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What People Are Writing About

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R. M. S., L. S., Edward Summers, James Wesley Deskins, Gordon L. Nielsen, Joe Wilkinson, Joseph F. Schirger, Arthur C. Corr, Shimon Magen, and Wilbur R. Ross

what people are writing about

BOOKS

The Encyclopedia of Management edited by CARL HEYEL, *Reinhold Publishing Corporation*, New York, 1963. 1084 pages, \$25.00.

In his foreword to this ambitious volume, editor Carl Heyel states the purpose of his book in these terms:

"In essence, it is the 'Great Books' idea in the field of management, between a single set of covers. It es-

says in one volume an authoritative treatment of its entire field."

That, in a world where "management" embraces every sort of knowledge from Monte Carlo theory to personnel evaluation, is quite an undertaking. But it is one to which Mr. Heyel and the authorities who have contributed articles prove themselves more than equal.

Aside from the completeness of coverage, the pattern of the book is extremely valuable. Although all entries appear in strict alphabetical order, the book also offers a core reading program in which each individual article is also classified by

category. Thus, an article can be read by itself for spot information, or it can be read in sequence in a core program which attempts to give the reader a quick introduction to a specific management field. There are 24 core programs covered in the book, ranging from Basic Management Sciences through Industrial Engineering and Systems and Procedures.

Obviously, no one can become expert in a field foreign to him simply by pursuing such a necessarily abbreviated reading program. But he can develop an understanding of the basic principles and concepts of a whole area in an orderly and controlled sequence. That is the

REVIEW EDITORS

In order to assure prompt and comprehensive coverage of magazine articles dealing with management subjects, MANAGEMENT SERVICES has arranged with fifteen universities offering the Ph.D. degree in accounting to have leading magazines in the field reviewed on a continuing basis by Ph.D. candidates under the guidance of the educators listed, who serve as the review board for this department of MANAGEMENT SERVICES.

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goal of the book, and that it achieves extremely well.

The articles themselves are excellent—comprehensive and readable. Moreover, many are followed by a list of information references covering associations active in the field, periodicals devoted to it, and authoritative texts, so that the reader who wishes to go into the subject in greater depth has the information he needs for further study. R.M.S.

The Managerial Mind by DAVID W. EWING, *The Free Press of Glencoe, a division of The Macmillan Company*, New York, 1964, 210 pages, \$5.95.

This book is an attempt to identify attitudes that differentiate the administrator from the accountant, lawyer, scientist, and man in the street. Nothing in it will be new to those who have kept up with the recent work of industrial sociologists. For others, particularly the accountant or consultant who is baffled by his clients' or his own administrative responsibilities, it may provide a valuable orientation.

Many critics of management—and many managers themselves—tend to look on administration as a function that is somehow inferior to those of the entrepreneur and the professional man, less creative, less demanding, less socially useful.

The author, an editor of *The Harvard Business Review* and former consultant, disagrees. He feels that management, which he defines as getting work done through other people, has a strong set of its own values and assumptions for which, despite certain shortcomings, there is no need to apologize. In this book, partly for the guidance of accountants, engineers, and other professionals who find themselves edging into management or dealing with the managerial mind as consultants, he tries to delineate these attitudes.

Mr. Ewing finds many similarities between the administrator's way of thinking and that of the professional man. Personal interests must be subordinated to the interests of a

larger group. Both careers demand knowledge, disciplined thinking, analysis, objectivity, and communication of experience and standards.

He also finds differences. There is more "tight-rope walking" among conflicts in the administrative point of view. Personal, physical elements are more important. Problems are messier, both in definition and in solution. The need for improvisation is greater.

Thus, the professional making the shift to administration will have to make some shifts in his thinking. He will have to be willing to judge and be judged by imprecise standards. He cannot be a perfectionist; he needs a willingness to gamble on people and a high degree of toleration of waste, inefficiency, and outright failure. He must learn to value rather than fear tensions in the organization and use them to advance its interests. He will have to learn to teach.

Some of Mr. Ewing's conclusions seem to apply to what he would consider "good" managers rather than to managers in general. He says he is trying to interpret "the way administrators think, with no claim that that way is necessarily the best one." Nevertheless, it is clear from his discussion of creativity, conformity, and manipulation that he prefers democratic to authoritarian management, and that the managers he is describing have the same preference.

This bias shows up in statements like these: "The administrative philosophy is essentially liberal and democratic. . . . The man with a managerial mind is full of hesitancy to manipulate employees or intrude into their personalities. . . . His preference is to manage by assigning jobs, while leaving methods and motivations up to the people performing them."

