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GUIDELINES FOR COST MANAGEMENT IN WATER AND SANITATION INSTITUTIONS

Technical Report No. 54
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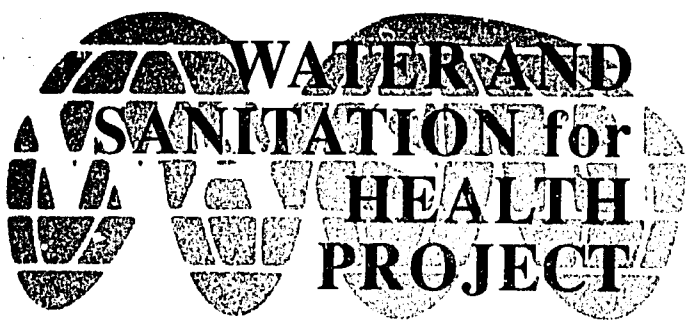

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WASH Technical Report No. 54

GUIDELINES FOR COST MANAGEMENT IN WATER AND SANITATION INSTITUTIONS

Prepared for the Office of Health,
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by

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RELATED WASH DOCUMENTS

Guidelines for Conducting Willingness-to-Pay Studies for Improved Water Services in Developing Countries. WASH Field Report No. 306. October 1988.

Guidelines for Institutional Assessment: Water and Wastewater Institutions. WASH Technical Report No. 38. February 1988.

Guidelines for Maintenance Management in Water and Sanitation Utilities in Developing Countries. WASH Technical Report No. 63. June 1989.

Willingness-to-Pay for Water in Rural Areas: Methodological Approaches and an Application in Haiti. WASH Field Report No. 213. September 1987.

ABOUT THE AUTHOR

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WASH FINANCIAL MANAGEMENT SERIES

The Water and Sanitation for Health (WASH) Project is developing a series of publications dealing with financial management and cost recovery issues. Currently there are four reports in this series. Titles of these publications are as follows:

Report 1	Guidelines for Conducting a Financial Management Assessment of Water Authorities (WASH Technical Report No. 53)
Report 2	Guidelines for Cost Management in Water and Sanitation Institutions
Report 3	Principles of Tariff Design for Water and Wastewater Services WASH Field Report No. 348)
Report 4	Guidelines for Financial Planning of Water Supply and Sanitation Institutions (draft)

The four reports provide an integrated package of financial and management assistance and have been prepared for audiences at varying skill levels within the financial discipline, at both the operational and the administrative levels. The approach of the reports is directive. The reports can be used individually or together. Report 1 is an assessment and diagnostic tool and would logically be the first report used to appraise the current financial management situation of a water supply institution. Weaknesses identified in the initial assessment of such areas as cost management, tariff policy, and financial planning can be addressed by using the other WASH reports in the series.

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There is ample evidence in development literature that the demand for potable water exceeds the financial and human resources to meet it. Scarce resources available for water supply and sanitation should be used as effectively and efficiently as possible. The purpose of the Guidelines for Cost Management is to develop a framework for understanding the basis of costs in the provision of water and sanitation services and the service objectives to which those costs contribute. The guidelines provide water and sanitation system designers and managers with a means to understand the performance of their own and other institutions. The development of such a **performance management program** will improve the cost effectiveness of these institutions.

The guidelines focus on three main functions: the identification of costs and performance; the uses of cost and performance indicators to identify major areas where improved cost management is needed; and the development of improved appraisal techniques to identify the needed improvements. In this process, the guidelines depend on the critical role of information feedback in assessing the institutional performance and identifying areas for potential managerial, technological, or financial changes. With this information, managers can change the organization and scheduling of work, personnel management practices, and technological procedures and learn from these new approaches. When comparative performance information is available for a network of regional water authorities, managers are able to learn from each other's experiences.

The guidelines are presented for use at two levels. The first and simpler level depends upon performance ratios based on information already at hand or available as part of normal operations. Such ratios include personnel per number of connections, cost of utilities per number of connections, and cost of billings per total revenue collected. The guidelines give the user specific tools to interpret these performance indicators. For example, if total costs per volume of water are rising but personnel costs are not, personnel may not appear responsible for the cost increase. However, a close examination of the personnel performance ratios may show that work crews are spending most of their time repairing or replacing old pipe, not providing new connections. This would explain the rising cost per volume of water delivered.

The use of the guidelines at the second level is more complex and would probably require significant changes at least in the accounting system and most likely in the organizational structure of the utility as well. But it would provide a much more detailed information system for managers to pinpoint areas of cost/performance problems and identify their causes without having to resort to special studies or outside consultants. An example of the type of application would be the development of a matrix approach which delineates specific service functions, say maintenance, against specific cost centers, say general administration and water distribution.

The guidelines are written as an introduction to the principles of performance management, and recommend the use of an external consultant with a background in public sector financial management and familiarity with accounting concepts and the operation of water and sanitation institutions. The guidelines are presented in a format of operational steps for ease of use. They lead the user through the various levels of the performance review, suggesting which work activities are critical at different stages and which personnel within the institution will be most useful to contact. A workshop format for collecting and disseminating information is suggested.

1

INTRODUCTION

The demand for safe and reliable drinking water for the world's population is far outstripping the scarce financial and human resources available to meet that demand. It is imperative that these scarce resources be used as efficiently and effectively as possible. These guidelines for *cost performance management* show that an analysis of comparative cost data from water supply and sanitation institutions can provide an understanding of the origins of costs, the service objectives to which they contribute, and possible areas for management attention to improve efficiency or effectiveness. Water and sanitation system designers and managers learning from the performance of others can develop technical and managerial strategies to improve the cost effectiveness of their own institutions. This is called a *performance management program.*

These guidelines are for managers of water supply and sanitation institutions as well as donor agencies and others involved in institutional design and technical assistance. They are not narrowly prescriptive, nor do they propose a single best way to organize information about the costs and performance of water and sanitation utilities. Rather, they offer guidance in the development of programs to improve cost management and system performance.

1.1 Role of Cost Management in Overall Institutional Development

Improving the management of costs is not the only institutional development problem for water supply and sanitation institutions. There are many others, often defined as technical, that are institutional in origin. In *Guidelines for Institutional Assessment* (Cullivan et al.: WASH, 1988), problems like the need to rehabilitate plants are often described as symptoms of deeper institutional deficiencies arising from the absence of policies emphasizing operation and maintenance or of adequate training for operation and maintenance staff. The present guidelines provide a means of identifying a wide range of institutional problems and suggest possible directions for seeking improvements.

The Water and Sanitation for Health (WASH) Project has examined the recurrent costs of different water supply technologies and has found wide variations even for the same technology. Two examples illustrate this. In Asia, annual per capita costs for borehole handpump systems ranged from $0.10 to $0.90; in Africa they ranged from $4.10 to $8.00 for borehole electric pump systems. (*The Operation and Maintenance of Water Supply Systems in Developing Countries: A Cost Study*, Bates and Wyatt, Research Triangle Institute/WASH, 1988). What can account for these extreme variations? What should be the recurrent costs for a particular system? It is important to be able to recognize cost standards and to isolate the reasons for abnormally high costs.

These guidelines focus on costs and performance, the use of cost and performance indicators to identify areas needing cost management improvements, and measurements to pinpoint these improvements.

