-of-living
or consumer price index incorporates complex information about many
prices and the amount of goods that go into an "average" family's pat-
tern of consumption. The value of this "market basket" for any year is
expressed as a ratio to the value for some base year, and the result
multiplied by 100 to give the index number in its conventional form.
The indexes used in this paper have similar properties.

Briefly, the indexes are defined as follows:

Cost: $$C_i = \frac{\sum_j c_{ij} n_{ij}}{\sum_j c_{*j} n_{ij}}$$

where:

C_i : the cost index value for district i.

c_{ij} : average expenditure per client in
district i with disability j.

n_{ij} : number of clients in district i with
disability j.

c_{*j} : average expenditure statewide per client with disability j.

$\sum_j$ indicates that we are summing the variables over all disabilities, j, within a given district, i.

Thus, the cost index relates actual expenditures in the district to the expenditure that would have prevailed had that district experienced costs equaling the statewide average for each disability. The number of clients of each disability type appears in both the numerator and the denominator of the ratio. Thus, the relative effect of the disability mix is minimized when the districts are compared, leaving other influences to account for differences between district performance.

The form of the output index is similar, with the number of clients rehabilitated in each district serving as the basic output measure. Thus, the index is:

Output: $$O_i = \frac{\sum_j r_{ij} n_{ij}}{\sum_j r_{*j} n_{ij}}$$

where:

O_i : the output index for district i.

r_{ij} : the average rehabilitation rate in district i for clients with disability j. This rate is the fraction of all clients entering the system who are rehabilitated.

r_{*j} : average rehabilitation rate statewide for clients with disability j.

n_{ij} and $\sum_j$ defined as above.

The output index, then, relates actual district performance to the level that would have persisted under statewide average conditions adjusted for the disability mix. Given the uniform base, districts are comparable for variations in other respects.

The productivity index consists simply of the ratio of output to cost, each in index form. It is defined as:

$$\text{Productivity:} \quad P_i \quad = \quad \frac{O_i}{C_i}$$

where: P_i : the value of the productivity index for district i.

Measuring the ratio of output to cost, the productivity index serves as an indicator of the efficiency with which resources are employed to attain the program's output.[2]

In order to calculate these indexes, it is necessary to specify operational definitions for the variables. Note that for computation, the local cost and rehabilitation rates need not be known. Only the local client mixture, the lcoal number of rehabilitations, the local total expenditure and the statewide average cost and rehabilitation rates are necessary.

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[2]The productivity index is the ratio of adjusted output to adjusted cost. Equivalently, it is the ratio of actual rehabilitations to actual cost divided by the ratio of predicted rehabilitations to predicted cost. The second ratio may be thought of as a scale factor which reduces the actual performance ratio of a district with a particular client mixture to a base in common with other districts.

The operational definitions used in this paper are:

c_{*j} : The statewide average case service expenditure per case closed, i.e., statuses 08, 26, 28 and 30, for disability type j in the year under consideration. Note that this definition of cost does not include all costs. In particular it excludes cost of counselor time, management and research. Unfortunately, it is all that is available by disability group.

r_{*j} : The statewide number of clients rehabilitated (status 26) out of the total number of clients served (statuses 08, 26, 28 and 30) of disability type j in the year under consideration.

n_{ij} : The number of clients served (statuses 08, 26, 28 and 30) of disability type j in district i in the year under consideration.

An extension of the cost index used to inspect the spending within a district for various types of service, e.g., maintenance, training and so forth, follows directly if we define:

c_{ijk} : The average expenditure in district i per client served with disability type j for case service type k,

then an expenditure index, disaggregated for type of service, would be:

Expenditure: $\quad E_{ik} \quad = \quad \dfrac{\sum_j c_{ijk} n_{ij}}{\sum_j c_{*jk} n_{ij}}$

where:

E_{ik} : The expenditure index, a measure of the input of service type k into district i.

c_{*jk} : statewide average expenditure on clients with disability type j for service type k.

Other methods of computing expected values could be used in indexes similar to those constructed here. For example the cost index could have been computed using fiscal data only. The numerator of the index would remain the same -- total case service expenditure for district i. The denominator would be the sum, for each disability type, of: the product of the statewide average fraction of each dollar spent on clients of disability type j for service type k and the total number of dollars spent on clients of that disability type in that district. It would be useful to compare the results of computing activity indexes by such methods. However, at this time the necessary data are not available.

The proportion that a rehabilitation unit spends of its total budget on any one type of case service expressed in percent is:

$$P_{ik} \quad = \quad \dfrac{\sum_j c_{ijk} n_{ij}}{\sum_j \sum_k c_{ijk} n_{ij}}$$

This formula is very similar to the expenditure index. The numerator is the same. The denominator uses the district expenditure rate, c_{ijk}, rather than the statewide average, c_{*jk}. It is summed over the types of service, k, as well as the types of disability, j. It is simply the total expenditure in that district for case services. Thus it is a smaller number (before multiplying by 100%) than the corresponding

expenditure index for that service in the same rehabilitation unit. This makes the percentage measure less sensitive to variations over several rehabilitation program units than the index value, as will be seen in Section V. This discussion was stimulated by the work of Alonso in an article discussing the sensitivity of mathematical models to error; his comments apply to the sensitivity of models to variations of the independent variables as well.[3]

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[3]William Alonso, "Predicing Best with Imperfect Data," _Journal of the American Institute of Planners_, XXXIV (1968), 248-254.

