"THERE SEEM TO BE TWO PRIMARY WAYS OF MAKING THE CONNECTIONS BETWEEN MEANS AND ENDS OR BETWEEN ACTIVITY AND RESULTS: EVALUATION, AND ANALYSIS."

FINDING THE BOTTOM-LINE PAYOFF FOR TRAINING

BY FREDERICK W. NICKOLS

By and large, efforts to improve human or organizational performance through applications of behavioral and management sciences are matters of faith; that is, resources are committed to such efforts in the hope, knowledge or belief that they represent a productive use of these resources. The precise nature of the connection between the "human side of enterprise" and the organization's bottom line, however, remains pretty much a mystery.

In one sense, this mystery exists because of the different ways in which results are measured. Managers, for example, tend to use a set of organizational measures, whereas training and organization development specialists tend to use a set of measures originating in the behavioral sciences. Until now, the two sets of measures just haven't fit together.

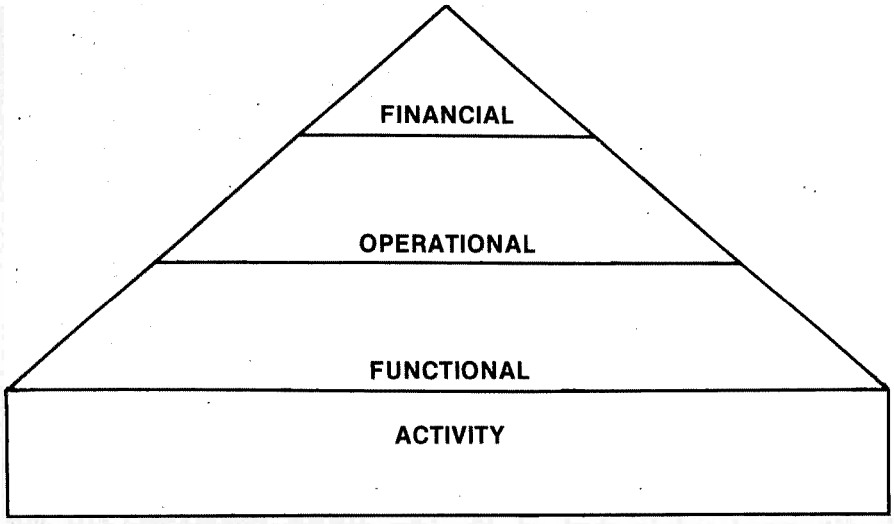
In quite a different sense, the mystery is the result of our lack of knowledge about the relationships between means and ends. In other words, we know a great deal about implementing various methods and techniques, but we're not very good at predicting the bottom-line results they will produce. By the same token, for a given result, we're not very good at saying which method or technique will produce it.

So, when faced with questions like: "What strategies will produce a 25 per cent increase in Earnings-per-Share?"; or, "What are the effects of these alternative strategies on our goals?", most managers become cautious. Understandably so, for they know the limitations of "hard" data and the price tag on impulse. The major problem facing those who would measurably and systematically improve organizational performance is an inability to hook what they are doing to the organization's bottom line.

There seem to be two primary ways of making the connections between means and ends or between activity and results: evaluation, and analysis. Over time, evaluation of results could tell us a great deal about the relationships between means and ends. Unfortunately, this approach suffers from what is perhaps a fatal flaw: evaluation cannot be carried out until resources have already been committed to and at least partially consumed in activity. Evaluation, therefore, is always after-the-fact; it provides hindsight. What is required in order to make sound decisions about intervening in organizational activity is foresight; analysis provides us with this capability.

In order to use analysis as the basis for targeting and selecting our interventions, we must first construct a map of the relationships between organizational means and ends. However, as was pointed out some 20 years ago, not much is known about how to do so.[1] It was originally thought that the key to constructing such maps lay hidden in the structure of the organization seeking to achieve the ends in question.[2] It does not. Instead, the key to constructing such maps can be found in the structure of the systems used to measure the desired ends. By identifying and breaking down the structure of these measurement systems, we

