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Robert N. Anthony

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“Planning and control systems” is usually used as a generic term. However, this article points out that there are many different planning and control processes in business, and suggests a classification of them, which can serve as a . . .

FRAMEWORK FOR ANALYSIS

by Robert N. Anthony

Harvard Graduate School of Business Administration

SINCE DOGS and humans are both mammals, some generalizations that apply to one species also apply to the other. It is for this reason that some new surgical techniques can be tested on dogs before being risked on humans. But dogs and humans differ, and, unless these differences are recognized, generalizations that are valid for one species may be erroneously applied to the other. For example, canine behavior can be largely explained in terms of conditioned reflexes, but human behavior is much more complicated. Similarly, some generalizations can be made about the

whole planning and control process in a business; however, there actually are several quite different types of planning and control processes, and mistakes may be made if a generalization (principle, rule, technique) valid for one type is applied to the other.

The purpose of this article is to suggest a classification of the main topics or “species” that come within the broad term, Planning and Control Systems, and to suggest distinguishing characteristics of each. Hopefully, this will lead to a sorting out and sharpening of principles and techniques applicable to each species.

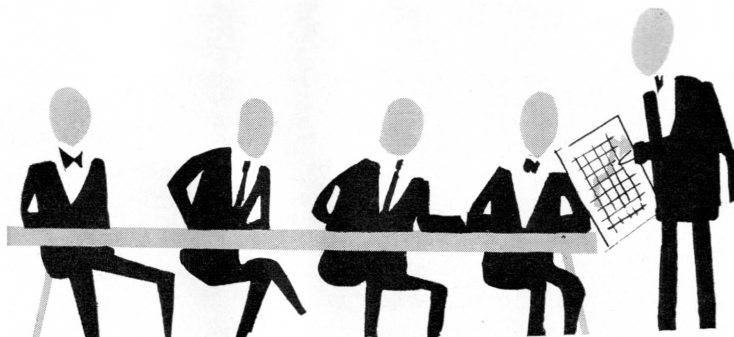
The particular classification chosen has been arrived at after careful analysis of how well various alternatives match statements made in the literature and, more important, what is found in practice. It is, however, tentative. Better schemes may well be developed,

and we expose this one primarily in the hope that discussion of it will lead to agreement on *some* scheme, not necessarily this.

In this article, we shall focus on a process labeled *management control*. We shall describe its main characteristics, and distinguish it from processes labeled *strategic planning* and *technical control*. (Two other processes, *financial accounting* and *information handling*, are also relevant, but space does not permit a discussion of them here.)

Obviously, we do not assert that these processes can be separated by sharply defined boundaries; one shades into another. Strategic planning sets the guidelines for management control, and management control sets the guidelines for technical control. The complete management function involves an integration of all these processes, and the processes are complementary.

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Psychological considerations are dominant in management control . . .

We do assert that the processes are sufficiently distinct so that those who design and use planning and control systems will make expensive errors if they fail to take into account both the common characteristics of a process and the differences between processes. This article will deal with these similarities and differences and point out some of the errors that are made when they are not recognized.

Management control

Management control is the process of assuring that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives.

Management control is a process carried on within the framework established by strategic planning. Objectives, facilities, organization, and financial factors are more or less accepted as "givens." Decisions about next year's budget, for example, are limited by policies and guidelines prescribed by top management. The management control process is intended to make possible the achievement of planned objectives as effectively and efficiently as possible within these "givens."

The purpose of a management control system is to encourage managers to take actions which are in the best interests of the company. For example, if the system is structured so that a certain course of action increases the reported profits

of a division, and at the same time lessens the profits of the company as a whole, there is something wrong. Technically, this purpose can be described as *goal congruence*.

"Total" system necessary

Psychological considerations are dominant in management control. Activities such as communicating, persuading, exhorting, inspiring, and criticizing are an important part of the process.

Ordinarily, a management control system is a *total* system in the sense that it embraces all aspects of the company's operation. It needs to be a total system because an important management function is to assure that all parts of the operation are in balance with one another, and, in order to examine balance, management needs information about each of the parts.