III. DATA

The data used in this study was originally collected by the Department of Rehabilitation of the State of California as a part of its routine operations. It comprises all cases closed in the 1970-1971 fiscal year ending in June and consists of client counts and case service expenditures for the year.

The data was broken down by closure status and disability type. Mental retardation and alcoholism were excluded from this analysis because separate programs now serve many of these clients. It might be useful to extend the analysis to these groups to examine the differences between the rehabilitation process they undergo and that of the basic program. The remaining disability types were aggregated into five groups coinciding with the categories of expenditure data. The groups are: (1) Sensory (blind and deaf); (2) Orthopedic and amputee; (3) Other physical; (4) Drug, behavior and character disorders; and (5) Other mental disorders. The number of clients in each disability group closed in each status was tallied from the raw data for each district and for the state as a whole.

Expenditure data was tabulated by closure status for each disability group at the state level by each of several types of service. At the district level it was given by closure status and service type. The types of service were aggregated into six groups: (1) Diagnosis and evaluation; (2) Physical restoration; (3) Training; (4) Maintenance; (5) Transportation; and (6) Other. The last consisted mainly of

miscellaneous medical expenses and was the smallest expenditure over the state. Alcoholic clinic fees which comprised about one percent of the total expenditure for the client groups considered here were excluded from the analysis.

The use of data from cases closed in a given year has a possible disadvantage. If it were used by an agency routinely, the performance of a district could be artificially increased by holding unsuccessful or extremely costly cases in an open status. However, this would be relatively easy to detect if it were suspected. Furthermore, it would be impractical for any length of time as the file of cases held open would have to increase year by year to maintain the artificial advantage.

It is presumed that the expenditure and closure data are exact. The sample is total. There is no reason to assume that systematic error is generated anywhere in the data processing from the district offices to the central computer files. However, the assignment of closure status does present a subtle problem.

It is possible that some cases assigned a successful closure status did not strictly qualify by federal regulations. This may be due to unintentional errors or by design. A significant number of people in the agency feel either a pressure to produce "numbers," i.e., an above average amount of successful case closures, or that other people are "playing the numbers game" for reasons of personal ambition. At present there is no way to estimate the seriousness of the problem. Another problem with closure data may be even more important.

A status 28 closure is considered totally unsuccessful as is an 08 or 30 status closure. However, the vocational requirement associated with qualifying for the successful status 26 closure suppresses the

substantial benefits felt by clients and observed by others in clients who are ultimately assigned to status 28. Likewise, there is a range of success within the successful closures which is not apparent in the data. No attempt has been made to deal with this problem here, but it should be kept in mind while evaluating the analysis.

A more meaningful criterion of success or program output might be proportional or absolute change in the income of a client. This information was not readily available. It should be in the future, however, and would be appropriate for an extension of this study.

Finally, fiscal data, whether it is expenditure (cost) or income (benefit) data, is greatly affected by local background costs, e.g., the local cost of living. Had these measures been applied nationally instead of to one state, it would have been important to include an adjustment for the local average cost level. It is less important when considering just one state, but the effect is still apparent. Future studies will examine this type of environmental variation in more detail.

IV. COST, OUTPUT AND PRODUCTIVITY ANALYSIS

This section surveys the rehabilitation program in the state and districts and analyzes cost, output and productivity characteristics of the districts. Measures were computed for eighteen of the state's nineteen regular district offices. One smaller district, Van Nuys, was excluded because of inconsistencies in the data describing its activities. Most of the following discussion is focused on seven districts selected for convenience of investigation in possible field studies following this report. The districts selected represent a range of populations from urban to suburban-rural. Five are located in northern California and two are near Los Angeles in southern California. Within the Department of Rehabilitation, there is some feeling that the operating styles of northern districts and southern districts are to some extent identifiably different. To place the districts in perspective, a brief overview of the state rehabilitation program will be presented first.

Overview of the State Rehabilitation Program

A statewide profile of the disabilities considered in this study appears in Table 1. The basic rehabilitation program in 1970-71 was clearly still serving the physically handicapped as its primary mission. More than half of all closures fell in the categories Orthopedic-and-Amputee or Other-Physical. Sensory disorders accounted for another 9%, although they comprised the smallest of the five disability groups. Behavior-and-Drug and Other-Mental Disabilities accounted for 32% of all closures. Expenditures showed a similar absolute pattern, but, as might

TABLE 1

Profiles of Cases Closed and Expenditures, by Disability Group: California State Rehabilitation Program, Fiscal Year 1970-71

Disability Group	Program Data, FY 1970-71							
	Not Rehabilitated Cases				Rehabilitated Cases^c		Total Closures	
	Dropped before program begun^a		Dropped after program begun^b					
	Number	Expenditure (thousands of dollars)	Number	Expenditure (thousands of dollars)	Number	Expenditure (thousands of dollars)	Number	Expenditure (thousands of dollars)
Sensory	3115	$ 67	509	$ 338	1317	$1120	4941	$1524
Orthopedic & Amputee	19240	212	2119	1099	3503	2679	24862	3990
Other Physical	10972	132	1143	583	1824	1220	13939	1936
Behavior & Drug	5550	193	1800	950	2387	1293	9737	2436
Other Mental	8340	248	1301	729	1374	948	11015	1925
All groups	47217	852	6872	3699	10405	7260	64494	11811

Source: California Department of Rehabilitation

Notes:

Cases defined in accordance with federal and state practices:

^a Closures in 08 and 30 status.

^b Closures in 28 status.