1.2 Objective

The guidelines describe the elements of a *performance management program*. They serve as a diagnostic tool and as a point of departure for designing and implementing a performance management monitoring program. They offer examples of how to use available comparative indicators and how to develop more comprehensive systems. Flexibility is essential. The guidelines can be adapted to small, relatively simple as well as to large, more complex institutions.

Although the guidelines can assist in the development of a complete performance monitoring program, including major changes in an institution's accounting system, a complete program is not the only answer. Most institutions can begin to collect information for some of the useful performance ratios without major shifts in organization or accounting, and all can benefit from doing so. However, users should be aware that most accounting systems focus only on information required for financial accounting objectives. They do not provide the information for thoroughgoing performance measurement and improvement. They may yield the information to construct global performance ratios such as *total costs divided by total volume of water produced* and *number of personnel per thousand customers*—indicators that when used for comparison can be very valuable in alerting managers to the need to examine costs and performance more closely. But few financial accounting systems in use can provide unit cost information such as *pipe installation costs per hundred meters*. Without these more detailed measures, managers may have difficulty determining where and how to look for specific means to reduce the total cost per unit of water produced. These guidelines suggest that more fully developed *management accounting systems* are necessary to make performance management an ongoing part of normal management practice.

The guidelines include suggestions for both water supply and wastewater institutions, but are not directly applicable to sewage treatment systems that rely on individual arrangements such as pit latrines, cesspools, and septic systems. Such systems typically are operated and maintained informally by the households or communities they serve.

1.3 Basis of a Performance Monitoring System

The initial step in improving the operations management and cost efficiency of water supply and sanitation systems is obtaining practical, reliable, timely information on the operational and cost characteristics of the system. With such information, system designers and managers are

able to develop a performance monitoring system. Box 1 sets out the basic steps in a performance monitoring system.

- Determine the cost of various service components in relation to service objectives.
- Pinpoint areas of system performance in greatest need of attention.
- Compare present and past system performance to identify potential problems.
- Compare performance with that of similar institutions—if other institutions monitor performance—to gauge the potential for improvement.
- Monitor the results of changes in technology, personnel management practices, or organization of work introduced to bring about improved system performance.

Box 1. Steps in Performance Monitoring

Developing a performance monitoring system is only the first step in improving performance. These guidelines do not contain prescriptions for particular management, work technology, personnel, or other policies. They focus on the critical role of information feedback in assessing institutional performance and exposing areas in need of change. With this type of feedback, managers can alter the organization and scheduling of work, personnel management practices, or technological practices and can learn from these modifications. When comparative performance information is available from regional or national programs, system designers and managers are able to learn from each other's experiences.

1.4 How to Use These Guidelines

These guidelines may be used at two levels, depending on the availability and extent of disaggregation of cost information. At the first level, simple performance ratios can be derived from information already available or obtainable as part of normal operations. At the more complex second level, significant changes probably would be required in at least the accounting system and most likely in the organizational structure. Most accounting systems and organization structures can accommodate level one analysis. For example, several key performance indicators depend only on basic production and cost information. If only

aggregate information is available on total annual expenditures, total number of personnel, total number of customers or connections, and total volume of water produced, simple performance characteristics can be measured. They are discussed in more detail in Chapter 2.

Simple measures may indicate a problem such as a rapidly rising ratio of total costs to volume of water produced, but they do not provide any indication of why the problem exists. For example, a water utility may observe that the total cost per 1,000 cubic meters of treated water has been rising for the past three years, and it may also observe that the number of employees per 1,000 connections has not been rising. A ready conclusion from this might be that rising costs have nothing to do with personnel. However, a more detailed examination might show that employees are spending more time repairing old water mains than they are on extending service to new areas. As a result, cost per volume delivered is increasing because of a particular pattern of how personnel are being assigned to work. To discover this, most utilities would have to rely on the manager's past experience or would have to conduct a special study. The detailed cost information that would pinpoint the exact cause of the increase probably would not be available.

The more complex application of the guidelines does provide this detailed information, but to get there may require an initial restructuring of the accounting system and possibly some reorganization of the utility. It also requires a continued analysis of information obtained through the new accounting procedures. While these are additional requirements to impose on the organization's information collection process, the payoff can be high. Effective management of the water and sanitation institution requires information on whether or not the organization is meeting its objectives, on how efficiently the organization's resources are being used to meet those objectives, and the basis for taking timely corrective action when objectives are not being met efficiently (Herbert, Killough, and Steiss, 1987, p. 527). The return on investing in these changes is (1) the ability to identify and correct problems without the delay and expense of special studies and (2) regular cost performance improvement.

1.5 Organization of the Guidelines

The performance monitoring guidelines are in five sections. The first two look at level one cost management techniques. They list cost performance indicators (Chapter 2) and show how simple ratios enable management to pinpoint performance problems (Chapter 3). The next three sections are for a level two analysis to develop a detailed performance management program. They describe the work activities on which cost and work information will be collected (Chapter 4), identify the types of costs that are to be differentiated (Chapter 5), and discuss the concept of cost centers, the organizational and accounting units around which cost information is developed (Chapter 6).

1.6 Consultant Selection

The guidelines only introduce performance management as a tool to improve the cost and operating efficiency of water and sanitation institutions. They are expected to be used with the assistance of an external consultant who should be familiar with both accounting concepts and the operation of such institutions, and should have a background in public sector financial management. The guidelines illustrate fairly simple applications of performance management to permit the execution of a program for improvement during a short consultancy. At the same time, the consultant could design a more comprehensive program for later application. The consultant could organize part of the information gathering or information dissemination in a workshop which the heads of all operating divisions and other key staff would most likely attend. Most of the work of a comprehensive cost and performance improvement program will be done by the management staff of the institution, however. An external consultant will be necessary to introduce the concepts and to assist in developing the institution's work program to implement the guidelines.

1.7 Operational Steps

The first step in using the guidelines is to review the organizational structure and major functions of the institution to develop a list of work activities similar to that in Chapter 4 which the consultant then discusses with the chief administrative officers. This will require interviews with managers to determine the routine and nonroutine activities their components of the institution perform and a few days observing work routines in the field and in the operating facilities.

The next step is to examine the cost and operating information available, preferably for several years, and to construct as many of the performance ratios suggested in Chapter 3 as possible. At this stage it makes sense to construct more than what might be required and consider discarding some later. The source of this type of information will be accounting records, annual reports, assessments conducted by external agencies, and perhaps other standard reports required by central government authorities.

If the information has been obtained for several years or for several institutions, it is extremely helpful to prepare graphs of the ratios constructed, as illustrated in Chapter 3. The ratios then should be discussed in an informal workshop setting with operating managers. These managers can be expected to offer many explanations of why changes have occurred or why some institutions appear to have more favorable ratios than others. These explanations, based on experience, no doubt will have considerable validity. However, it also is very likely that some of the costs are so aggregated that they conceal the underlying causes of deterioration that are reflected in some performance indicators. This situation will provide an opportunity to introduce the concepts discussed in Chapters 4 through 6 as a means for the institution(s) to

begin collecting the detailed information that will enable more comprehensive monitoring and evaluation.

Having introduced the concepts of work activity measurement and cost centers, the consultant should spend time with operating managers, either one on one or in small functionally related groups, to draw up a list of work activities that fit the institution. Based on these work activities, the operating managers, perhaps with the addition of first-line supervisory personnel, should discuss the design of reporting forms that can be used by personnel in the field to develop the database for more detailed work activity measurement.