With rare exceptions, the management control system is built around a *financial* structure; that is, resources and outputs are expressed in monetary units. Money is the only common denominator by means of which the heterogeneous elements of output and resources (e.g., hours of labor; type of labor; quantity and quality of material; amount and kind of products produced) can be combined and compared. (Although the financial structure is usually the central focus, nonmonetary measures such as time, number of persons, and

reject and spoilage rates are also important parts of the system.)

The management control process tends to be *rhythmic*; it follows a definite pattern and timetable, month after month and year after year. In budgetary control, which is an important part of the management control process, certain steps are taken in a prescribed sequence and at certain dates each year: the dissemination of guidelines, the preparation of original estimates, the transmission of these estimates up through the several echelons in the organization, the review of these estimates, final approval by top management, dissemination back through the organization, operation, reporting, and the appraisal of performance. The procedure to be followed at each step in this process, the dates when the steps are to be completed, and even the forms that are to be used can be, and often are, set forth in a manual.

Interlocking subsystems

A management control system is, or should be, a *co-ordinated, integrated* system: that is, although data collected for one purpose may differ from those collected for another purpose, these data should be reconcilable with one another. In a sense, the management control system is a *single* system, but it is perhaps more accurate to think of it as a set of interlocking subsystems. In many organizations, for example, three types of cost information are

(1) *costs by responsibility centers*, which are used for planning and controlling the activities of responsible supervisors; (2) *full program costs*, used for pricing and other operating decisions under normal circumstances; and (3) *direct program costs*, used for pricing and other operating decisions under special circumstances, such as when management wishes to utilize idle capacity. ("Program" is here used for any activity in which the organization engages. In industrial companies, programs consist of products or product lines, and "product costs" can be substituted in the above statements.)

Line managers are the focal points in management control. They are the persons whose judgments are incorporated in the approved plans, and they are the persons who must influence others and whose performance is measured. Staff people collect, summarize, and present information that is useful in the process, and they make calculations which translate management judgments into the format of the system. Such a staff may be large in numbers; indeed the control department is often the largest department in a company. However, the significant decisions are made by the line manager, not by the staff.

(including policies as to management control and other processes); the acquisition and disposition of major facilities, divisions, or subsidiaries; the markets to be served and distribution channels for serving them; the organization structure (as distinguished from individual personnel actions); research and development of new product lines (as distinguished from modifications in existing products and product changes within existing lines); sources of new permanent capital; dividend policy; and so on. Strategic planning decisions affect the physical, financial, and organizational framework within which operations are carried on.

Irregular in nature

Briefly, here are some ways in which the strategic planning process differs from the management control process.

A strategic plan usually relates to some part of the organization, rather than to the totality; the concept of a master planner who constantly keeps all parts of the organization at some co-ordinated optimum is a nice concept but an unrealistic one. Life is too complicated for any human, or computer, to do this.

Strategic planning is essentially *irregular*. Problems, opportunities, and "bright ideas" do not arise according to some set timetable, and they have to be dealt with whenever they happen to be perceived. The appropriate analytical techniques depend on the nature of the problem being analyzed, and no over-all approach (such as a mathematical model) has been developed that is of much help in analyzing all types of strategic problems. Indeed, an overemphasis on a systematic approach is quite likely to stifle the essential element of creativity. In strategic planning, management works now on one problem, now on another, according to the needs and opportunities of the moment.

The estimates used in strategic planning are intended to show the *expected* results of the plan. They



Strategy is used here in the usual sense of deciding on how to combine and employ resources . . .

Strategic planning

Strategic planning is the process of deciding on changes in the objectives of the organization, in the resources that are to be used in attaining these objectives, and in the policies that are to govern the acquisition and use of these resources.

The word *strategy* is used here in its usual sense of deciding on how to combine and employ resources. Thus, strategic planning is a process having to do with the formulation of long-range, strategic, policy-type plans that change the character or direction of the organization. In an industrial company this includes planning that affects the objectives of the company; policies of all types

trast, the management control process, and the data used in it, are intended to influence managers to take actions that will lead to *desired* results. Thus, in connection with management control, it is appropriate to discuss how "tight" an operating budget should be: Should the goals be set so high that only an outstanding manager can achieve them, or should they be set so that they are attainable by the average manager? At what level does frustration inhibit a manager's best efforts? Does an attainable budget lead to complacency? And so on. In strategic planning, the question to be asked about the figures is simply: Is this the most reasonable estimate that can be made?