^c Closures in 26 status.

be expected from variations in disabilities, the correspondence is not exact. For example, total expenditures on the largest disability group (Orthopedic-and-Amputee) comprised only 34% of all expenditures compared to 39% of closures.[4]

This type of variation is brought out more clearly in Table 2 where expenditure per client is given for disability groups and type of service given. Comparison with Table 1 shows that the smaller programs, especially that for Sensory disabilities and Behavior-and-Drug disorders, have the highest expenditures per case. The variation is not explained by differences in broad types of services delivered. For every disability group, training accounts for the largest single item of expenditure. Furthermore, the most expensive disabilities show high levels of expenditure on almost all types of services. Sensory disabilities record the highest average expenditure for all types of service, except for diagnosis and evaluation and maintenance where Behavior-and-Drug ranks first.

To explain such variations requires that we understand the nature of the rehabilitation process. However, examination of other aggregate data may yield useful insights. In Table 3 the average costs per case by disability groups are compared to their success rates, defined as the proportion of all cases closed in rehabilitated (26) status. The success rate in this table is strikingly proportional to average cost per case closed.[5]

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[4]In this study 08-not-seen closures as well as 08-seen and 30-seen closures have been included. An unpublished study by Takao Iwasa of the California Department of Rehabilitation shows that case service expenditures on clients closed in the 08-not-seen status are on the order of $1. In a future application of these index measures it would be appropriate to omit client counts and expenditures for the 08-not-seen group.

[5]The correlation coefficient between the two variables is .99 which is partly due to the extreme values for Sensory and Behavior and Drug groups.

TABLE 2

Average Expenditures by Disability and Type of Service: California State
Rehabilitation Program, Fiscal Year 1970-71

Disability Group	Average Expenditure per Case Closed by Type of Service[a]						All Services
	Diagnosis & Evaluation	Physical Restoration	Training	Maintenance	Transportation	Other	
Sensory	$35	$52	$127	$30	$21	$44	$309
Orthopedic & Amputee	18	14	77	25	19	7	160
Other Physical	21	20	58	20	14	5	138
Behavior & Drug	65	5	98	51	18	13	250
Other Mental	41	6	77	32	16	3	175
Average Group[b]	36	19	87	32	18	14	206

Source: California Department of Rehabilitation

Notes:

[a]The category "cases closed" comprises all cases in statuses 08, 26, 28 and 30.

[b]The expenditures shown for the "average group" are the unweighted averages of the expenditures shown for the five separate disability groups above.

TABLE 3

Rehabilitation Success and Cost Rates by Disability Group:
California State Rehabilitation Program, Fiscal Year 1970-71

Disability Group	Average Success Rate (Rehabilitations per case closed)[a]	Average Cost Rate (Dollars per case closed)[a]
Sensory	.27	$310
Orthopedic & Amputee	.14	160
Other Physical	.13	140
Behavior & Drug	.25	250
Other Mental	.13	175
Average Group[b]	.18	207

Source: Computed from California Department of Rehabilitation data.

Notes:

[a]Cases closed as defined in footnote to Table 1.

[b]The average success rate and average cost rate shown for the "average group" are the unweighted averages of the success and cost rates shown for the five separate disability groups shown above.

The strength of the observed relationship could be tested by using data disaggregated into finer disability groups. If it were found to hold under further disaggregation, the question of its meaning would still remain. Does it imply that successful rehabilitation is simply related to the amount of money spent on clients? Or on the other hand do counselors tend to spend substantially larger amounts on clients with a strong likelihood of successful rehabilitation. A third possibility may be that certain clients "demand" more service and are successful in obtaining both the extra expenditure and a successful rehabilitation.

Explanation of this simple relationship implies three important policy questions: (1) Do case service expenditures determine the probability of successful rehabilitation, or do case service dollars tend to flow toward those who, for other reasons, are likely to be rehabilitated? (2) Where does control over expenditures in the department-counselor-client system reside? (3) Is the distribution of control consistent with the objectives of the department? Complete explanation of the relationships is not within the scope of this paper. It would require more detailed analysis to identify the underlying causal relationships. However, some light on the question may be shed by examining the behavior of the rehabilitation system within the districts. It is to this subject that we now turn.

District Program Performance

For the purposes of analysis and presentation, we have selected seven of the state's nineteen rehabilitation program districts for detailed comparative analysis. Where necessary in the latter part of the paper, these are supplemented with data from the remainder.

Table 4 presents a profile of the districts by disability empha-
sis, output and total expenditure. The variation among districts is
considerable. District D has both the highest total expenditure and the
highest number of closures in the successful (26) and unsuccessful
after-beginning-program (28) categories. District A, with a similar
total expenditure, has about the same number of 26 and 28 closures, but
a third less 08 (not accepted for service) and 30 (accepted for service
but dropped before program begun) closures. District B, with an expendi-
ture less than half of district D's, has slightly more 08 and 30 closures.
The ratio of 26 closures to 28 closures is a suggestive indicator of
success once the commitment to rehabilitation has been made. District A,
which has the highest success rate of the seven districts shows a value
of about two to one for this ratio for every disability group. District B
is similar. But in district G the ratio is at most one, and, for the
groups Other Physical and Other Mental, the ratio is closer to one half
than to one. The only other district with such characteristics is
district C with an overall ratio of 26's to 28's of about one. Thus we
begin to see distinct characteristics of the districts emerge from the
basic operational data.