The list of work activities and the proposed reporting forms should be discussed with the accounting department to determine how the accounting system might provide the necessary cost information. This may result in some modifications to the list of work activities and reporting forms. It also may lead to recommended changes in the financial accounting system to provide more management accounting information.

Finally, the consultant should meet again with the chief administrative officers, including operating managers, to discuss the results of the sessions at the operational levels and with accounting. At this point, if there is interest in a more comprehensive performance management program, a general implementation plan and work statement can be developed by the group.

2

COST PERFORMANCE INDICATORS

This chapter discusses indicators of key costs set out as ratios to the general performance characteristics of a water and sanitation institution. The measures are fairly typical and illustrate the kind of information required and how to use it. The three basic types used in improving cost performance management are set out in Box 2.

- Primary operating characteristics of the utility and its customer or client base
- Personnel characteristics of the utility
- Cost characteristics

Box 2. Three Building Blocks of Cost Performance

2.1 Building Block 1: Primary Operating Characteristics

The institution's operating characteristics are determined by size, measured by both the numbers of customers and the volume of production. These characteristics provide a basis for initial unit cost comparisons, for grouping different utilities according to their similarities, and for providing information on the general environment of the utility. Operating characteristics include:

- Current population served (coverage)
- Future population to be served (demand)
- Number of residential connections (present and future)
- Number of commercial connections (present and future)
- Number of industrial connections (present and future)
- Raw water production (m^3/day)
- Treated water production (m^3/day)

- Billed production (m^3)
- Collected production (m^3)
- Maximum treatment plant capacity (m^3/day)
- Average demand (liters/capita/day)
- Maximum daily demand (liters/capita/day)
- Peak hourly demand (liters/capita/second)
- Length (000s of meters) of water pipe (subdivided by size)

2.2 Building Block 2: Personnel Characteristics

The largest and most controllable cost for most utilities is personnel. Costs for electricity or fuel may be especially critical in some countries because payment is in foreign exchange. But the total number of personnel is basic, and more detailed breakdowns are very helpful. The division set out below permits analysis of the personnel component of the utility's operations:

- Number of employees (total)
- Number of employees by class:
  - Manual labor
  - Engineering/technical
  - Accounting/billings/collections
  - Clerical
  - Management/administrative
- Average salary by class
- Average size of work crew (by specific activity)

2.3 Building Block 3: Cost Characteristics

Cost information is the most difficult to record and maintain since it depends on the design and capacity of the accounting system. Most financial accounting systems, except in some established commercial water utilities, are not organized to provide the kind of cost breakdowns most useful to cost management. Public water utilities, as governmental

institutions, usually have accounting systems that provide only line item cost information for the total utility and by department. Departmental costs, however, rarely are subdivided by type of activity. The following kinds of cost information are most likely to be available:

- Total annual cost of the utility
- Total annual operating cost (operation and maintenance)
- Total annual capital investment
- Total cost by department or other organizational subunit
- Operation and maintenance cost subdivided by department
- Capital investment by department
- Personnel costs (salaries, fringe benefits, other outlays)
- Materials and supplies costs
- Utilities (electricity, petroleum products)

2.4 Comparative Indicators

The three building blocks can be used to construct a variety of ratios that indicate how well the utility is managing its costs. *Guidelines for Conducting a Financial Management Assessment of Water Authorities* (WASH Technical Report No. 53) discusses a number of these. Taken in isolation, of course, the ratios tell us nothing. For example, the number of employees per 1,000 connections is an indicator of the size of the utility's personnel complement. There are no precise standards against which such a ratio can be judged, although the experience of the utility manager will be helpful as may information of the same type from other utilities in the country. Tracking data over time will show trends.

Useful ratios are:

- Employees/connections by class of connection
- Personnel costs/connection
- Materials and supplies costs/connection
- Employees/m^3 delivered, m^3 billed, m^3 collected

- Cost of billings or collections/revenue collected
- Utilities costs/connection
- Other costs/connection
- Utilities costs/m^3 delivered
- Other costs/m^3 delivered
- Percentage of total population (potential) served
- Percentage of residential consumers (potential) served
- Percentage of commercial consumers (potential) served
- Percentage of industrial consumers (potential) served
- Total cost (excavation, installation, coverup)/thousands of meters of line installed

Some of these ratios illustrate the problems with typical accounting systems. For example, the net collection ratio (cost of billings or collections divided by revenue collected) may be obtainable, but typically only if there is a department responsible for nothing but billing and collection. If billing and collection are the functions of a department under general administration, only a cost of general administration/revenues collected ratio might be possible because the financial accounting system does not separate the costs of billings/collections activities from other general administrative activities. If a comparison with other utilities or information over time suggests that the ratio indicates a potential cost problem, it would be difficult to determine whether the problem is due to the cost of billings and collections, or to some other aspect of general administration such as plant management.

One approach to evaluating such ratios is to establish definitive standards against which to compare performance. Ideally, the utility, or in many developing countries a national government institution responsible for water and sanitation utilities, is able to define the proper cost per m^3 meter delivered, within ranges defined by characteristics specific to the local utility, such as topography and average distance from treatment plant to customer. This *proper* cost, which becomes the *standard*, is determined by a fairly detailed engineering analysis of each of the steps required in accomplishing the specific task, such as installing water supply lines from a main to individual household connections. But to determine the proper or standard cost per m^3 delivered, someone must perform the detailed engineering analysis of each activity involved in reaching the end result of m^3 delivered. Once each activity has been defined and analyzed, the sum of all the standard costs yields a *standard cost per m^3 delivered.* Any

individual utility then can measure its performance, cost per m^3 delivered, against the standard.

There are several disadvantages to this *standard cost* approach. Those detailed engineering studies are time-consuming, expensive, and may or may not accurately reflect the variations in local conditions. Furthermore, the actual measure the individual utility has of its own cost per m^3 may be highly inaccurate if the accounting system does not measure all the same costs used in defining the standard. For example, in developing the standard, attribution of administrative costs and the value of capital facilities to each cost component will have been defined. The individual utility, however, may or may not even know the value of capital facilities if it has taken over operation from the national water supply system after capital facilities have been built.

A substitute for the detailed standard cost approach is comparative performance measurement. This involves the collection of similar institutional level information across a large number of utilities. The Indonesian Ministry of Public Works, for example, has extensive information from each water utility in the country on water delivered, total costs, and so forth. The development of comparative cost indicators across all the utilities is therefore a relatively simple proposition. Of course, comparisons among unlike utilities will be meaningless, so utilities need to be grouped in meaningful groups based on characteristics of their clientele, local environmental conditions, and perhaps regional cost variations. Within these groupings, comparisons can quickly pinpoint those utilities with unusually high or unusually low performance, and some follow up in the form of workshops for all the utility managers in a region may fairly readily uncover some of the reasons for variation.

The next chapter discusses these types of comparisons and the uses to which comparative cost/performance ratios can be put.

3

USING RATIO MEASURES

3.1 Developing Tables and Graphics

The most likely use of information available to most utilities is in comparing the performance of several key indicators over time and/or against those of similar utilities. Where a national or regional agency systematically collects information about a large number of utilities, comparative ratios for similar utilities will be the most cost-effective approach because it makes use of data already collected. This type of comparative "benchmarking" provides the utility manager and regional or national boards, agencies, or ministries with an indication of differences among similar institutions, or over time for the same institution. These differences may raise questions about the need for greater attention to one or more aspects of productivity or cost.