Strategic planning relies heavily on *external information*, that is, on data collected from outside the company, such as market analyses, estimates of costs and other factors involved in building a plant in a new locality, technological developments, and so on. When data from the normal information system are used, they usually must be recast to fit the needs of the problem being analyzed. For example, the current operating costs of a plant that are collected for measuring performance and for making pricing and other operating decisions usually must be restructured before they are useful in deciding whether to close down the plant.

Communications are limited

Another characteristic of the relevant information is that much of it is imprecise. The strategic planner estimates what *will* happen, often over a rather long time period. These estimates are likely to have a high degree of uncertainty, and they must be treated accordingly.

In the management control process, the communication of objectives, policies, guidelines, decisions, and results throughout the organization is extremely important. In the strategic planning process, communication is much simpler and involves relatively few persons; indeed, the need for secrecy often re-

quires that steps be taken to inhibit communication. (Wide communication of the *decisions* that result from strategic planning is obviously important, but this is part of the management control process.)

Strategic planning is essentially applied economics, whereas management control is essentially applied social psychology.

Both management control and strategic planning involve top management, but middle management (i.e., operating management) typically have a much more important role in management control than they have in strategic planning. Middle managers usually are not major participants in the strategic planning process and sometimes are not even aware of the fact that a plan is being considered. Many operating executives are by temperament not very good at strategic planning. Also, the pressures of current activities usually do not allow them to devote the necessary time to such work. Currently, there is a tendency in companies to set up separate staffs which gather the facts and make the analyses that provide the background material for strategic decisions.

These and other differences between management control and strategic planning are summarized in Exhibit 1, above.

Strategic planning and management control activities tend to conflict with one another in some respects. The time that management

spends in thinking about the future is taken from time that could otherwise be used in controlling current operations, so in this indirect way strategic planning can hurt current performance. And, of course, the reverse also is true.

More directly, many actions that are taken for long-run, strategic reasons make current profits smaller than they otherwise would be. Research and some advertising expenditures are obvious examples. The problem of striking the right balance between strategic and operating considerations is one of the central problems in the whole management process.

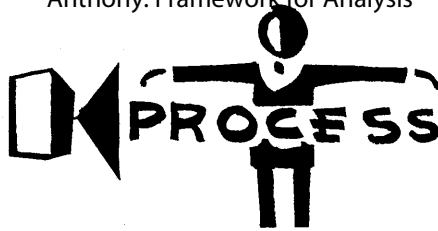
Consequences of confusion

Following are statements illustrating some of the consequences of failing to make a distinction between strategic planning and management control.

"We should set up a long-range planning procedure and work out a systemized way of considering *all* our plans similar to the way we construct next year's budget." (A long-range plan shows the estimated consequences over the next several years of strategic decisions already taken. It is part of the management control process. Although it provides a useful background for considering strategic proposals, it is not strategic planning. Strategic proposals should be made whenever the opportunity or the need

SOME CONTRASTS

	STRATEGIC PLANNING	MANAGEMENT CONTROL
Person primarily involved	Staff and top management	Line and top management
Number of persons	Small	Large
Mental activity	Creative; analytical	Administrative; persuasive
Variables	Complex; much judgment	Less complex
Time period	Tends to be long	Tends to be short
Periodicity	Irregular, no set schedule	Rhythmic; set timetable
Procedures	Unstructured; each problem different	Prescribed procedure, regularly followed
Focus	Tend to focus on one aspect at a time	All encompassing
Source of information	Relies more on external and future	Relies more on internal and historical
Product	Intangible; precedent setting	More tangible; action within precedent
Communication problem	Relatively simple	Crucial and difficult
Appraisal of soundness	Extremely difficult	Much less difficult



is perceived in a form that best presents the arguments.)

"The only relevant costs are incremental costs; pay no attention to fixed or sunk costs." (This is so in strategic planning, but operating managers are often motivated in the wrong direction if their decisions are based on incremental costs; for example, in intracompany transactions.)