From the basic operational data, we wish to construct measures of
performance for the districts. In particular, we want to compare measures
with and without adjustments for the local disability mix, in order to
identify the existence of potential sources of district variation. Un-
adjusted output and input are defined as cases closed as rehabilitated
(status 26 closures) and total case service expenditures, respectively.
Disability mix adjusted measures will consist of the indexes described
above.

TABLE 4

Output and Cost Profiles for Seven Rehabilitation Program
Districts, by Disability Group: State of California,
Fiscal Year 1970-71

Cases Closed, by Disability Group and Closure Status [a]

District	Sensory			Orthopedic & Amputee			Other Physical			Behavior & Drug			Other Mental			All Groups			Total Expenditure (thousands of dollars)
	08-30	28	26	08-30	28	26	08-30	28	26	08-30	28	26	08-30	28	26	08-30	28	26	
A	166	63	103	895	113	238	503	50	102	215	86	150	268	39	63	2047	351	656	$ 1002
B	208	32	49	1325	91	182	763	47	83	299	59	100	566	25	55	161	254	469	498
C	79	8	29	534	70	85	317	28	47	258	103	106	586	178	98	1774	387	365	728
D	214	46	70	744	119	147	620	67	82	865	220	234	567	106	130	3010	558	663	1167
E	183	49	64	1407	178	239	669	76	63	587	179	190	446	100	78	3292	582	634	911
F	80	9	21	602	55	95	229	20	27	117	30	77	132	15	32	1160	129	252	339
G	118	23	22	735	125	118	480	110	70	148	55	55	178	33	15	1659	346	280	548
Average District [b]	150	33	51	892	107	158	512	57	68	356	105	130	392	71	67	1872	372	474	742

Source: California Department of Rehabilitation

Notes:

[a] Cases closed as defined in footnote to Table 1.

[b] The data shown for the "average district" are the unweighted
averages of data shown for the seven districts above.

Unadjusted measures of performance for the districts appear in Table 5. The output and input measures are closely related to the absolute population of each district. The output to input ratio, an unadjusted productivity measure, is more nearly independent of size, and offers the first measure of district performance. The ratio varies from just over five rehabilitations per $10,000 case service expenditure, to nearly 10. District B has by a substantial margin the highest productivity by this measure and district G the lowest.[6] The northern California districts are clustered around the average value of 6.4 while the southern California districts, B and G, are at the extreme high and low positions. This group of seven districts generally exceeds the state-wide average value of 5.5.

Case-mix[7] adjusted measures of cost, output and productivity are shown in Table 6. The output index varies from about .8 in districts B and G to 1.3 for district A. The cost index more than doubles from .7 in district B to 1.8 in district A. From these scores we conclude that the performance of the districts varies considerably but not wildly. The range of both unadjusted and case-mix adjusted measures is less than an order of magnitude. The highest measure in every case is about twice the lowest.

What can be said about the influence of adjusting for the mixture of clients served by each district? The districts can be ranked in order

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[6]It is important to think of the ratio as a measure of what a district is doing without assigning labels like good or bad. Because of the problems associated with using the 26 closure as a measure of success, it should not be used by itself as an indicator of program effectiveness.

[7]The term "case-mix" refers to the mixture of disabilities represented in the group of clients served by a rehabilitation program unit.

TABLE 5

Unadjusted Measures of Program Performance for Seven Rehabilitation
Program Districts: State of California, Fiscal Year 1970-71

District	Cases Closed as Rehabilitated (1)	Total Case Service Expenditure (thousands of dollars) (2)	Rehabilitations per $10,000 Expenditure[a] (3)
A	656	1002	6.56
B	469	498	9.42
C	365	728	5.01
D	663	1167	5.69
E	634	911	6.96
F	252	339	7.43
G	280	548	5.11
Average District[b]	474	742	6.39[c]

Source: Computed from California Department of Rehabilitation data.

Notes:

[a] The statewide average number of rehabilitations per $10,000 expenditure is 5.5 for the disability groups analyzed in this report.

[b] The data shown for the "average district" are the unweighted averages of the data shown for the seven districts above except for column three.

[c] Each datum in column three is the ratio of the corresponding datum in column one divided by the datum in column two. Thus, the rehabilitations per $10,000 expenditure for the "average district" is not the average of the above averages in column three, but the ratio of the column averages preceding it to the left in the last row.

TABLE 6

Case-mix Adjusted Indexes of Program Performance for Seven
Rehabilitation Program Districts: State of California,
Fiscal Year 1970-71

District	Output Index[a] Value (1)	Cost Index Value (2)	Productivity Index Value (3)
A	1.30	1.76	.74
B	.77	.71	1.07
C	.91	1.55	.59
D	.88	1.39	.63
E	.84	1.08	.78
F	1.01	1.21	.84
G	.77	1.36	.57
Average District[b]	.93	1.29	.72[c]

Source: See Table 5.

Notes:

[a] Indexes as defined by Serot and computed according to operational
definitions defined in text above.

[b] The data shown for the "average district" are the unweighted averages
of the data shown for the seven districts above except for column three.

[c] See footnote c in Table 5.

of decreasing values of both Serot's case-mix adjusted productivity
index (from column three, Table 6) and the unadjusted productivity ratio
(from column three, Table 5). This is done in Table 7. The ranks are
identical except for districts C and G which reverse positions in the
lowest ranks. Since by both measures these districts are close numer-
ically, the reversal is not significant. It seems clear that adjusting
for the number and type of clients served by each district has not
affected their relative productivity. This fact is consistent with the
direct linear relation between rehabilitation success rate and expendi-
ture rate by disability groups discussed above.