Table 1 provides an example of four performance ratios from data for a group of British water authorities. The Anglian Water Authority's performance ratios show a trend toward slightly increasing operating and maintenance costs per capita from 1980 through 1984, and a slight decline in manpower per 1,000 connections during the same period. With only the information in the table to rely on, what might be happening?

Since manpower is not increasing, a plausible explanation might be that other costs, such as utilities or materials, are the cause of the increase as there was a substantial increase in capital expenditure per capita in 1984. This increased capital expenditure could be ascribed to the cost of replacing rather than continuing to repair worn-out pipes, thus preventing a further increase in O&M costs. Since that type of information is available, the same management most likely would look at similar authorities and at the average across all authorities weighted by the proportion of total expenditures (the last section of the table). The conclusion would be that there are no significant cost/performance issues raised by the data since other utilities are experiencing a similar high rate of growth in O&M expenditures.

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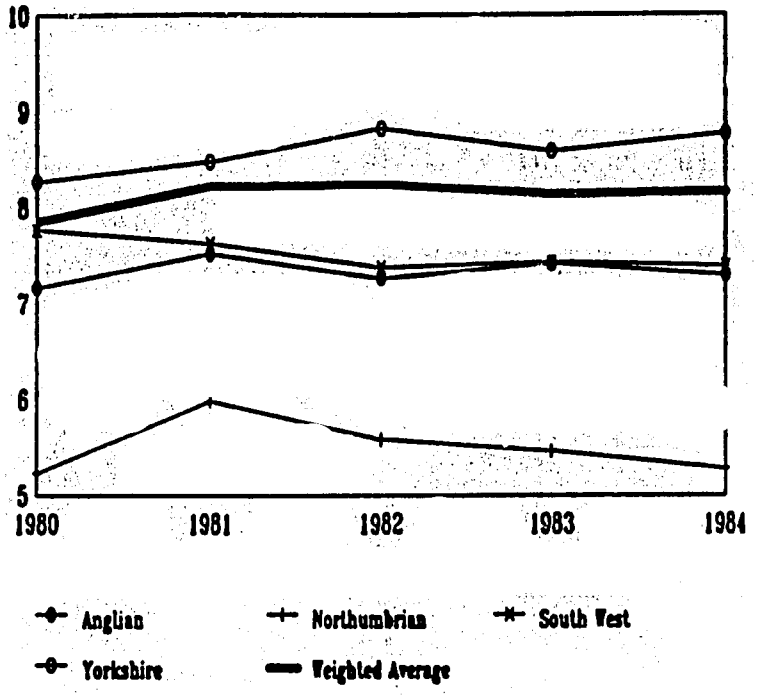
Table 1

Illustrative Performance Ratios:
Sample of Water Authorities/Great Britain

	1980	1981	1982	1983	1984
ANGLIAN					
O&M Cost Per Capita	7.16	7.51	7.26	7.41	7.39
Percent Population Coverage	98.90	98.90	98.90	98.90	98.90
Manpower per 1000 Connections	0.92	0.92	0.90	0.87	0.76
Capital Expenditures Per Capita	3.48	3.30	3.66	3.51	5.12
NORTHUMBRIAN					
O&M Cost Per Capita	5.23	5.98	5.58	5.46	5.28
Percent Population Coverage	99.00	99.20	99.20	99.20	99.20
Manpower per 1000 Connections	0.91	0.89	0.72	0.74	0.68
Capital Expenditures Per Capita	7.05	6.71	3.29	2.69	2.83
SOUTH WEST					
O&M Cost Per Capita	7.76	7.62	7.37	7.42	7.39
Percent Population Coverage	92.40	93.10	93.90	94.70	94.70
Manpower per 1000 Connections	1.18	1.20	1.10	1.11	1.05
Capital Expenditures Per Capita	4.92	4.19	4.92	6.57	6.26
YORKSHIRE					
O&M Cost Per Capita	8.27	8.47	8.82	8.58	8.76
Percent Population Coverage	99.30	99.30	99.30	99.30	99.30
Manpower per 1000 Connections	0.88	0.92	0.92	0.84	0.83
Capital Expenditures Per Capita	4.81	4.97	5.04	5.07	6.57
ALL WATER AUTHORITIES (weighted averages)					
O&M Cost Per Capita	7.89	8.25	8.26	8.17	8.19
Percent Population Coverage	98.90	98.90	99.00	99.00	99.00
Manpower per 1000 Connections	0.94	0.96	0.91	0.89	0.83
Capital Expenditures Per Capita	3.60	3.27	3.32	4.13	4.49

Another way of using the same information when comparing several similar organizations is to plot the data graphically as in Figure 1.



The Yorkshire Authority in the graph is the only one consistently above the weighted average for all authorities in operation and maintenance expenditures per capita.

• **Weighted average for all authorities**

Figure 1. O&M Costs Per Capita; Selected Authorities and Weighted Average

This graph shows at a glance how a key performance indicator of a particular authority compares with those of other authorities and the average for all authorities. But this only tells management that there is an aspect of cost and performance that may deserve further attention, without any clue to the cause.

3.2 Developing Country Applications: Performance Ratios in the Philippines

These types of simple performance indicators are practical for water and sanitation institutions in developing countries. The Philippine government's local water authority administration guidelines for institutional development illustrate this. Among a number of detailed indicators on individual utility operations, local water authorities collect data for such simple ratios as number of connections per employee and average salary per employee. This information is subdivided into systems based on gravity flow and pumps, and is further subdivided into those whose resources are greater or less than $12,500. Table 2 shows the average number of

connections per employee and average salaries for local water authorities with pumping systems and with resources greater than $12,500.

Table 2

Selected Performance Ratios for Philippine Local Water Authorities (Resources greater than $12,500)

	1979	1980	1982	1983
No. of connections/employee	68	65	74	83
Average salary/employee (pesos)	646	631	1,276	1,124

The figures presented in Table 2 are industry averages. The same information is available for each local water authority, except for some of the smallest gravity-based systems. From the information presented, it appears that the number of connections per employee has been rising, indicating a higher level of productivity per employee. At the same time, the average salary per employee has been increasing, but without additional information about inflation in the Philippines, the jump from 1980 to 1982 cannot be interpreted. Figures for the number of connections suggest that, on average, water authorities in the Philippines are increasing the number of connections faster than they are adding employees. In addition, if the jump between 1980 and 1982 is due to inflation, and if 1982 to 1983 establishes the new trend, then average salaries are not increasing either. Both indicators together seem to show an improvement in the cost/performance management of the local water authorities. There are other issues that would affect this interpretation.

Overall these measures only indicate potential problems that need further investigation. The indicators themselves tell us nothing about how significantly cost/performance ratios have improved, or what might be the underlying causes of significant deterioration in cost performance. Most accounting systems are not structured to provide information except by department, and then often in such an aggregated form that one can only determine which departments are the most expensive. These simple ratios and indicators do not explain why costs have changed.