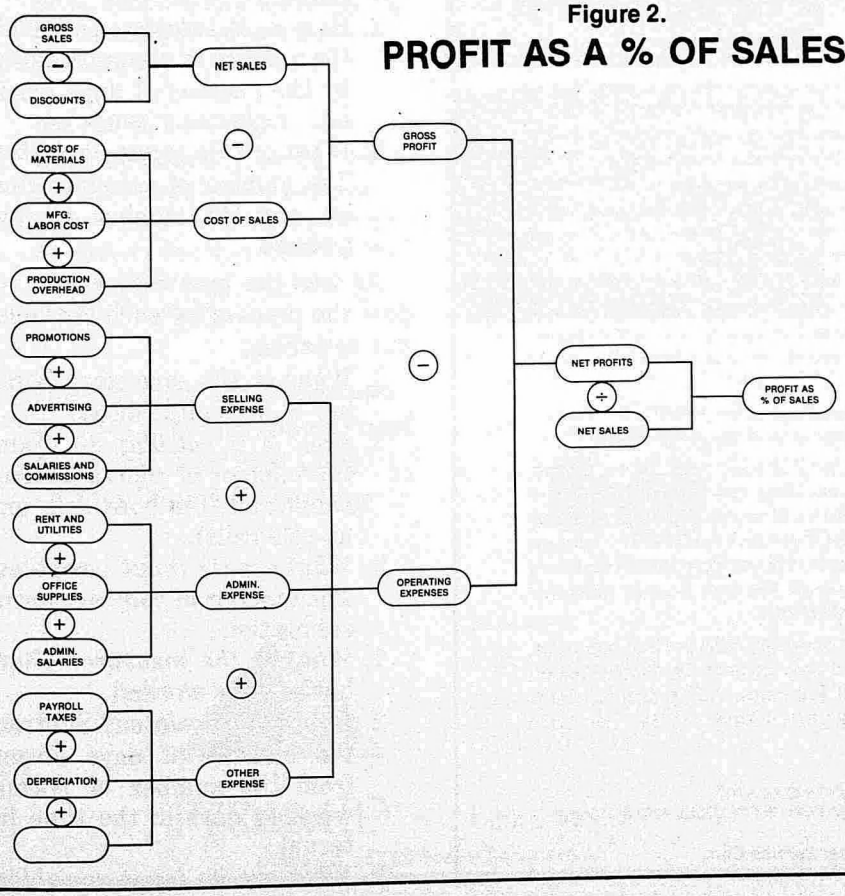
Figure 1.
LEVELS OF ORGANIZATIONAL PERFORMANCE



can identify the connections between the results measured and the activities which lead to them. Once this has been accomplished, we can utilize various methods and techniques drawn from behavioral and management sciences to intervene in these activities so as to achieve the desired results.

One method for doing this sort of analysis is called "Measurement-Based Analysis." It consists of two primary activities: building models, and analyzing them. Models can be constructed for financial measurements such as Return-on-Equity, Profit as a Percentage of Sales, or Return-on-Assets-Managed. They can be constructed for operational measurements such as Inventory Turnover, Average Collection Period, or Productivity Indexes. And, they can be constructed for functional measurements such as the number of hours worked, the amount of lost time due to accidents or absences, or the number of units produced or sales closed. These three types of organizational measurements can be thought of as a pyramid, one which rests on a foundation of organizational activity (Figure 1). It is at the bottommost or functional level of this pyramid where the actual links between results and activity exist, a point to which we will later return.

Figure 2.
PROFIT AS A % OF SALES



Constructing models of measurement systems is a fairly straightforward task. It consists of asking three basic questions: What is the measure? How is it calculated? What are its input variables? Then, for each of the input variables, the same three questions are asked again. This process continues until you have a complete model of the measurement system you wish to analyze. The model is complete when the variables identified are the direct outputs or products of activity.

The model-building process is really little more than a practical application of the idea that the best way to understand any system is to trace its inputs through its processes until they are transformed into outputs.[3] In the initial stages of this process, you are usually dealing with very abstract measurements; that is, the input variables are the products of previous calculations (e.g., Return-on-Equity). In later stages, you encounter much more concrete measurements; the input variables are direct measurements of activity (e.g., the number of sales closed).

Activity always takes place in the physical world. Results, once defined and articulated, also exist in an abstract world of language and measurement. The model-building process enables you to identify the linkages between abstract and concrete measurements. In turn, these linkages enable you to trace the connections between a given activity and a desired result. Modeling an organization's measurement systems, then, connects the abstract world of measured re-

sults with the concrete world of physical activity.