While we cannot rule out the effect of case-mix on district
performance without further studies of other states and districts, this
preliminary finding suggests that other sources of variation need to be
investigated. In the next section, we look at the effect of variations
in types of expenditures among districts in the state.

TABLE 7

Rankings by Unadjusted and Adjusted Measures of Productivity
for Seven Rehabilitation Program Districts: State of California, FY 1970-71

Rank	Productivity Index	
	Unadjusted[a]	Adjusted[b]
1 (highest value)	B	B
2	F	F
3	E	E
		___c
4	A	A
	___c	
5	D	D
6	C	G
7 (lowest value)	G	C

Source: Computed from California Department of Rehabilitation data.

Notes:

[a]From Table 5, column three.

[b]From Table 6, column three.

[c]Location of the unweighted mean value of the index.

V. EXPENDITURE PATTERNS AMONG DISTRICTS

In this section case service expenditures are analyzed in two ways. Relations between various types of expenditure for case services and between expenditure and overall indexes for cost, output and productivity are examined for significant patterns and characteristics in the process of rehabilitation across the state. The state is represented by eighteen of its nineteen regular rehabilitation program districts. The process of rehabilitation consists largely of the services obtained for clients, so it seems reasonable to assume that the expenditure levels and proportions for services describe many of the essential characteristics of the service, "rehabilitation."

The second part of this section is a comparison of districts by expenditure profiles. Although similar in form to the expenditure analysis, it is a first effort to compare the districts by some common measure, and as far as we know is a completely original approach.

Variations in Case Service Expenditures

Case service expenditures are grouped by the state's Department of Rehabilitation into six types: (1) Diagnosis and evaluation; (2) Physical restoration; (3) Training; (4) Maintenance; (5) Transportation; and (6) Other (primarily miscellaneous medical services). For the seven sample districts, percentage expenditures for each service are shown in Table 8. Training for every district is the largest expenditure, a little less than half of all case service expenditures. This is not surprising because the traditional emphasis of the rehabilitation

TABLE 8

Percentage Distribution of Expenditures by Case-Service Category for Seven
Program Districts: State of California, Fiscal Year 1970-71

District	Case Service Expenditure Category						
	Diagnosis & Evaluation	Physical Restoration	Training	Maintenance	Transpor- tation	Other	Total
A	14%	4%	50%	18%	8%	6%	100%
B	23	15	39	6	10	6	100
C	18	2	46	21	10	3	100
D	14	6	52	19	5	4	100
E	20	6	52	19	7	5	100
F	14	4	43	23	10	6	100
G	16	6	36	28	13	2	100
Average District[a]	17	6	45	19	9	5	100

Source: See Table 5.

Notes:

Row totals may not add exactly to 100% because of rounding.

[a]The data shown for the "average district" are the unweighted averages of the data shown for the seven districts above. They have been normalized so that the row total for the average district is 100%.

movement has been to enable clients to reenter or move up in the job market. Of all districts, district B spends the greatest proportion on diagnosis and evaluation and also the greatest proportion on physical restoration, by nearly a factor of three over the district spending the next lesser amount. There are no extreme deviations between districts on the proportion spent for training. District G is the lowest although it is only 3% down from the next higher and 16% down from the highest spending district. District B spends the least amount on maintenance, nearly one third the proportion spent by the next higher spending district. Among transportation expenditures there is considerable variation, with district G spending the largest proportion in this category.

The expenditure index, E_{ik}, measures the case-mix adjusted level of spending rather than the relative proportion of the total expenditure. Thus it allows more effective comparison across districts. Expenditure indexes are shown in Table 9. District B spends at a substantially higher level for physical restoration than any other district, District D being the closest with an index value of 1.11 compared to B's 1.21. In contrast B shows a markedly low level of expenditure for training and even lower for maintenance. The expenditure for every type of service except physical restoration, and diagnosis and evaluation, is below one. District C is opposite; the index values are above one for every type of expenditure except physical restoration. District A shows a high index value for "other," which will be analyzed later. District G shows a high expenditure level for maintenance and transportation (2.41 and 1.80, respectively). From these index values, districts B and G appear to have exceptional spending patterns. Where one is high, the other is low. District C appears to be very similar to district G. District G is urban,

TABLE 9

Expenditure Indexes Adjusted by Number and Type of Clients Served, for Seven Rehabilitation
Program Districts: State of California, Fiscal Year 1970-71

| District | Case Service Expenditure Category | | | | | |
	Diagnosis & Evaluation	Physical Restoration	Training	Maintenance	Transportation	Other
	Expenditure Index Value					
A	1.48	.85	2.00	2.06	1.45	1.84
B	1.01	1.21	.64	.27	.76	.87
C	1.41	.46	1.65	1.97	1.69	1.03
D	.99	1.11	1.70	1.50	.82	1.14
E	1.25	.85	1.17	.97	.78	1.01
F	1.03	.55	1.19	1.77	1.19	1.39
G	1.37	.79	1.13	2.41	1.80	.48
Average District[a]	1.22	.83	1.35	1.56	1.21	1.11

Source: See Table 5.

Notes:
The ratios are dimensionless fractions. A value of 1.0 indicates the spending for the service
was just equal to a level consistent with the local case-mix served at the statewide average
spending patterns. Neither rows nor columns add up to 100 or any other constant.

[a]See footnote b, Table 4.

B is suburban and C ranges from urban to rural but is predominantly suburban. Explanation of these differences appears to be worth further investigation.