The Philippines case illustrates what may be possible with a different orientation of the accounting system. In addition to the simple cost/performance indicators shown in Table 2, local water authorities also have detailed breakdowns in the following categories:

- Pumping expense per m^3
- Transmission and distribution expense per connection
- Transmission and distribution expense per kilometer of main
- Water treatment expense per m^3
- Administration and general expense per m^3

These measures are not automatic byproducts of most accounting systems, unless the water authority is organized by departments such as pumping, transmission, treatment, and administration. More commonly, the structure combines several functions within the same department, and the accounting system does not separate the costs. For example, pumping, transmission, and distribution may be combined within an engineering department, for which the accounting system may provide only total costs. If one wanted to pinpoint reasons for cost/performance deterioration over time or as compared with other utilities, it would be impossible to determine whether the culprit was pumping expenses or the cost of transmission lines.

To differentiate the cost components that enable management to isolate performance problems, most water and sanitation institutions will have to reconsider the structure of the cost accounting system. The next three sections describe a cost accounting approach for a more detailed and more complex cost/performance management program.

4

WORK ACTIVITIES

4.1 Cost Accounting Applications

Performance management involves the application of cost accounting principles, which are familiar to many commercial utilities but rarely used by public sector institutions. Most public sector institutions rely on accounting systems organized, by department, that monitor expenditures at the time they occur and against department budgets. If, for example, a truck is purchased, the entire expenditure is recorded against the department or subdepartment for that fiscal year. The facts that the truck will be used for several years over which its cost should be spread, and that it will be used by several other departments or subdepartments, are not recorded.

This treatment of capital costs can create problems in the development of simple ratios, such as the cost per m^3 of treated water, because they distort those years in which there are major equipment purchases. In addition, more refined measures to isolate the cost of installing a hundred meters of main supply lines may be understated because there is no means of allocating the cost of using the equipment of another department. This attribution of major equipment costs to its uses, and at the time it is used rather than the time it is purchased, is one of the steps in developing a cost accounting system to assist in performance management.

4.2 Measurement of Work Activities

The starting point for a discussion of cost accounting and performance measurement is the allocation of costs to specific work activities, which involves defining the work activities and developing recording methods that allow their measurement. This requires identifying actual work processes, such as water distribution, and developing record-keeping systems, such as job tickets, that allow labor, materials and supplies, and equipment usage to be measured for a particular activity.

This work measurement is combined with an accounting definition of costs as resources consumed. A cost does not occur until the resource is used. That is obvious for personnel, consumable supplies, and such items as fuel. But for items that are only partly consumed, the difference from typical public sector accounting practice in developing countries is significant. Accounting for costs as resources consumed at the time of use means that the cost of a truck, for example, will be attributed to the particular work activity in which it is used, based usually on the amount of time it is used. This means the purchase price of the truck is spread over several years, and a fraction of this price is assigned to each user at the time of use.

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Work is measured directly by recording hours, materials, and equipment usage (the costs) and volume of work accomplished (the outputs) during a standard reporting period (such as a day or the job), or indirectly through some type of estimation process. Cost accounting considers the measured use of equipment and the application of cost at the time of use rather than the time of purchase. When the two are combined, the cost per unit of work activity, such as the cost of installing a hundred meters of main supply line, can be determined.

4.3 Analysis of Major Service Functions

To identify the work activities around which costs will be grouped, one usually begins by identifying the major service functions of the institution. Those typical for water and sanitation institutions are set out in Box 3.

- General Administration
- Raw Water Supply
- Water Treatment
- Water Distribution
- Wastewater Collection
- Wastewater Treatment and Disposal.
- Customer Relations

Box 3. Major Service Functions

- **General Administration**

  General administration is either a separate functional area or a component of each of the other functions. Many institutions separate the costs of overall system administration, including the general manager's office and staff, from all other costs of the institution.

TYPICAL ACTIVITIES WITHIN FUNCTIONAL AREAS

General Administration	Raw Water Supply	Water Treatment	Water Distribution	Wastewater Collection	Wastewater Treatment And Disposal	Customer Relations
Supervision	Supply Line Installations	Routine Maintenance	Main Line Installations	Main Line Installations	Routine Maintenance	Hygiene Education
Billings	Pump Installations	Repairs	Secondary Installations	Secondary Installations	Repairs	Fee/Charges Obligation
Collections	Pump Maintenance	Water Quality Sampling	Customer Connections	Pump Installations	Monitoring and Quality Sampling	
Accounting	Source Maintenance		Line Repairs	Pump Maintenance	Disposal Lines Installations	
Personnel				Line Repairs	Line Repairs	
Procurement				Customer Connections		

Box 4. Work Activity Structure

- **Raw Water Supply**

  Raw water supply is the channeling of water from the source into the treatment system. It may require only tapping into gravity-fed sources and piping water to a treatment plant, or it may involve an elaborate system of catchment/impoundment facilities and pumping.

- **Water Treatment**

  Water treatment concerns the maintenance and repair of major treatment plant equipment and water quality engineering.

- **Water Distribution**

  Water distribution is the transmission of treated water to customers, and covers the laying of pipelines, maintaining these lines, installing and maintaining connections, and metering.

- **Wastewater Collection**

  Wastewater collection requires many of the same work processes as treated water distribution. Although different types of equipment and personnel may be involved, line installation, maintenance, and repair are the same. Engineering expertise for the two is different, however. In addition, wastewater collection may not involve sewer lines at all, but may be restricted to pumping out septic systems and carting the waste to treatment facilities, as in Bangkok, for example.

- **Wastewater Treatment and Disposal**

  Wastewater treatment in most developing countries consists either of directly discharging wastewater into nearby water bodies such as rivers or oceans, or collecting wastewater from onsite septic systems and treating at a central plant. Increasing environmental health concerns, however, are changing those practices to more systematic collection, treatment, and discharge of treated effluent into nearby water bodies.

- **Customer Relations**

  Customer relations in many water and sanitation institutions is a separate functional area. In developing countries, the water utility may be involved in health and hygiene education to encourage the use of clean drinking water and the safe disposal of human wastes. In addition, the effective collection of user charges involves public education in the consumer's responsibility to pay for services. Customer relations may encompass both health education and public service activities.

There are other functional categories that could be used. Most utilities have an engineering department, but it is not considered one of the functions the utility performs for its consumers. Rather, engineering services are used in several of the functional categories discussed above, and the costs of these engineering services would be assigned to the activities that require them within those functional categories.

4.4 Identification of Work Activities Within Functional Areas

Box 4 lists possible work activities of the major functional areas described above. These are illustrative rather than prescriptive.

The two principal bases for deciding how to separate a major function into work activities are: (1) the type of personnel involved; and (2) the nature of the work. These two bases provide the criteria for what is called the work breakdown structure. For example, the work activity of maintaining pumps in the treatment plant is substantially different from laying water supply pipes, and therefore two separate work activities would be included in the work breakdown structure for raw water supply. A work activity requiring only personnel with formal engineering training might be a candidate for a separate activity classification in the work breakdown structure.

The object of analyzing the work performed within functional areas is to list distinctive work activities in a work breakdown structure. Each element in this structure then would measure the personnel time, materials, and equipment used to complete them. The accounting system, following the work breakdown structure, will accumulate the cost information necessary to identify the total costs in a time period of performing those activities. Simultaneously, the management system will need to track the number of those activities performed in that same time period. Combining the cost accounting with the management accounting information, it then will be possible to measure directly the cost per unit of output for each activity performed.

Water distribution offers an illustration of this process. The institution lays main and secondary water lines, installs connections, and repairs lines. Lines can be measured by length of line installed. Customer connections (where meters are used) can be measured by the number of

meters installed. Line repairs can be measured by the number of repair jobs and lengths of pipe replaced or repaired. For uniformity, these measurements are based on standard units, such as hundreds or thousands of meters of lines.