To illustrate the model-building process, consider the fairly common measurement of Profit as a percentage of Sales. It compares Net Profits against Net Sales and is considered not only a measure of profitability but also one of good management.[4] Asking the three questions presented earlier, we arrive at the following answers:

1. *What is the measure?* Profit as a Percentage of Sales.
2. *How is it calculated?* Divide Net Profits by Net Sales.
3. *What are its input variables?* Net Profits, Net Sales.

Displaying our answers in picture form — a model — is reasonably simple; merely lay them out in a hierarchical or tree-chart format and indicate the arithmetical function involved.

Next, we repeat the same three questions for each of the input variables:

1. *What is the measure?* Net Profits.
2. *How is it calculated?* Subtract Operating Expenses from Gross Profit.
3. *What are its input variables?* Operating Expenses, Gross Profit.
1. *What is the measure?* Net Sales.
2. *How is it calculated?* Subtract Discounts, Returns, and Allowances from Gross Sales.
3. *What are its input variables?* Discounts, Returns, Allowances, and Gross Sales.

Armed with this additional information, we can expand our tree-chart. Continuing this process, we eventually arrive at a model which shows many of the variables from a typical organization's income statement and balance sheet (Figure 2).

But we're not finished. If we broke Gross Sales apart, for instance, we would find the following answers to our three questions:

1. *What is the measure?* Gross Sales.
2. *How is it calculated?* Add the dollar amounts of individual customer purchases.
3. *What are its input variables?* Dollar amounts of individual customer purchases.

If we broke the dollar amount of an individual customer's purchase down, we would find that it is equal to the selling price of the item multiplied by the number of items purchased less any discounts or allowances. We also find that we are moving out of the organization under study and into its customer's activity; namely, the buying decision. Thus, we find that Gross Sales is a direct measure of customer activity (i.e., buying behavior), but only an indirect measure of selling activity. Although an analysis of buying behavior is not beyond the scope of this methodology, it is beyond the scope of this article. Therefore, we will continue the illustration of the model-building process with a direct measurement of selling activity: Closing Rate.

Closing Rate compares the number of accounts in which the sales call has been completed (closed) to the number of days worked in a given time interval. Going back to our three basic questions, we find the following answers:

1. *What is the measure?* Closing Rate.
2. *How is it calculated?* Divide the number of accounts closed by the number of days worked.
3. *What are its input variables?* The number of accounts closed, and the number of days worked.

As was the case before, we repeat the process for each of the input variables:

1. *What is the measure?* Number of accounts closed.
2. *How is it calculated?* Count the number of contract forms submitted (for both sale and no-sale calls).
3. *What are its input variables?* The number of contract forms submitted.
1. *What is the measure?* Number of days worked.
2. *How is it calculated?* Subtract the number of days absent from the number of normal working days in the time interval.
3. *What are its input variables?*

The number of days absent, and the number of normal working days in the time interval.

At this point, our analysis of the Closing Rate measurement would halt. We have identified two input variables which are the direct product of the salesperson's activity: number of contracts submitted, and number of days absent. There are other measurements of sales activity for which models could be constructed, however, the purpose of this article is not to build all possible models; instead, it is merely to demonstrate that they can be constructed.

Analyzing Models

Models can be constructed for any form of organizational measurement system. One rather large organization, for example, uses a measurement of production productivity and cost called "Costs Per Work Unit." All that is required to construct a Cost Per Work Unit model is a quantitative measurement system. What that system measures is irrelevant to the task of constructing them. It is worth noting, however, that when models of financial measurements are constructed, care must be taken to ensure that they are consistent with the accounting conventions of the organization under study.