Other conclusions are far from original. It will hardly come as a surprise to those who know something about the administrative way of life that "the most important feature of the managerial mind is its commitment to the life and growth of the organization." But then, as its author emphasizes, this book is one

of "reflections on research findings." Its sources are case studies, corporate histories, biographies, and personal observation.

The Managerial Mind does not claim to be a major contribution to knowledge. It has little to offer the serious student of management. But its subject is one in which there is growing interest. It does offer a simple, readable introduction to that subject for those who want such an introduction, probably including the consultant who has trouble following some of the thought processes of his clients and the accountant who has just assumed, or is about to assume, administrative duties for a company or within his own practice. L.S.

MAGAZINES

Long-Range Planning—The Key to Future Profits by JOHN D. SIMMONS, *The Texas CPA*, July 1963, pp. 17-24.

Management's real need is for data that are pertinent as a basis for managerial action—data specifically developed and presented for the purpose of control and planning. Accountants generally pay only lip service to the concept of long-range planning. There are trends in industry which indicate that tomorrow's day-to-day decisions and actions will be made within the limitations set by today's planning. Under such circumstances, long-range profit planning is not only desirable but almost mandatory.

Long-range planning results in a program comprising (a) performance objectives, (b) policies to govern future actions, and (c) plans for achieving objectives. The long-range objectives of management must be expressed in terms of growth rates, profit levels, markets, products, dividends, and future expansion financing, as affected by the length of the long-range planning period. The plans for achieving objectives must consider such areas as long-range economic forecasting, organization and facilities planning, capital

budgeting, long-range cash forecasting, and expense budgeting. When all the areas are brought together they should provide a projection and measuring of financial results over the planning period which is consistent with the annual budget for the current year. The projection is a management performance standard and a basis for measuring the adequacy of each year's budget as it is prepared. No new techniques are required for long-range planning and control. What is required is a thorough and comprehensive approach—for large-scale planning demands the fullest co-ordination of corporate resources in order to achieve results.

EDWARD L. SUMMERS
The University of Texas

The Role of Standards for Cost Control and Pricing by T. J. DIGGORY, *Cost and Management*, January 1964.

The author feels that many persons become so preoccupied with the "trees" of techniques that they overlook the "forest" of the underlying purpose of costing and cost control. This article points out the purpose of some principal techniques in the hope that this re-emphasis will improve the application of the technique in dynamic business situations.

T. J. Diggory re-emphasizes the purposes of eight major costing and cost control techniques. These are:

1. The function of predetermined standards is to act as a continual spur to management to keep performance and cost in line. Comparisons with predetermined standards are more effective than comparisons with data from a given past time period.
2. Costs and prices are inextricably related concepts. In merchandising a product, a business will first estimate its cost to buy or manufacture; second, it will accumulate and compare its actual costs with its estimates (or standards); and, finally, it will relate its cost experience to the market price. If this last comparison is unfavorable, the business

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must question what it can do about cost to insure a fair profit.

3. When discussing direct costing vs. absorption costing, emphasis should be placed on the value to be derived from using the techniques—not on the techniques themselves. While direct costing is particularly valuable as a means of measuring profit-volume relationships (given a selling price), it is inherently *not* particularly helpful in establishing the selling price of a product. Standards can be used in either direct costing or absorption costing.

4. With regard to analysis of variation in a standard cost system, one should often ask himself if the variances are meaningful to the person in management who must take the action. Every effort should be made to translate dollar variability into units which are the most significant to the reader, e.g., labor hours for shop foremen.

5. Although accountants may understand the significance of a volume variation from a flexible budget standard, many executives are unaware of its significance, and accountants should attempt to educate them as to its usefulness. The author also urges accountants not to "grind out" variances, but to report variances that an individual charged with responsibility can do something about, i.e., take pains to use the most relevant standards.

6. Charts and graphs must be used only when they clarify an otherwise involved set of relationships or when another dimension is required (for example, trend). They are especially useful in connection with breakeven analysis.

7. The limitations of inductive statistical techniques, which are based on the theory of probability (as opposed to "descriptive statistics"), should be understood by those who compile them and by those who use them. However, those familiar with them should be ready to apply them where they assist in controlling costs or determining future courses of action.

8. Among the different methods of calculating rate of return on investment, the "present value" (discounted cash flow) method appears

to be more precise, although the most difficult to understand. But regardless of methods used, the business should follow up investment decisions by determining the realized rate of return—preferably on a sampling basis—so that the estimated rates of return will tend to approach actual.