Personnel time, materials, and equipment used for the installation are recorded in these standard units. The most common recording device is the job ticket. A job ticket is a reporting sheet that records personnel by name or by personnel classification or salary grade, the materials and supplies obtained from inventory, the time (including travel to and from the job site) each piece of equipment is used, and the length of pipe laid. Each job ticket can be analyzed separately to assess the performance of the crew on a particular job, and all the job tickets for an activity can be analyzed to assess overall or average performance. Information from the job ticket about the cost components (personnel hours by individual crew members, materials and supplies, and so forth) flows directly to the cost accounting system. Box 5 shows the type of information on a job ticket.

JOB TICKET

Work Order No. _____ Date _____

- **Description**
  Installation of 100 meters of secondary line (excavation and pipe laying)

- **Personnel** — Number of Hours
  - Manual _____
  - Supervision _____
- **Equipment**
  - Time use of Equipment
    - Backhoe _____
    - Other (special) _____
- **Materials Used**
  - Pipe _____
  - Other _____
- **Services**
  - Employment of Contractor (electrician) _____
  - Other _____

Box 5. Example of a Job Ticket

For each activity, forms are developed for recording the individual cost elements of a standard unit of work as in the examples above. The information from these forms provides the basis for calculating input/output ratios. With accounting system support, the cost of each element (manual labor hours, supervisory hours, hours of backhoe usage, and materials) can be added to the summary, and the total cost for a hundred meters of installed water line can be calculated.

5

RESOURCE COSTS

Identifying the individual cost elements of each activity is common in most water supply and sanitation institutions. Typical accounting systems capture the line item or type of expenditure necessary to identify the most important cost categories. A typical set of cost elements includes:

- Personnel (salaries)
- Fringe benefits (often combined with personnel in smaller institutions)
- Materials and supplies
- Utilities
- Contracts (contracted services, including consultants)
- Communications (printing, telephones, travel, etc.)
- Other

If the expenditure for a particular element is high, it might be separated into several subitems. For example, an item that might be listed separately rather than left in the broader cost element of materials and supplies is fuel costs for vehicles. Individual items that require foreign exchange for purchase often are listed as subitems within an element in order to aid in controlling demand for foreign currency. Whether an item should be included within a larger category or remain separate depends on whether it is significant enough to be managed individually.

Most accounting systems have a similar classification of cost elements that will not need to be modified to support a performance management program. A performance management effort should begin with a review of the present line item or object classification for large expenditures to see if they must be broken out to provide more detail. Often, no revision will be necessary in an acceptable accounting system.

The difference between what most accounting systems provide and what is required is that line item expenditures are organized by departmental or divisional structures, which may not be the best way to organize data for measuring cost performance. To support a performance management program, the accounting system must be able to measure each of the resource

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costs for specific work activities, through job tickets or other reporting forms, and to account for costs on a "cost center" basis as discussed in the following section.

In addition, as discussed in Chapter 4, the accounting system must be able to apply the "resource use" definition of cost in order to assign costs to work activities as resources are consumed, rather than as financial expenditures occur. This does not mean that traditional accounts that monitor financial transactions are not necessary. A utility still needs to examine its cash flow position at a given time. The cost accounting system that monitors resources only as they are consumed will not be able to do this. For example, the purchase of a piece of major equipment will require an outlay at a specific time or times, when the utility must have the necessary funds. A cost account that reflects only time of resource use will not indicate whether these funds are available. Materials and supplies may be purchased in quantity to take advantage of volume discounts, at which time an expenditure will be made, generating a demand on the utility's financial accounts. However, these materials may be drawn out of inventory over a period of several months, and used in the execution of several different work activities. The cost accounting system will record those materials as cost when they are drawn out of inventory for use. Sometimes the difference between *cost accounts* and *financial accounts* can be substantial. Both are required.

6

COST CENTERS

6.1 Cost Center Defined

A cost center is an organizational and accounting entity around which the utility maintains cost information. It is made up of individual cost elements such as personnel, materials, space rental, fuel, etc. All major parts of the organization for which these costs are to be maintained are defined as separate cost centers, and the accounting system must report the cost elements grouped around these centers. A small artisan business with 10 to 15 employees would be very unlikely to have more than one cost center—that is, the whole company. It would be just as unlikely to use the term "cost center." However, if the company grew to several hundred employees with separate departments for marketing and sales, production, shipping, and general management, it probably would modify its accounting system to match the change in organizational structure. If the accounting system now reported cost elements separately for each department, then each department would be a cost center.

6.2 Identifying Cost Centers

There are two criteria for identifying appropriate cost centers. First, costs that are expected to be managed by one person should be grouped together as a cost center. Every cost center need not have a separate manager; one manager may be responsible for more than one cost center. Also, a cost center can be divided into subcenters.

The second criterion is that every major organizational function should have its own cost center so that the costs of each major function can be evaluated separately.

The rationale behind the first criterion is that the accounting system should be able to account separately for the costs of each part of the organization's work for which a manager is responsible. By implication, this means that costs should be assigned to a particular cost center. Every organization has some general costs that are hard to assign to any one part of the organization. For example, central management has administrative responsibilities in all the cost centers of the organization, and it would be extremely difficult to allocate portions of this cost among the cost centers. For that purpose, a separate central management cost center or overhead cost center usually is established.

The rationale behind the second criterion is that each major function of the organization contributes differently to the total costs of the operation. Production uses different technological and personnel skills from customer billings and collections. It is necessary to separate the costs

of production from the costs of billings and collections in order to assess each function separately.

Both criteria suggest principles for designing the cost structure of the organization but do not dictate a particular structure for water and sanitation institutions. For example, a major function of many water utilities is installing service connections to individual households, community standpipes, or other consumer service points. Information about the cost of this function is critical to managing its performance.

Another major function is treating raw water for transmission by the distribution system. This requires managing the technology used in treatment, procuring treatment materials, and managing personnel. The functions, operational requirements, and costs for installation of service connections differ from those for treatment of raw water. These differences include:

- Type of personnel (e.g., proportion of semi-skilled versus manual laborers)
- Type of materials (e.g., chemicals and filters versus distribution pipes and fittings)
- Types of technology employed
- Management strategies (e.g., degree of direct supervision)

If cost information for these two different functions is aggregated in one cost center with no subdivision by function, it is impossible to manage their costs and performance effectively. If costs for personnel, materials, fuels, and miscellaneous activities for installations and treatment are known but lumped together, there is no way to determine whether cost increases for this aggregated function should be ascribed to installations or treatment or both.