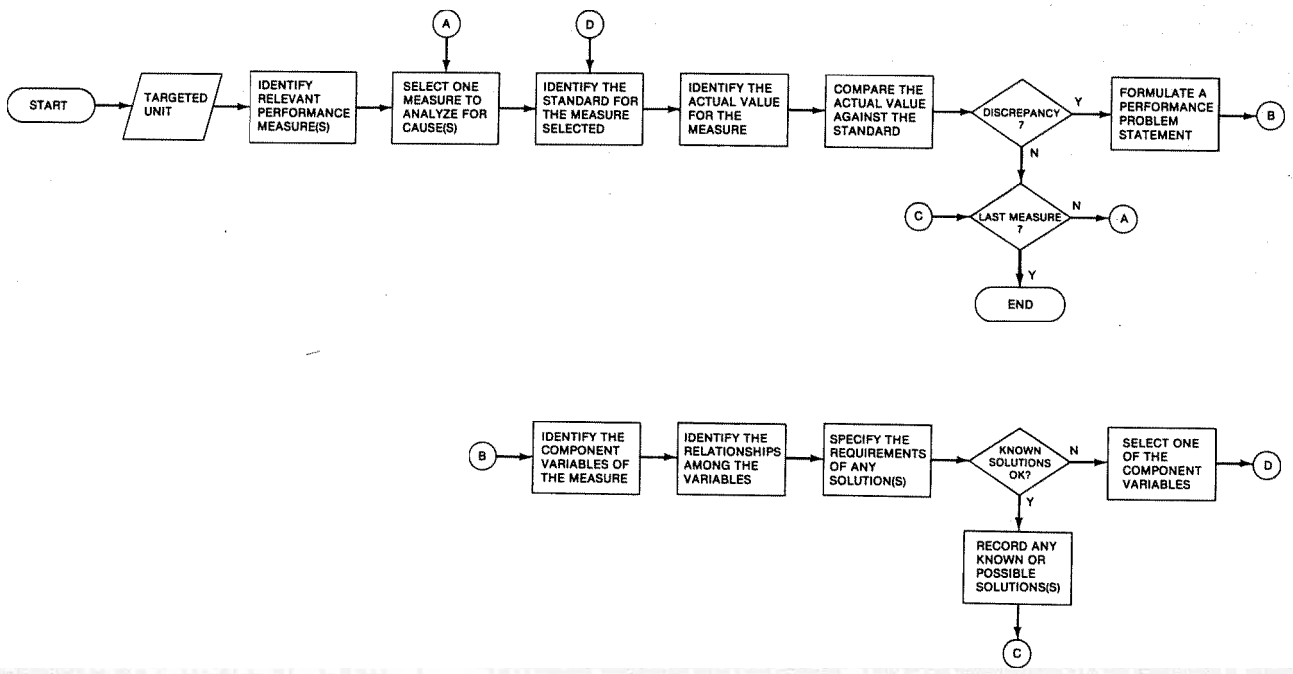
Analyzing the models you build is as straightforward a task as is the one of building them. Basically, the process involves identifying standards for the variables at each level of the model and comparing them with the actual values. This is consistent with the proposition that one should use measurable discrepancies as the basis for defining problem or need statements.[5] In the absence of organizationally-imposed standards, one can use industry norms, trends and/or projections, or relative rates of change between the variables. If a discrepancy exists at one level, you move to the next, and identify any discrepancies at that level. This process repeats itself until you have worked your way down through all the abstract measurements to the concrete ones. The analytical process can be displayed in schematic form (Figure 3).

When you reach the level of concrete measurements, you can identify the organizational activities which might be changed so as to achieve the desired results. Moreover, you can specify how they must be changed in order to produce the desired effects in the measurement system. These effects can then be traced back through the measurement system in order to define the impact on the original discrepancy. It is this capability which makes it possible to (1) target specific organizational units for improvement efforts, and (2) select appropriate methods and techniques for intervening in the targeted units.

To illustrate how the analysis of measurement models works, let's take an organization that has a "collections" problem. The average collections period is running 72 days versus an organizational goal and industry norm of 45 days. Now

Figure 3.

MBA: THE PROBLEM ANALYSIS PROCESS



knowledgeable managers know that the collections period is affected by variables such as credit authorization, the terms granted at time of sale, and the intensity of the collections effort. But these are broad areas. Sweeping actions in any of them is akin to using a 12-gauge shotgun to hunt squirrels; a little more precision is required. So, let's construct a model.

The organization is using the fairly common practice of computing the average collection period based on Receivables expressed as a percentage of Net Sales multiplied by 360.