A possible hypothesis explaining the differences between the expenditure profiles of districts B and C may come from the local cost levels. Suppose that the cost of obtaining services is closely related to the overall cost of labor which is (hypothetically) high in district C and low in B. Therefore, their expenditure levels are high and low, respectively. Assume further that physical restoration is a highly specialized service and is much more independent of local wages than other services. Thus for the high cost district, C, physical restoration expenditures would be lower than expenditures for other services there as reflected by the expenditure indexes, and just the opposite for B, the low cost district. However, this does not explain why the expenditure levels for restoration vary. A more revealing comparison emerges from examination of the indices of output, overall cost, productivity and expenditure by service type.

Because the local mixture of clients is scaled out by the index measures, we can detect where high spending in one area corresponds to low in another. Likewise, high levels of rehabilitation and productivity can be compared to each other and to the expenditure levels. In Table 10, correlation coefficients between values of the three aggregate indexes and the six case service specific indexes are shown. They have been computed from index measures for the eighteen districts.

Striking in this table are the relatively strong correlations between cost and the other indexes, especially productivity, and the weak correlation between output and the cost and service-specific input

TABLE 10

Correlations Between Values for Output, Cost, Productivity and Case Service Expenditure Indexes Across Eighteen Rehabilitation Program Districts: State of California, Fiscal Year 1970-71

Correlation Coefficients

Indexes		OI (1)	CI (2)	PI (3)	D&E (4)	RSN (5)	TNG (6)	MTC (7)	TRS (8)	OTR (9)
Output	(1)	1.	.27	.38	.02	.10	.36	-.01	.09	.60*
Cost	(2)	.27	1.	-.76*	.57*	-.14	.90*	.86*	.68*	.52*
Productivity	(3)	.38	-.76*	1.	-.54*	.13	-.61*	-.80*	-.50*	-.10
Diagnosis & Evaluation	(4)	.02	.57*	-.54*	1.	.05	.34	.55*	.31	.03
Physical Restoration	(5)	.10	-.14	.13	.05	1.	-.26	-.22	-.38	.14
Training	(6)	.36	.90*	-.61*	.34	-.26	1.	.63*	.53*	.55*
Maintenance	(7)	-.01	.86*	-.80	.55*	-.22	.63*	1.	.59*	.27
Transportation	(8)	.09	.68*	-.60*	.31	-.38	.53*	.69*	1.	.15
Other	(9)	.60*	.52*	-.10	.03	.14	.55*	.27	.15	1.

Source: See Table 5.

Notes:
* Asterisked values are significant at the 5% level.

aThe correlations are between the columns of data in Tables 6 and 9 extended to include eighteen rehabilitation program districts.

measures. The correlations between output and productivity, and cost and productivity show that cost dominates the productivity measure. The range of variation of the cost index is slightly greater than that of the output index, but it is not obvious why cost should so clearly correspond to productivity. Output and cost show a weak positive correlation which contradicts the strong relation between fractional success rates and per-client expenditures apparent in Table 3. Because that relation was tabulated by disability group while the index measures merge expenditures and rehabilitations for all disability groups served, it may be that there is group specific causality. In other words, either disability groups are identified by the counselors or by themselves as having a good chance for successful rehabilitation. However, this additional piece of information from Table 10 is not enough to settle the determination of causality.

There are some other significant relations between the indexes. Cost, and to a lesser extent productivity, are strongly correlated to every expenditure index except physical restoration. If the costs of service vary widely over the state, then the overall cost index should vary with the separate cost indexes. The physical restoration expenditure index seems to be independent of the overall cost and separate cost indexes. There appears to be some underlying factor tying overall and separate (except physical restoration) costs together. This may be the general district environment, i.e., cost of living, wage level, income level, etc., but we do not know that now. If the cost of a "unit" of physical restoration is constant over the state, then by inspection of the variation of the restoration index, different districts purchase

significantly more or less of this service than would be expected from the client mixtures.[8]

The remaining significant relations are all direct, i.e., as one increases so does the other. Diagnosis and evaluation is tied to maintenance, maintenance to training and training is tied to both transportation and other. The only strong relation between the output index and any other index is to expenditures for "other." If the costs for setting up businesses for the disabled is included under that category, then the relation seems plausible. However, this is not known. A possible explanation is that expenditures for "other" is a good proxy for carefully individualized service to clients.

The web of connections suggests a multiple correlation analysis to determine the underlying causal sequence if any exists. This would be no simple task, but there appear to be some important policy issues particularly in the connection between costs and output.

Variations Among Districts

Just as we have compared expenditures for case-services across the state, using districts as observations, so it would be useful to have a way of comparing districts. Such a measure could be used to identify groups of districts with special needs and to detect unusual operating styles. Broad trends across the system could be detected over time and so could unique deviations of a particular district or perhaps

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[8] Jerry Turem of the Urban Institute has suggested that variations in the degree of coordination between rehabilitation programs and public health programs like Medi-Cal accounts for the independent variation of the physical restoration expenditure index. If this were so then that index might be used to identify districts with high or low levels of coordination with public health programs separate from the Department of Rehabilitation's programs.

an odd client group. To provide such a measure, the correlation coef-
ficients between districts have been computed. Each district is corre-
lated with every other district according to the values of the expenditure
indexes described earlier. The correlation serves as a simple measure
of similarity between districts. It serves as an inspection tool and is
not used here to estimate quality or goodness of any particular district.