6.3 Cost Center Concept

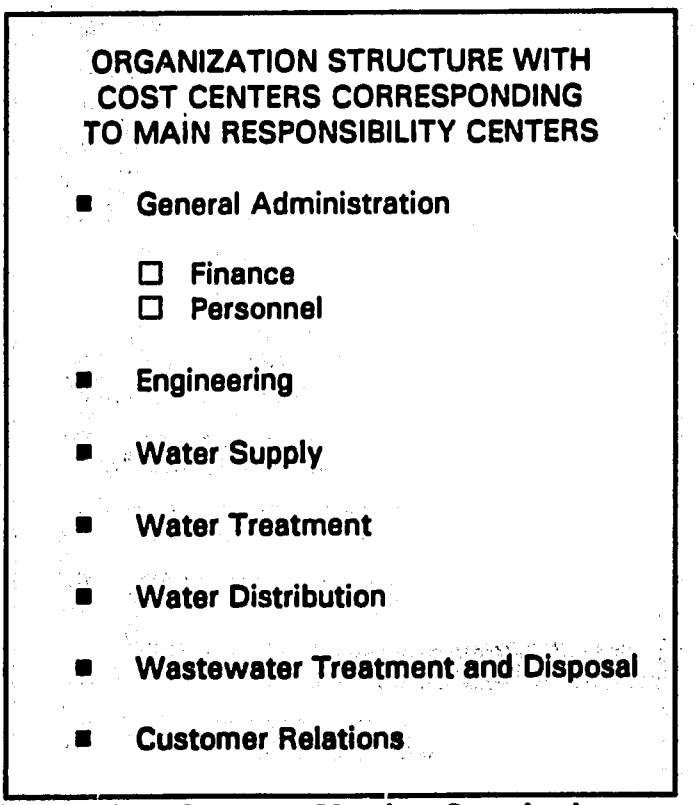
The cost center concept provides an organizational structure for costs similar to that for dividing managerial responsibilities. In the simplest structure, the subdivisions for assigning managerial responsibilities and for collecting cost information are likely to be the same. Each may be both an operating division with a designated manager and a cost center showing the full costs for the division. For example, a small water utility may have divisions for:

- Supply or source development and maintenance
- Treatment
- Installations

- Customer relations (billings, collections)
- General management (personnel, accounting, overall supervision)

As with organizational structures, cost structures for most institutions are hierarchical. Management responsibility on one level may encompass supervision of lower-level managers who in turn are responsible for their own subdivisions. Similarly, cost centers may be grouped so that several centers are part of a larger center. Ultimately, the costs of every center are grouped as one center.

In a larger water utility, the operating divisions and cost centers may not correspond on a one-to-one basis, and each management subdivision may be too large for only one cost center per subdivision to suffice. Boxes 6 and 7 show two cost structures for water and sanitation authorities. In Box 6, cost centers correspond exactly to management subdivisions. In Box 7, they slice horizontally across several or all management subdivisions in a more complex configuration.



Box 6. Cost Structure Matches Organization Structure

Box 6 illustrates an organization with seven departments, only one of which—General Administration—is further subdivided. Each department has a manager and a distinct function, with little overlap with the other departments. The accounting system is set up to provide cost information for each department, which is thus also a cost center.

This combination of an organizational structure with a cost structure works well as long as one department does not include significant activities of any other. To the extent that costs can be separated cleanly by department, separate cost centers are unnecessary. Where the operations of a water supply and sanitation institution are larger and more complex, however, it is quite likely that work within the management responsibility of one department may involve different functions whose costs need to be separately analyzed.

Box 7 illustrates a structure that permits analysis both of the costs of a department and of a major functional activity. For a larger, more complex institution, a cost structure of this type is preferred because improved cost management may require improving the control of costs for one department which involves the work activities of several others.

6.4 Cost Center Organization

Box 7 represents a structure that can be adapted easily to the needs of a variety of water supply and sanitation institutions. It is not suggested as the ideal structure but rather as a useful point of departure for designing a new institution or reorganizing an existing one. For a utility that has water supply responsibilities only, all functions related to wastewater collection and treatment would of course be deleted. The rest of this chapter discusses six example cost centers:

- General Administration
- Raw Water Supply
- Water Treatment
- Water Distribution
- Wastewater Collection and Disposal
- Billings and Collections

Functions	Departments						
	General Manager	Chief Engineer		Maintenance	Finance	Personnel	Customer Relations
		Plant Mgmt	Construction				
General Admin.	√				√	√	√
Supply			√	√			
Water Treatment							
Raw Water		√	√	√			
Wastewater		√		√			
Water Distribution							
Installations			√	√			
Repairs			√	√			
Waste Collection							
Installations			√	√			
Repairs			√	√			
Billings	√						√

Box 7. Sample Intersection of Organizational and Cost Center Structure

6.4.1 Cost Center 1—General Administration

The general administration cost center is a classification of all costs that cannot be attributed directly to the performance of a specific service function. As a rule of thumb, every attempt should be made to assign a cost to one of the direct service functions, and only if this is not possible should it be classified as a general administrative or overhead expense. The cost of the office of the general manager or equivalent head of the institution is the most typical example, since that office is responsible for supervision of all other functions.

In making general administration a separate cost, it is recognized that there are certain administrative activities that are general in nature and not part of a specific service function. In Box 7, the costs of finance (accounting, auditing, and financial reporting), personnel (employee records, selection and dismissal procedures, and perhaps training and counseling), and a portion of customer relations are shown as general administrative costs not directly attributable to any of the service functions.

All the costs of the finance and personnel departments are attributed to the general administrative cost center, whereas only a portion of the costs of the department of customer relations is considered a general administrative cost. This apportionment of customer relations costs assumes that the department has a general public relations and consumer education function serving all the other service delivery functions and, therefore, general administration. The department of customer relations has a more direct service function—that of billings and collections. Although from the customer viewpoint billings and collections are not normally thought of as a service, from the institution's point of view they are a direct service designed to generate revenue. Thus, the cost of that portion of the department that is involved in this direct service activity is assigned to the billings and collections cost center.

Box 7 also illustrates one possible choice in assigning administrative costs. There is an overall administrative cost for the institution, but there are no overhead or administrative costs shown in the engineering (chief engineer) and maintenance departments. It is assumed that all costs for these two departments are direct costs attributable only to direct service activities such as water treatment or water distribution, for example, and that the time and materials costs for personnel in the engineering department can be charged to their work in the various functions identified in the vertical headings of Box 7. This also assumes that the general supervisory functions of the chief engineer (the head of the department) and his or her direct staff also can be charged to the various service functions. In practice, the chief engineer and immediate office employees are probably engaged in various support and supervisory activities related to the work of the engineering and technical staff. Most often the costs of the chief engineer and his immediate staff are apportioned to each of the other cost centers as part of the costs for time and materials incurred by the engineering and technical staff for an actual function. In apportioning the chief engineer's office costs, the same principle should be followed as in apportioning costs for general administration. Only those costs that cannot be assigned to a specific service function should be spread among all functions. Thus, the chief engineer's

immediate office should be small and include only staff, equipment, and materials that are not easily divisible in the performance of specific service functions.

There is another possible choice, that would change the distribution. It can be decided that a certain portion of every department somehow is involved in general administration. Box 7 then would show an asterisk for every department on the general administration cost line. In this alternative arrangement, the chief engineer and immediate support staff would have their costs assigned to general administration, except to the extent that their time and materials costs are incurred for one or more service functions. In a similar manner, the supervisory activities of the head of the maintenance department would be allocated to the general administration cost center.

Either of these two alternatives is acceptable. The choice should be based on what the accounting system can most easily accommodate and on staff capabilities. Careful attention should be paid to how allocations are made, whether allocating general supervisory time to several cost centers or allocating a portion of a department's costs to general administrative overhead, because costs can easily be understated or overstated. If the same system is being developed for more than one institution, staff must be trained in the consistent application of the same allocation principles.