The actual value of the collection period is 72 days; the standard is 45 days. There is a discrepancy of 27 days. A problem statement is easily formulated: "The collection period is averaging 72 days; it should not exceed 45 days." The component variables are Receivables as a percentage of Net Sales, and 360 days. The relationships between these two component variables is such that if Receivables as a percentage of Net Sales decreases, so does the average collection period. Because the 360 days component variable is a constant, we must confine the balance of our analysis to the Receivables variable. Now we are ready to specify the requirements of any solution to the "collections" problem.

Given the actual values, it is easily determined that Receivables as a percentage of Net Sales is currently 19.9 per cent. Transposing the equation, we divide the goal of 45 days by 360 to determine that the standard for Receivables as a percentage of Sales is 12.5 per cent. In other words, in order to have a collection period of 45 days, Receivables should not exceed 12.5 per cent of Net Sales. Thus, we have another discrepancy, one which could be stated as follows: "Receivables as a percentage of Net Sales is 19.9 per cent; it should be no higher than 12.5 per cent."

Continuing our analysis in accordance with the guidelines provided by the schematic in Figure 3, we determine that the component variables of Receivables as a percentage of Net Sales are the dollar amounts of Receivables and Net Sales. The relationships between them are such that if Receivables decrease relative to Net Sales, then so does Receivables as a percentage of Net Sales, and so does the average collection period. (As a comment in passing, it is helpful to look at the relative rates of change. If Receivables are increasing at a rate faster than that of Net Sales, there may not be a collections problem, but there soon may be one.)

Now to specify the solution requirements. If the standard for Receivables as a percentage of Net Sales is 12.5 per cent, then the dollar amount of Receivables should be no higher than that percentage. The dollar amount of Net Sales is $224,787,000. Multiplying that figure by 12.5 per cent tells us that Receivables (at this point in time) should be no higher than $28,098,375. The actual value of Receivables is $44,957,102. The difference between the two figures is $16,858,727. Thus, any solution must be able to reduce Receivables by approximately $17,000,000 in order to reduce the collection period to 45 days; more accurately, it must reduce and maintain Receivables as a percentage of Net Sales to no more than 12.5 per cent.

As a result of our analysis, we have determined that the cost of the "collections" problem is ap-

proximately a $17,000,000 reduction in the organization's cash flow. The value of reducing the collection period from 72 to 45 days is considerable. But we still haven't identified any specific solutions; so, the analysis must continue.

The leftmost variables in your model should show that the two input variables are Net Sales and Receivables. Mathematically, if we could make Net Sales increase at a faster rate than Receivables, we could reduce Receivables as a percentage of Net Sales over time. However, it is probably more practical — and more immediate — to reduce Receivables. Consequently, we must extend the model. Receivables, in dollars, at any point in time, is the difference between the dollar amounts that have been invoiced and the dollar amounts that have been received in the form of payments from customers.

Viewing Customer Activity

As with our earlier analysis of Gross Sales, our current analysis of Receivables leads us out of the organization under study and into its customer organizations. Specifically, it takes us to the customer organization's accounts payable function. It is important to recognize that this environmental activity lies between the issuance of an invoice and the receipt of payment, for receivables are not the automatic product of a mechanical cause-and-effect device called an invoice. In other words, paying decisions are of as much interest to a selling organization as are buying decisions. Unlike our earlier analysis of Gross Sales, this time we will look at customer activity.

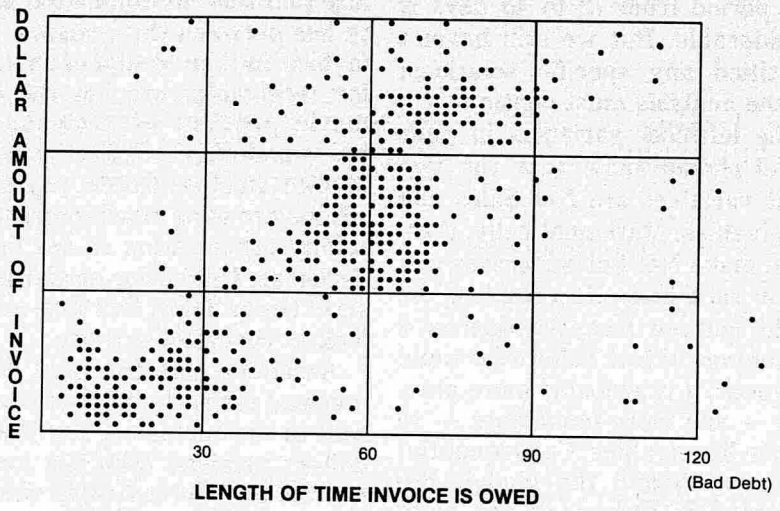
Assuming that the total dollars invoiced takes the form of invoices sent to the customer, and that the dollars received take the form of payments received from the customer, then we can connect the two variables through a simple systems model. The input to this model is the invoice, the process is the paying decision, and the output is the payment or lack of it.