The author's conclusion consists of a list of the "Ten Commandments" of good cost control, which are from *Cost Controls for Industry* written by an associate (complete citation not given), and which is selectively quoted as follows: (1) *Control All Costs, Not Just a Segment*; (2) *Summarize the Major Elements of Cost First* (restrain the temptation to show how much information is available); (3) *Recover the Overhead by the Nature of the Process* (be on the alert for incorrect overhead recovery, make certain first that the proper base is being used); (4) *Do NOT Expect the Customer to Pay for an Inefficient Operation*.

JAMES WESLEY DESKINS, CPA
The University of Texas

Modern Marketing and the Accountant by BRUCE E. MALLEN and STEPHEN D. SILVER, *Cost and Management*, February 1964.

This article brings to the attention of the accountant the almost total lack of accounting applications to marketing problems. In attacking the topic, the authors discuss the nature and importance of marketing, marketing research, sales analysis, distribution cost accounting, cost analysis, cost control, and other pertinent areas. The article concludes with a bibliography of eight items on distribution costs and related marketing cost problems.

The authors state the purpose of the article is "to show the importance of marketing in Canadian business and to describe the potential role of the accountant in providing assistance to the marketing executive . . ." They describe the function of marketing in a free and expanding economy, and indicate that marketing costs are very significant in

relation to total product cost, and yet are subject to less analysis and control than production costs. The article implies that the accountant can assist in marketing research by providing necessary information such as sales statistics, which can be used to analyze the weaknesses and strengths of the marketing organization.

The accountant, according to the authors, should be very familiar with how the marketing man thinks and acts, the nature of his problems and the information he needs for planning, directing, and controlling marketing activities. The progress made in cost accounting for the production function is cited as being analogous with the co-operation between accountants and production men.

One cannot dispute the writers' assertion that there is a significant need for distribution cost accounting and that some analysis of all marketing costs is essential in order to perform the ordinary functions of management effectively.

In short but rather good exhibit and discussion, two approaches to analyzing product profitability, "net profit" and "contributed margin," are compared to absorption and direct costing techniques, and the situations in which each present their greatest advantages are summarized.

The article is most notable for the enumeration of five prime elements of a system of control and the three main devices of the accountant in maintaining an information system to make control possible. The latter are given as budgets, standards and reports, while the former include:

1. Formulation of a plan of action
2. Determination of standards
3. Development of an information system
4. Analysis of variances
5. The taking of corrective action

After listing the limitations of distribution cost accounting as high cost, difficulty of measurement, and lack of trained personnel, the authors conclude that "distribution cost accounting can . . . pinpoint and

prevent troublespots, evaluate performance and facilitate control and the assignment of responsibilities."

The article suffers in that the material is excessively broad, general and elementary. A person with a basic understanding of cost accounting, marketing, and management would find the article to be light reading but not informative.

GORDON L. NIELSEN, CPA
The University of Texas

Theory and Method in the Exploration of Human Decision Behavior by GEOFFREY P. E. CLARKSON and WILLIAM F. POUNDS. *Industrial Management Review*, MIT, Fall 1963.

A provocative article on the theory of predicting the behavior of individuals and organizations by programing computers to emulate human "think" processes.

If the process by which humans reach decisions can be precisely described, it should be possible to predict the behavior of individuals and of organizations. The authors attempt to outline a theory that should be a fruitful beginning for this enormously complex but highly intriguing task. While the reading is heavy because of the abstract nature of the bulk of the article, and also because of the need for a new vocabulary, it is consistently interesting and informative.

For purposes of problem solving, the decision maker is considered to be composed of memory storage, information processing facilities, and a set of decision rules. It is assumed that each step in the process can be described in mechanical terms. The theory is general in that the processing rules are independent of the subject matter held by the memory.

In order to perform any empirical test, only parameter values and decision rules in specific terms need to be supplied. Testing is usually performed with the aid of an electronic computer. When the results obtained by the process programed on the computer are consistent with those obtained from the human subject, the theory is considered to pre-

dict observed behavior adequately, and thus to earn an additional proof of its validity.

The goal of the decision maker must be a part of the process. It determines the tests to be applied to the information. These tests comprise a complex "net" whose interconnections must be known exactly in order for behavior to be determined. This is a formidable undertaking, especially as human decision systems are probabilistic, rather than deterministic as the authors seem to assume. Also, humans are often known to act irrationally and in contradiction to their supposed goals. This may not invalidate the theory, but it can definitely complicate the testing.