"We may be selling Plant X some day. We should therefore set up the operating reports so that management will have at its fingertips the information it will need when it is deciding this question. For example, we should show inventory and fixed assets at their current market value." (Operating reports should be designed to assist in the management of current operations. Special compilations of data are needed for such major, nonroutine actions as selling a plant. Collection of such data routinely is both too expensive and likely to impede sound operating decisions.)

"Our ultimate goal is an all-purpose control system—integrated data processing—so that management will have all the data it needs for whatever problem it decides to tackle. We should collect data in elemental building blocks that can be combined in various ways to answer all conceivable questions." (This is an impossible goal. Each strategic proposal requires that the data be assembled in the way that best fits the requirements of that proposal. No one can foresee all the possibilities. The "building block" idea is sound within limits, but the limits are not so broad that all problems are encompassed.)

"All levels of management should participate in planning." (All levels of management should participate in the planning part of the management control process, but operating

managers typically do not have the time, the inclination, or the analytical bent that is required for formulating strategic plans. Furthermore, such plans often must be kept highly secret.)

Technical control

Technical control is the process of assuring the efficient acquisition and use of resources, with respect to activities for which the optimum relationship between outputs and resources can be approximately determined.

The definition of technical control refers to outputs and resources. *Outputs* are the accomplishments of the organization, what it does, and *resources* are the inputs which the organization consumes. For a whole business, the outputs are the goods and services sold, which are measured by revenues earned, and the inputs are costs and expenses incurred. In rough terms, "output" equals "results," and "resources" equals "cost."

One of the important tasks in an organization is to seek the *optimum* relationship between outputs and resources. For some activities, this optimum relationship is fairly easy to establish: To manufacture a given part should require such-and-such labor, a certain sequence of machine operations, and so on. For other activities, there exists no "scientific" (even in the loose sense of this term) way of establishing the optimum relationship; for these activities, decisions as to what costs to incur depend on human judgment.

The term "managed costs" is a descriptive one for those types of resources for which an objective decision as to the optimum quantity to be employed cannot be made. An important management function

is to make judgments as to the "right" amount of managed costs in a given set of circumstances. These are, by definition, subjective judgments.

Management control applies to the whole of an organization, and to any parts of the whole in which managed costs are significant. Technical control applies to those activities, and only to those activities, in which there are no significant elements of managed cost. Or more simply, in the management control process, management judgment is an important element; in the technical control process, the technique itself is dominant.

As an example of technical control, consider inventory control. If the demand for an item, the cost of storing it, its production cost and production time, and the loss involved in not filling an order are known or can be reasonably estimated, then the optimum inventory level and the optimum production schedule can both be calculated, and reasonable men will agree with the results of these calculations.

In other than exceptional circumstances, these calculations can determine the actions that should be taken. Management intervention is necessary only when these exceptional circumstances arise.

Some areas can't be measured

By contrast, consider the legal department of a company. No device can measure the quality, or even the quantity, of the legal service that constitutes the output of this department. No formula can show the amount of service that should be rendered nor the optimum amount of costs that should be incurred. Impressions as to the "right" amount of service, as to the "right" amount of cost, and as to

In the technical control process, the technique itself is dominant . . .

whether the relationship between the service actually rendered and the cost actually incurred was "right" are strictly subjective. They are judgments made by management. If persons disagree on these judgments, there is no objective way of resolving the disagreement. Yet the legal department as a part of the whole organization must be controlled; the chief counsel must operate within the framework of policies prescribed by top management. The control exercised in this situation is management control.

Examples of activities that can be subjected to technical control are: automated plants, such as cement plants, oil refineries, and power generating stations; the direct operations of most manufacturing plants (but often not the overhead expense items); production scheduling; inventory control; the "order-taking" type of selling activity; and order processing, premium billing, payroll accounting, check handling, and similar paperwork activities.

Examples of activities for which management control is necessary are: the total activities of most manufacturing plants, which include such "judgment" inputs as indirect labor, employee benefit and welfare programs, safety activities, training, and supervision; most advertising, sales promotion, pricing, selling (as distinguished from order taking) and similar marketing activities; most aspects of finance; most aspects of research, development, and design; the work of staff units of all types; and management activity itself.