There actually are three decisions of interest in the process block of this systems model. One is a simple binary decision: To pay or not to pay is the question. A second decision modifies the first. If the decision to pay is made, then: Is all or part of the invoice to be paid? The third decision, of course, is: When is it to be paid? Identifying these decisions makes our identification of relevant variables easier.

Customers might decide not to pay because of errors in the invoices, nonreceipt of goods purchased or receipt of damaged goods, or because they simply don't have the money. These considerations can be traced to related functions in the selling organization (e.g., billing, shipping, claims, and credit authorization). A customer may elect to make a partial payment for some of the same reasons: invoice errors, incomplete shipments, or inadequate funds. The customer's decision as to when to pay can be influenced by several factors (e.g., financial conditions, the terms granted as a condition of the sale, the customer's sense of urgency about paying, or competing priorities for available funds). Again, there are corresponding functions in the selling organization (e.g., credit terms authorization and credit approval, and the

Figure 4.

SCATTERGRAM OF INVOICE PAYMENT PATTERNS



collections effort).

We now know a number of possible courses of action: tighter quality controls in billing (speed and accuracy), more emphasis on shipping (speed and safety), tighter credit controls (authorization and terms), and an intensified collections effort. An experienced manager would recognize these possibilities right away, but would be as hampered as we are by the fact that these are appropriate possibilities, not sure-fire solutions. More analysis is required.

Average Collection Period Analysis

The analysis we have just completed is one of a model of the calculation of the average collection period based on financial variables. It is a very abstract measurement, one that does not hold for seasonal kinds of businesses because it relies on income statement figures which are subject to drastic changes. More importantly, it is a calculated measurement of the average collection period, not a direct measurement. So, we must look at the average collection period in a more direct manner.

The average collection period can be arithmetically determined by identifying the time between issuance and payment for each invoice, adding these times, and dividing by the number of invoices involved. The use of Julian dates can facilitate this determination. This process, like the others we have examined, can be displayed in model form.

The model provides us with a much more valid measurement of the true collection period. Unfortunately, it does not indicate what is important about a reasonably short collection period: the cost of money and the impact on cash flow. At least the earlier calculation served to remind us of why the collection period was important. But we're getting closer. We have determined that the calculation of the collection period based on financial figures isn't detailed enough for diagnosis. We also have determined that the more accurate calculation based on time doesn't tell us what we really want to know; that is, why are receivables so high? And that's what we want to know. Are receivables high because of a few large amounts of money being owed for a long period of time? Or are they high because of moderate amounts of money owed on a large number of invoices for a long period of time? Or, are the excessive receivables just due to a general pattern of delayed payments on invoices?

We now know that we're really interested in the relationships between two key variables: the amount of money owed on an invoice, and the length of time it is owed. A scattergram is an easy way to look at these relationships. Let the vertical axis represent the

amount of money owed, and let the horizontal axis represent the length of time it is owed. Each invoice can be plotted on this axis (by a computer, if one wishes). Clusters or concentrations of dots represent significant effects on the collection period (Figure 4).