Nevertheless, the theory does offer a framework upon which models for specific applications in predicting rational behavior may be built.

An example of a portfolio selection process illustrates the abstract discussion: Memory storage contains data on the attributes of companies, the industry, and the economy. Processing involves creating ratios and indices to judge relative performance and formulating the appropriate investment policy. It also includes the sifting of the data through the discrimination net according to the investment policy. Decision rules are employed to decide how many shares of each security to purchase. The model was tested in an actual computer run by a discriminating procedure called Turing's Test, in which the computer was programed to perform a form of "thinking." The results indicated that the theory in this case could very closely predict the behavior of a trust officer in selecting a portfolio, since both the human and the computer went through similar decision processes.

Since such a summary cannot do justice to this intricate topic, it is recommended that those who are concerned with problem solving—and who isn't?—read the article and some of the references mentioned at the end. While only a beginning has been made here, especially with empirical testing, the theory appears susceptible to further model devel-

opment and research and offers promise of greater insights into the human mind.

JOE WILKINSON
University of Oregon

Decision Models for the Selection of Research Projects by ROBERT H. CRAMER and BARNARD E. SMITH, *The Engineering Economist*, Winter 1964.

A lucid presentation of the problems involved in evaluating research proposals and a suggested method for the analyst to follow in approaching these problems.

Robert H. Cramer and Barnard E. Smith discuss the need to consider risk in evaluating research projects and caution against the use of expected monetary value as the measure of merit in evaluating research projects and point out that "only at the lowest level of research activity are the expenses and rewards so modest that the loss of the entire investment would be viewed as no more important than an equivalent gain. While \$100 might well be spent for a 20 per cent chance at \$1,000, a \$100,000 research proposal might be rejected even if it were viewed as leading to a \$1 million payoff with a 20 per cent chance of success. This is strictly not in accord with the decision procedures based on expected monetary value."

The analyst, accordingly, in his evaluation of most research projects, must face the fact that management does not view all risky dollars as having a constant value, and therefore must take into account the utility of money. Of the several methods of dealing with risk, the authors recommend that expected utility or certainty equivalents be used as the measure of merit in evaluation work. Of the two methods, the authors favor the certainty equivalent model for the selection of research projects, since, in their opinion, the model is best suited for handling dependent projects, i.e., the case where the benefits of the first project selected are affected by the decision or decisions made on a related project or projects. When dependent projects are involved in the portfolio analy-

sis, the model requires that estimates of conditional probabilities be made. Messrs. Cramer and Smith predict that these will be extremely difficult for management to make. They argue that the certainty equivalent model provides a far more convenient procedure for evaluating dependent projects, since the dependency between projects can be estimated in terms of a correlation coefficient. In the authors' opinion, management will have less difficulty estimating the correlation coefficient than the conditional probabilities.

Messrs. Cramer and Smith discuss construction of the utility function required by the expected utility or certainty equivalent model and cite their own experience in constructing separate utility functions for production and research managers by interviewing a limited number of research and manufacturing executives of a leading U.S. corporation. The interview technique used by the authors was based on the standard gamble and the questions were styled after the procedure employed by C. Jackson Grayson, Jr.¹ Responses from the standard gamble questionnaire are tabulated in the body of the report.

Analysis of the interview data showed that the responses of the research executives differed considerably from those of the manufacturing executives. Messrs. Cramer and Smith note that "intuition suggests that the manufacturing executive would be more interested in small but sure propositions while research executives would have less fear of loss and would be more willing to take the long shot." They correctly point out that joint action by groups of manufacturing and research executives would be difficult if the utility functions of the two groups differ significantly and suggest that agreement on a single utility function might resolve some of this difficulty. However, they do not elaborate on this remark and for practical purposes bypass the issue in the il-

lustrative example, when they develop separate models for each of the groups.

Two certainty equivalent models—one for the research department and one for manufacturing—were constructed from the data gathered from the standard gambles. The model for the manufacturing department was developed from a correlation analysis of the mean and variance of the gamble at indifference.² The model for the research department differed from that of the manufacturing department, since the research responses were affected by the proportion of total research funds that would have to be invested in the project under review. Thus, the model for the manufacturing department was found to be a function of the mean and variance of the gamble at indifference, and the model for research was found to be a function of the mean and variance of the gamble at indifference and the proportion of total funds that would have to be invested in the project.