6.4.2 Cost Center 2—Raw Water Supply

Raw water generally comes from impoundments, rivers, or underground sources. Raw water supply involves maintenance of the supply source, such as dams at impoundments, or maintenance of intakes and pumping stations at river edges. Increasingly, water from underground sources involves not only extraction, usually through deep wells and pumping facilities, but regulation of access as well. Private access to underground sources around Jakarta, for example, is depleting the resource, and threatening salt water intrusion. Effective environmental management may require restricting access to underground water supplies, treating them as a public rather than a private good even in their undeveloped (before entering the distribution system) state. One regulatory device is an outright prohibition of private access to the source. Another, more commonly used, is a charge on the amount of water extracted.

Additional activities in raw water supply include the construction and maintenance of supply mains and lines from source to the utility, and installation and maintenance of the pumping facilities to charge the system.

6.4.3 Cost Center 3—Water Treatment

Box 7 shows the accounting constructs that capture the costs for treatment of raw water and wastewater. Raw water and wastewater treatment may be somewhat similar or very different.

In many developing countries, only raw water is treated prior to entering the distribution system. Untreated wastewater and normal water runoff share the same drainage pipes to reach the eventual disposal point, usually a large body of water such as a river or the ocean. In Montevideo, for example, wastewater flows into large storm sewers that carry the untreated effluent into the Rio Plata. In Bangkok, almost all wastewater is either held in septic systems or dumped illegally into canals and the river. The Bangkok Metropolitan Administration provides pumping trucks to empty septic systems and cart the effluent to treatment sites where some of it is converted into sludge for fertilizer.

Box 7 illustrates a more conventional system of sewage lines connected to one or more treatment plants run by the water utility. This will become more common as larger urban areas in developing countries grapple with the environmental health problems from un- or inadequately treated effluents. Any managerial and accounting changes in an existing system to develop a performance management program should include provision for wastewater treatment, so that major redesign will be unnecessary as functions are added.

For both raw water and wastewater, treatment essentially is an in-plant function. Costs for treatment begin as the water or effluent enters the plant and stop as it leaves the plant, either for distribution or disposal. Treatment is distinguished from wastewater collection and water distribution by a difference in technologies, often by a difference in staff and the level of skills, and by a difference in most of the materials and equipment purchased. Because of these dissimilarities, managing the costs effectively will also be different. Supervisory styles, forms of in-house or on-the-job training, work-group structures, and schedules may also vary.

The logic behind the concept of a cost center is apparent in these differences of how the function is performed and how management may alter the performance of the function. If the skill levels of personnel, their work patterns, their material and equipment usage, and the technologies employed are different, then the types of management interventions and innovations to be used to improve the function are likely to be different, and the function should be treated as a separate cost center. For example, the types of management and possibly technology changes contemplated if costs are too high are likely to be different for general administration and for raw water treatment. Thus, in order to make that initial judgment, the cost information for the two must be separable. Hence the need for separate cost centers in the accounting system.

6.4.4 Cost Center 4—Water Distribution

Water distribution is the distribution of potable water from the treatment plant to the consumer. The primary cost elements involved are piping and pumping stations. As Box 7 shows, installation may be distinguished from repairs. Should it be distinguished in all systems? The answer is implied in the preceding section's discussion of differences in the type of personnel, materials, and equipment employed and the technologies for engaging these factors. Clearly, the same excavation equipment and manual laborers are involved. The supervisory activities

are not likely to be any different. The main difference is that the installation of water lines involves survey and engineering work that need not be repeated when a crew returns only to repair or replace an existing line. This difference accounts for a large cost difference in the two types of functions, and therefore the two are best kept separate.

The differences in cost elements and technologies may not appear great enough to warrant separation in the accounting system. However, separate cost centers would be useful if the management of a system wanted to distinguish between new installations or construction and repairs. This distinction enables a clearer representation of the costs of operation and maintenance versus capital investments in the annual budget. Repairs are operation and maintenance costs and come under a current operating budget, whereas new installations are a capital investment. In practice the distinction sometimes is blurred. If several hundred meters of damaged pipe are replaced, it normally is considered maintenance. However, if the same length of pipe is replaced as part of a scheduled plan to replace capital facilities just before they become nonoperational, then it normally is considered a capital investment. For purposes of monitoring and improving the performance of the water distribution function, however, the distinction between capital and current budget items is not important. Because both activities in the example involve replacing old pipe, the personnel skills, equipment, and materials used are the same as in other repairs. Thus, if the monitoring process showed the costs per unit to be too high, the considerations for management and technological interventions would be the same for capital as for current budget items.

Because the technologies involved overlap considerably, some utilities include the activities related to water impoundment or capture and transmission to the treatment plant in the water distribution function. In that case, the cost center may be named more aptly "water impoundment and distribution." Again, piping and pumping stations are the major capital items, and from a management point of view installations and repairs are not really distinguishable whether water is going to or from treatment. There may be unique costs associated with watershed management, maintenance of a dam, or even management of recreational uses of impounded water that should be distinguished from installations and repairs. In such an instance, operation of the impoundment facility may be added to water impoundment and distribution as a third subcategory.

6.4.5 Cost Center 5—Wastewater Collection

As noted, many water supply institutions do not include sewage treatment or sanitation. The functions for wastewater treatment are similar, and it is expected more and more institutions will take on both functions in the future.

There is little overlap between the activities and the types of personnel, materials, and equipment for water distribution and wastewater collection. The pipe diameters and materials are different, and different survey, engineering, and excavation activities are involved in new

installations. Similarly, repairs utilize different personnel. It is necessary to distinguish the costs for the two functions because they are not always linked—many customers may have water but not sewer service—and it is useful for management to know the two costs separately.

6.4.6 Cost Center 6—Billings and Collections

As a cost center, billings and collections bears the costs of calculating the amounts owed by customers, notifying them of those amounts, and collecting the payments. It could be argued that this is a general overhead or administrative expense to be subsumed entirely under the finance department. Whether or not there is a separate department for billings and collections, the cost center should be distinguished from the financial accounting and other activities associated with a finance department.

There are two main reasons for maintaining this cost separation. First, there is a public relations aspect to billing and collection. Different cultures may have different ways that are more acceptable, and more successful, in collecting taxes or user charges. In addition, education in community responsibilities often is tied to billing and collection. This public relations aspect is quite unrelated to the other activities of a finance department. Thus, whether or not there is any managerial separation, the functions should be separated because the skills and conduct of activities are different.

Second, it is important to the effective management of a water system to know what the costs of revenue collections are. Many of the operational costs of a system can be reduced without improving its financial soundness because the costs of collection are too high in relation to the revenues received. Again, devising management, technological, and public relations strategies to remedy this problem would be quite different from devising strategies to minimize the costs of accounting and other financial activities in the finance department.

7

CONCLUSION

The preceding discussion is an introduction to performance management, whose purpose is to improve the cost and operating efficiency of water and sanitation institutions so that scarce financial and human resources can be used as effectively as possible.

A successful performance management program will depend on a number of interrelated factors. The quality and availability of cost and service data are paramount, and the cost of obtaining appropriate data must be weighed against the expected improvement in performance. The choice of consultant for the task is another important factor. It is essential that the results of the cost management review are correctly interpreted, and that the recommendations have the correct perspective. They must be presented against the background of the institution's resource constraints and perhaps, more widely, of the economy as a whole.

The strength of the guidelines is in the specific procedures and methods that provide a new perspective and various analytical tools for diagnosing complex problems of cost inefficiencies. The flexibility of these tools should be appreciated by the user. The guidelines need to be adapted to fit the circumstances of the particular water and sanitation system under review.