From an analysis of the clusters, if any, in such a scattergram, we can uncover facts that prove most informative; for example:

1. Twenty per cent of the total amount in receivables at any given point is owed by six major customers;

2. Thirty-five per cent of the amount past due at any given point is owed by 12 customers, including the six largest;

3. Eighty-five per cent of the smaller customers pay their bills within 45 days;

4. Roughly 50 per cent of the medium-sized customers pay within 60 days and there is a significant cluster around that point;

5. No-pays or bad debts are confined to the smaller customers, with less than a one per cent bad debt rate among medium-sized customers, no bad debts with larger customers; and,

6. The precise collection period figures are: Mean or Average — 64 days; Median — 52 days.

At this point, a few questions seem fairly obvious. Why are larger customers taking so much longer to pay? Why do the medium-sized customers cluster around the 60-day mark? Why are the smaller customers paying so promptly? Why is there such a deviation between the actual collections period figures and our earlier calculated ones? It is now time to put on our investigator's hats and venture into the world of physical activity to find some answers. Our findings prove very interesting. An invoice does not receive collections treatment until it is 30 days past due, so when the customers pay the invoice in response to the collections call, it is outside the standards. Smaller customers are being given terms that range from Net 10 to Net 30 days; medium customers get terms ranging from Net 20 to Net 45 days; and larger customers are being given terms that average 60 days. This preferential treatment of the larger customers is in keeping with their status, but is wholly inconsistent with a goal of 45 days for the average collection period. The credit manager, the person who authorizes credit and approves terms, reports to the general sales manager; he is under considerable pressure to "approve" credit, not "check" it. And, the sales force regularly assures its medium and larger customers that "there's no hurry, invoices really aren't due for 60 days." Explaining the solutions to the collections problem at this point would be anti-climactic.

Organizational Improvement Via Measurement-Based Analysis

The primary benefit of Measurement-Based Analysis is that it systematically connects organizational means (activities) to organizational ends (results). There are other benefits as well, many of which have been illustrated in the

preceding examples. The process can be applied to any quantitative measurement system, it is not limited just to financial ones.

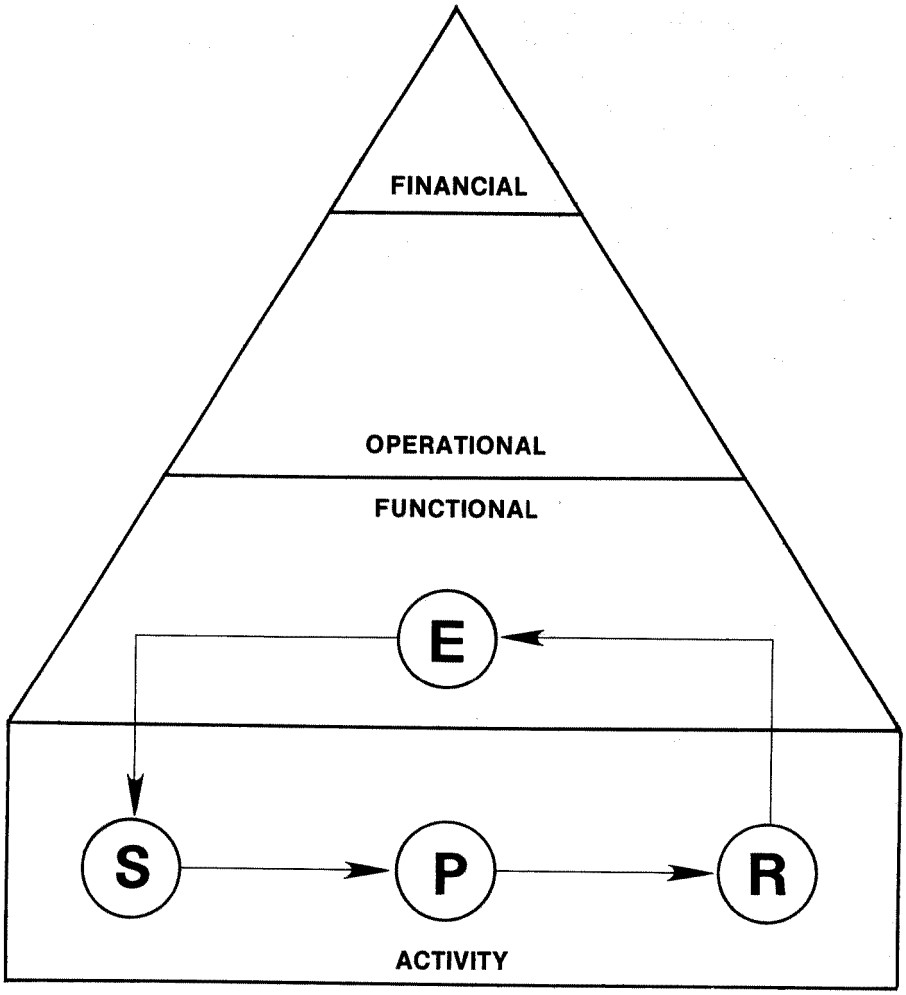
It can begin at any point in the organization, it does not have to start with any particular measurement or level of measurement. It quantifies both the cost of the problem and the value of the solution, thereby enabling truly valid cost-benefit comparisons among competing alternatives.[6] It forces you to concentrate on only that which is relevant at the time, thus avoiding information overload. More importantly, it prevents inadvertent screening out of relevant information. It very quickly points out flaws in the measurement systems themselves; for instance, invalid measurements, measurements which aren't connected to anything, and measurements which yield little or no useful information. Perhaps most importantly, it allows you to readily identify numerous alternatives for organizational improvement instead of persisting in what is frequently a futile search for the *cause* of a problem.