Three sets of correlations have been computed. First, we compute
correlations between districts on the basis of their percentage distri-
butions of expenditures for each type of case service. By this standard,
Table 11 shows the districts to be very similar. Weakest are the corre-
lations between district B and the other districts. Only two are signif-
icant at the 5% level, but they are all quite large and positive.

Correlations between districts by levels of expenditure indexes
prove more revealing. The correlations are shown in Table 12. District B
is not merely unrelated to the other districts. It is opposite them.
In other words, where expenditures are above what might be expected on
the basis of case-mix for district B, they are low in most other dis-
tricts and vice versa. Districts F and G are quite similar to district C
but not to each other so strongly. District A which is urban northern
California is similar to districts C, D and F, also in northern California,
and with less strength similar to E the only other northern California
district. District D seems to be unlike (rather than opposite) the
other districts.

So it seems that not only is district B a low cost and high
output district, it is somehow different from the other districts con-
sidered here. From the viewpoint of an administrator, remote analytical
work like this would be well complemented by direct field inspection.

TABLE 11

Correlations between Rehabilitation Program Districts by Profiles of Proportional Expenditures for Case Services: State of California, Fiscal Year 1970-71

District	Correlation Coefficients						
	A	B	C	D	E	F	G
A	1.	.82*	.98*	1.*	.98*	.98*	.89*
B	.82*	1.	.79	.84*	.91*	.73	.62
C	.98*	.79	1.	.98*	.97*	.99*	.95*
D	1.*	.84*	.98*	1.	.98*	.98*	.89*
E	.98*	.91*	.97*	.98*	1.	.94*	.86*
F	.98*	.73	.99*	.98*	.94*	1.	.95*
G	.89*	.62	.95*	.89*	.86*	.95*	1.

Source: See Table 5.

Notes:

* Asterisked values are significant at the 5% level.
The correlations are between the rows of data in Table 8.

TABLE 12

Correlations between Rehabilitation Program Districts by Profiles of Case-Mix Adjusted
Expenditure Indexes for Case Services: State of California, Fiscal Year 1970-71

District	Correlation Coefficients						
	A	B	C	D	E	F	G
A	1.	-.84*	.76	.64	.42	.89*	.34
B	-.84*	1.	-.87*	-.60	-.03	-.90*	-.74
C	.76	-.87*	1.	.35	.20	.78	.80
D	.64	-.60	.35	1.	.39	.40	.15
E	.42	-.03	.20	.39	1.	.12	-.15
F	.89*	-.90*	.78	.40	.12	1.	.56
G	.34	-.74	.80	.15	-.15	.56	1.

Source: See Table 5.

Notes:

* Asterisked values are significant at the 5% level.
The correlations are between the rows of data in Table 9.

The striking differences between the correlations by percent profiles of district expenditures and those correlations by expenditure index profiles at first suggested to me that case-mix adjustment not only failed as an explanatory factor in variations between districts but was in fact the source of variation by index measures. This would mean that districts were separately hewing to some standard of operation independent of the type of clients served. However, proportions are inherently different from levels. Proportions are independent of local cost levels because they are relative measures. The expenditure indexes are not because they are absolute measures of levels of expenditure, albeit indirect. In order to judge the influence of case-mix adjustment, another expenditure index was created. It is defined here:

$$E'_{ik} = \frac{\sum_j c_{i*k} n_{ij}}{\sum_j c_{i**} n_{ij}}$$

where:

E'_{ik} : The expenditure index for district i for case service type k as a function of the number but not the type of clients served by the district.

c_{i*k} : The average expenditure in district i for service type k. It is the average over all disability types.

c_{**k} : The statewide average expenditure per client for service type k. It is the average over all districts and all disability types.

The numerator of E'_{ik} is the same as that of E_{ik}. The denominator depends only on the number and not the type of clients served by the district. Thus it is an ideal measure to estimate the influence of disability type adjustment by comparison against the first expenditure index.

The index values for E'_{ik} are shown in Table 13. By comparison to Table 9 where indexes were adjusted for number and type of clients, the index values were almost identical. In no case is the difference between the two types of indexes greater than about 20% and it is usually less than 10%. In only three cases does the index value change from above a value of one to below or vice versa. The three are: district D for diagnosis and evaluation and for physical restoration, and district C for "other."

The correlations between these disability-independent expenditure indexes are shown in Table 14. They are very similar to those shown in Table 12 based on the disability adjusted indexes. To determine how similar they are in fact, one might compute correlations of these correlations, but for the purpose of this analysis it is sufficient to observe the evident likeness between the results of adjusting for the number and disability of clients served, and adjusting for only the number of clients.

Given the diverse needs of different types of disabled individuals, it seems natural that adjusting for these needs based on statewide averages should explain a significant if not a major portion of the variation in spending levels. However, it is clear from this comparison that the local client disability mixture does not explain much of the variation in spending levels. Another look at the expenditure profiles of each disability type might be useful. The expenditures for each disability group expressed as percent of total expenditure for that group are shown in Table 15.

The largest percentage of expenditures for diagnosis and evaluation occur in the Behavior and Drug and Other Mental groups which seems reasonable. Physical restoration expenditures are highest for the

TABLE 13

Expenditure Indexes Adjusted for Number of Clients Only, for Seven Rehabilitation
Program Districts: State of California, Fiscal Year 1970-71

District	Case Service Expenditure Category					
	Diagnosis & Evaluation	Physical Restoration	Training	Maintenance	Transportation	Other
	Expenditure Index Value					
A	1.44	.93	2.04	2.04	1.47	2.11
B	.95	1.23	.63	.26	.76	.85
C	1.62	.36	1.66	2.11	1.66	.86
D	1.25	.98	1.79	1.77	.82	1.25
E	1.32	.80	1.19	1.01	.79	1.03
F	.98	.55	1.19	1.74	1.21	1.40
G	1.22	.85	1.09	2.26	1.78	.47
Average District	1.25	.81	1.37	1.60	1.21	1.14

Source: See Table 5.