Attempts to correlate individual responses within the two departments resulted in widely scattered data. Because of the lack of correlation between responses within departments, Messrs. Cramer and Smith developed their models by averaging the means and variances within the departments. Therefore, the two models developed by the authors are best described as representing the average consensus of the departments.

It is important to note that, at the present state of the art, the authors cannot justify the averaging technique on the basis of theory or empirical research. About all that one can do is to recognize that the technique is a practical expedient and that there is no proof that a "group consensus" will be reached by aver-

²The mean and variance of the gamble at indifference are given by:

$$\begin{aligned}\mu &= Gp + L(1-p) \\ \sigma^2 &= p(1-p)(G-L)^2\end{aligned}$$

Where

$$\begin{aligned}p &= \text{indifference probability of} \\ &\quad \text{gaining, } G \\ 1-p &= \text{probability of losing, } L\end{aligned}$$

¹Grayson, Jr., C. Jackson, *Decisions Under Uncertainty*, Harvard Business School Press, Boston, 1960.

aging the operations of the A Magazine of Analysis, Systems, and Controls, Vol. 1, No. 2, August 1964, pp. 10-11. In this article, the author discusses the importance of time analysis in the office practical and desirable. Because of the lack of knowledge concerning the propriety of averaging the means and variances of individual responses, it seems best to proceed with caution before applying the technique in a given situation.

The article is well worth consideration since it suggests a rational approach to the problem of evaluating the various research proposals that are presented by the staff throughout the year. Because of the article's clear presentation of principles, the practitioner should be able to develop some worthwhile insights into the problems involved in evaluating research proposals and an understanding of the approach that a static model would take toward resolving these problems.

JOSEPH F. SCHIRGER
New York University

Stretching Your Clerical Dollar by ROBERT BEYER, *Administrative Management*, February 1964.

Application of work measurement techniques such as time and motion studies and work sampling to clerical work, an area which has been neglected by operations analysis, will result in improved efficiency and lowered costs.

In the past, scientific work measurement and control techniques have not been widely applied to office work. The main reason for this lies in the very nature of the work. For example, office work lacks repetitiveness; frequently one worker processes several kinds of work units, and even like work units require different amounts of time and are difficult to measure.

The author claims that no definite or permanent improvement is ever made in any kind of work until scientific measurement is applied to establish the time requirements of work loads and to set standard operating times for measuring performance and for planning operations. In addition, functions and services must be examined to ensure that a business gets the most for its clerical costs. New methods have been developed which make the use of op-

ment in the office practical and desirable.

In operations analysis, each department is taken in turn and its activities are examined in detail. All unnecessary activities are eliminated and those remaining are examined for improvements, short cuts, and other expense-saving possibilities before being incorporated into a recommended procedure. As a result, some activities may be transferred to other departments in order to obtain the maximum over-all improvement and economy. Finally, work loads and work flows for each department are identified and analyzed.

Work measurement can now be applied to the work load for each department to determine the number and qualifications of the people needed to handle it efficiently. Work measurement can be accomplished through time and motion studies, predetermined time standards, work sampling and operation time analysis.

Time and motion study is applied to a particular task to determine how the task should be performed and how long it should take. Motion study, which should come first, is necessary to establish the best sequence and co-ordination of motions. Time study, in turn, determines the standard time for performing the task in the standard method.

Predetermined time systems are based on the idea that to find the time required for a particular operation, it is only necessary to break it down into its elementary motions, find the predetermined standard time for each, and add these times together. Predetermined time systems, which have been in extensive use for only fifteen years, are used primarily for setting standard times with limited use of a stopwatch. In recent years they have been extended to less repetitive work.

Work sampling is based on the observation, through random sampling, of activities performed by individuals. It provides an estimate of the amount of time spent on various functions or tasks. It is particularly

rapidly and in decreasing delay times.

Time analysis is a yardstick method used for setting standard times on variable type work. The time that an operation should take is estimated by a supervisor or an analyst, or both together, and this becomes the standard time allowed. Efficiency or productivity reports can then be prepared by comparing the actual time spent with the standard time allowed.

Standards derived from work measurement help in the areas of manpower assignment and variable budgeting. Knowledge of standard operating times makes it easier to determine the personnel requirements for any department or section in advance. The preparation of variable budgets requires that the volume of work handled be expressed in terms of standard units in order to determine the standard cost allowed. The variable budget reports compare the actual cost with the standard cost allowed and permit variances between the two to be traced to their sources.

Operations analysis and work measurement techniques can be applied by someone within the firm or by an outside consultant. The author concludes the article with a few words of advice and caution for each eventuality.