Using Measurement-Based Analysis is subject to certain restrictions. You cannot use it, for instance, when there is no quantitative measurement system to analyze — unless, of course, you are prepared to develop one as part of your effort — as we did in parts of our analysis of the collections problem. Nor can you derive the ultimate benefit from this analytical method — linking activity to results — unless you also take a systems view of performance, especially the performance of human beings. This view guides intervention; it also provides the link between human behavior and the organization's bottom-line.

The systems view of human performance holds that the outcomes or environmental effects of behavior define performance.[7,8] A systems model of behavior and performance would clearly illustrate the distinction between behavior and performance. It could show the environment (E), stimuli inputs (S), the person (P), and the person's behavioral responses or repertoire (R). The model is consistent with the formulation of performance as a function of both individual and environmental variables.[9] More importantly, it would show us that performance is defined by the environmental effects of behavior. Regarding the credit authorizing behavior of the credit manager, for instance, the terms granted define performance, not the behavior of granting them.

Figure 5.

THE "HUMAN SIDE OF ENTERPRISE" AND THE BOTTOM-LINE



Behavior acts to control the behaving individual's perceptions of his or her environment, including his or her effects upon it, in order to make them consistent with a set of internally-held referents[10] Thus, it was the credit manager's definition of and criteria for granting or not granting credit terms which governed the manager's behavior. The definition and criteria, of course, were subject to outside influences (e.g., corporate policies, training in credit authorization procedures, and the opinions of other credit managers).

An individual's behavior is a means to a person's own survival. Consequently, individuals frequently find themselves at the center of conflicting environmental influences. The credit manager, for instance, was clearly in a bind. Doing the job "properly" might have helped the collections problem, but doing so was certain to get the manager in trouble with the boss who was more interested in sales than in collections. As Perrow points out: ". . . visible organizational problems generally are exemplified by the people in the organizations and their relationships with one another. But this does not necessarily mean that in order to change these problems you have to change the people." Thus, one reason a systems view of performance is necessary is to ensure that relevant environ-

mental variables receive attention. In the case of the credit manager, changing the terms that had been authorized meant changing the reporting relationship, the manager's behavior changed accordingly.

It is necessary to adopt a systems view of performance because the outcomes of behavior can be quantified, measured, and related to the organization's bottom-line, behavior cannot. Indeed, at the functional level of measurement, the outcomes of human behavior form a significant part of the bottom line (Figure 5).

Measurement-Based Analysis, coupled with a systems view of performance, provides the conceptual framework and the analytical tools necessary to connect an organization's results measurement systems to the performance of its members. Once these connections are made, it is possible to connect the "human side of enterprise" to the bottom-line.

REFERENCES

NOTE: The references listed below each contain a great number of the original ideas on which the methodology described in this article is based. They were carefully selected on that basis, and they are highly recommended for additional background.

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Frederick W. Nickols is presently a free-lance consultant based in Washington, DC. He founded The Systems Corp. of America in 1976 and was its president for almost three years. Before founding SCA. he was vice president of The Athena Corporation, and before that, director of training and organization development for Manpower Development Services in Evanston, Ill. He has been an ASTD member for several years and has published several articles on the subjects of training, human performance, and organization development. He has consulted to several of the nation's largest corporations regarding individual, group and organizational performance.