Notes:

See footnotes to Table 9.

TABLE 14

Correlations between Rehabilitation Program Districts by Profiles of Expenditure Indexes
Adjusted for Number of Clients Only, for Seven Rehabilitation Districts: State of California,
Fiscal Year 1970-71

	Correlation Coefficients						
District	A	B	C	D	E	F	G
A	1.	-.77	.52	.72	.41	.87*	.11
B	-.77	1.	-.84*	-.71	-.19	-.92*	-.71
C	.52	-.84	1.	.53	.40	.70	.80
D	.72	-.71	.53	1.	.58	.57	.24
E	.41	-.19	.40	.58	1.	.17	-.12
F	.87*	-.92*	.70	.57	.17	1.	.51
G	.11	-.71	.80	.24	-.12	.51	1.

Source: See Table 5.

Notes:

* Asterisked values are significant at the 5% level.
The correlations are between the rows of data in Table 13.

TABLE 15

Percentage Distribution of Expenditure, by Case Service Category, Provided to Each
Disability Group: State of California, Fiscal Year 1970-71

Disability Group	Case Service Expenditure Category						
	Diagnosis & Evaluation	Physical Restoration	Training	Maintenance	Transportation	Other	Total
Sensory	11%	17%	41%	10%	7%	14%	100%
Orthopedic & Amputee	11	9	48	16	12	4	100
Other Physical	15	14	42	14	10	4	100
Behavior & Drug	26	2	39	20	7	5	100
Other Mental	23	3	44	18	9	2	100
Average Group	17	9	43	16	9	6	100

Source: See Table 5.

Notes:

See footnotes to Table 8.

Sensory and Other Physical groups which also seems reasonable. Expenditures for training are all slightly less than half the total. Expenditures for maintenance and for transportation vary slightly over the disability groups. The expenditure for "other" for the sensory group is nearly three times as large as that for the next smaller group expenditure on that category. The expenditure patterns of the disability groups vary observably but not grossly.

So we are left with the unexplained variation of the expenditure indexes. Two hypotheses could explain the variation. First, it could be that the technology of the rehabilitation process varies widely from district to district. That is, the mechanics and cost of obtaining the various services could vary widely. By definition, technology is independent of the decisions of the district personnel. The alternate hypothesis is that the style of the district personnel accounts for the variation. Either randomly or systematically, individuals within a district may develop unique styles of rehabilitation counseling that lead to presently unaccountable variations in expenditure levels. We do not now have enough information to establish or reject either hypothesis.

VI. CONCLUSION

This preliminary analysis of expenditure and rehabilitation data for California has some important policy implications.

There is a strong direct relationship between expenditures and rehabilitation success rates when comparisons are made by separate disability groups. This relation disappears in the activity indexes which are computed for each district and merge the impact of the separate disability groups. This implies that something associated with the disability groups accounts for the relation between cost and success. It may be that either the counselors or the clients identify certain groups as having a higher chance for successful rehabilitation and exert influence to obtain an extra amount of service.

When the districts are ranked according to their productivity indexes, the ranks are essentially similar for both adjusted and unadjusted measures. Furthermore, the case service expenditure indexes are substantially the same when they are adjusted for only the number of clients served locally as when they are adjusted for both the number and type of clients. We conclude that variations of disability type do not explain much of the variation of the expenditure or output of the districts. This means that the local environmental factors affecting the rehabilitation of the disabled, or the operating style of the local rehabilitation program district office cause the variations. This striking conclusion deserves substantial further investigation.

From an analysis of the expenditure indexes it is clear that expenditures for physical restoration vary rather independently of expenditure for other services. The expenditures for this service seem to be high where those for other services are low and vice versa. No hypothesis explaining this seems obvious. Perhaps there are widely varying local conditions that affect the price of this service across the state.

Expenditures for services included under "other" are directly correlated to the level of rehabilitation output. For every group except Sensory, this is the smallest expenditure. If the cost of establishing businesses for the blind is included under "other," then the relationship is explained.

Finally, this kind of analysis can be used to detect trends and perturbations in the relations between districts. For example we have seen that district B has a much higher proportion of 08 (client not accepted for service) and 30 (client dropped before plan begun) closures than average, and a spending pattern that is opposite from most of the other districts and similar to no district. Districts C and G serve urban black lower class and a mixture of urban black and suburban white client populations, respectively. However, their expenditure and producitivity indexes are very similar. Perhaps the most interesting relationship of this type is the extreme similarity of all the districts when compared by percentage expenditures. This is in part due to the high proportion that every district spends on training, but a visual inspection of the percent expenditures by district shows that their profiles are basically similar.

This analysis has raised several questions. The utility of these tools may well be in locating significant questions so that administrators

responsible for operating and evaluating rehabilitation programs can apply their skills where they are needed. When problems are identified, more sophisticated tools coupled with direct contact with people in the field and broad knowledge of the program can be used. However, the basic evaluation and monitoring of ongoing program operations is probably most efficiently performed using simple measures like percentages and ratios as employed here. They are relatively easy to apply, are not difficult to understand and do not require data of an unusual structure or format. Routine information can yield insight without major analytical effort.