This article sets forth techniques which can be used to obtain more efficient operations at lower costs in the area of clerical work. It points up the need for determining more scientifically the level of productivity that should be considered satisfactory for each activity. It discusses some of the techniques of operations analysis and work measurement and how they are applied. By indicating what can be done, the article should stimulate those responsible for the planning and control of office work to find out more about these techniques and their uses.

However, the author neglects a most important aspect of the problem, namely: the effects that the introduction of work measurement and work standards will have on clerical employees. How will indi-

viduals and groups react to the change? What will happen to the morale of the office force? What about employee motivation? In recent years many studies have been made and much has been written in this area by the behavioral scientists. Most employees at the lower levels in an organization have a natural resistance to change. An awareness of the impact of change upon people is essential if the office manager is to achieve all the benefits available through such programs.

ARTHUR V. CORR
New York University

Salesmen Compensation at United Shoe Machinery Corporation by CAMERON DAY, *Sales Management*, February 7, 1964.

How a successful salesmen compensation plan was formulated, what its objectives are, and how it works.

Mr. Cameron describes the USM compensation plan which has been operating successfully since it was introduced about six years ago. The plan had been introduced after the company diversified into other industrial lines besides shoe manufacturing equipment. It is based on the logic that salesman compensation should be a function of the commodity sold, and the amount of effort that goes into making that sale.

The three main advantages of the plan are:

1. It attracts and holds the caliber of salesmen needed and, at the same time, keeps total sales expenses in line
2. It has sufficient flexibility to allow for a rapidly growing sales force which would require frequent territorial changes and is able to accommodate new product lines
3. It provides equal incentive to sell each product line

In its preparation, the consulting firm which engineered the plan followed these key steps:

1. A careful analysis of the selling process
2. Determining the effort and

knowledge it takes to achieve a sale and how long it takes to make a sale

3. Determining the extent of guidance needed to direct the salesman

The distinguishing feature of the plan is the "Factored Sales Formula," a procedure whereby the different product groups are assigned a factor or a multiplier to ensure "that those items which are difficult to sell receive a heavy weighting and those which are easy to sell receive a reduced weighting. This sales factoring provision gives equal incentive to the salesmen to market any of the items in the line."

The factoring formula was determined after a study of actual sales situations had been made and the following factors noted:

1. The amount of time required for a customer call
2. How many calls per day a salesman selling one product can make
3. The number of calls which must be made before a sale is consummated

Each product line was then ranked according to difficulty of selling. The median group was assigned a rank of one hundred; a group of items considered more difficult to sell was given a higher rank, such as one hundred and fifty; and groups easier to market were weighted sixty. Then the weighting formula was developed. In short, *the principal determinant of the salesman's effort and his reward was the measurement of difficulty in selling an item.*

It seems, however, that a major ingredient in the formula was omitted. Although the qualitative factors in building the formula are certainly relevant in judging the performance and determining the compensation of salesmen, the quantitative profit factors are equally and perhaps more relevant. The contribution of each salesman (commonly called the variable margin) should have been included. This margin shows the results of the salesman's effort in his own territory, compared with the

cost of keeping him on the road and the direct costs of the goods he sells. His contribution to the company profits is the residual figure.

SHIMON MAGEN
New York University

PERT—Accounting for Dynamic Management by THOMAS H. WILLIAMS, *The Texas Certified Public Accountant*, XXXVI (November 1963), pp. 9-14, 34.

The basic element of PERT is network analysis. This article briefly outlines the underlying concepts of PERT and examines the manner in which it can be utilized to improve the decision making process. The mathematical analysis associated with the technique is emphasized, and the vehicle development network presented shows how the PERT technique requires a clear outline of the activities that must be undertaken and of the events that must occur before the end objective of awarding a contract is reached.

Some of the special meanings of terminology associated with PERT such as "event," "activity," "critical path," etc., are discussed to the degree necessary to make the article meaningful. Necessary equations relative to expected values and variances to be used in connection with the probability aspects of the PERT technique are presented. Probability theory based on the normal curve is applicable to expected completion times as well as both positive and negative event slack—the difference between the latest completion date and the expected completion date.

Mr. Williams concludes that accountants must remain attentive to innovations such as PERT if they are to preserve their increasingly important status as members of the management team. To the extent that PERT motivates further research on, and subsequent development of new, sufficiently flexible accounting systems, it may contribute more to accountancy and management than the actual expertise that will be derived from use of this particular quantitative technique.

WILBUR R. ROSS, CPA
The University of Texas