The control appropriate for the whole of any unit which carries on both the technical and the management types of activities is management control. The control of the whole accounting department is management control even though

technical control is appropriate for certain aspects of the work, such as posting and check writing.

Some people believe that the distinction between the two classes of activities described above is merely one of degree rather than of kind; they say that all we are doing is distinguishing between situations where control is "easy" and "difficult," respectively. We think the distinction is more fundamental than that, and hope this will be apparent from the following brief list of characteristics that distinguish management control from technical control.

Management control covers the whole of an organization. Each technical control procedure is restricted to a subunit, often a narrowly circumscribed activity.

Just as management control occurs within a set of policies derived from strategic planning, so technical control occurs within a set of well-defined procedures and rules that are derived from management control.

Control is more difficult in management control than in technical control because of the absence of a "scientific" standard with which actual performance can be compared. A good technical control system can provide a much higher degree of assurance that actions are proceeding as desired than can a management control system.

Rules can be programmed

A technical control system is a *rational* system; that is, the action to be taken is decided by a set of logical rules. These rules may or may not cover all aspects of a given problem. Situations not covered by the rules are designated as "exceptions" and are resolved by human judgment. Other than these excep-

tions, the application of the rules is automatic. The rules can in principle be programmed into a computer, and the choice between using a computer and using a human being depends primarily on the relative cost of each method.

In management control, psychological considerations are dominant. The management control system at most assists those who take action; it does not directly or by itself result in action without human intervention. By contrast, the end product of an inventory control system can be an order, or a decision to replenish a certain inventory item, and this order may be based entirely on calculations from formulas incorporated in the system. (The formulas were *devised* by human beings, but this is a management control process, not a technical control process.)

In a consideration of technical control, analogies with mechanical, electrical, and hydraulic systems are reasonable and useful, and such terms as feedback, network balancing, optimization, and so on, are relevant. It is perfectly appropriate, for example, to view a technical control system as analogous to a thermostat which turns the furnace on and off according to its perception of changes in temperature. These analogies do not work well as models for management control systems, however, because the success of management systems is highly dependent on their impact on people, and people are not like thermostats or furnaces; one can't light a fire under a human being simply by turning up a thermostat.

A management control system is ordinarily focused on a financial structure, whereas technical control data are often nonmonetary. They may be expressed in terms of man-hours, number of items, pounds of

waste, and so on. Since each technical control procedure is designed for a limited area of application, it is feasible to use the basis of measurement that is most appropriate for that area.

Approximations meet data needs

Data in a technical control system are in real time and relate to individual events, whereas data in a management control system are often retrospective and summarize many separate events. Computer specialists who do not make such a distinction, dream about a system that will display to the management the current status of every individual activity in the organization. Although this *could* be done, it *should not* be done; management doesn't want such detail. Management does not need to know the time at which lot No. 1007 was transferred from station 27 to station 28; rather, it needs to know only that the process is, or is not, proceeding as planned, and, if not, where the trouble lies.

Similarly, technical control uses exact data, whereas management control needs only approximations. Material is ordered and scheduled in specific quantities, employees are paid the exact amount due them, but data on management control reports need contain only two or three significant digits and are therefore rounded to thousands of dollars, to millions of dollars, or even (in the U. S. Government) to billions of dollars.

A technical control system requires a mathematical model of the operation. Although it may not always be expressed explicitly in mathematical notation, there is a decision rule which states that given certain values for parameters a, b, \dots, n , action X is to be taken. Models are not so important in management control. In a sense, a budget or a PERT network are models associated with the management control process, but they are not the essence of the process.

The formal management control *system* is only a part of the management control *process*, actually a

relatively unimportant part. The Anthony Framework for Analysis system can help motivate the manager to make decisions that are in the best interests of the organization, and the system can provide information that aids the manager in making these decisions; but many other stimuli are involved in motivating the manager, and good information does not automatically produce good decisions. The success or failure of the management control process depends on the personal characteristics of the manager: his judgment, his knowledge, his ability to influence others.

Technique is all-important

In technical control, the system itself is a much more important part of the whole process. Except in fully automated operations, it is an exaggeration to say that the system *is* the process, but it is not much of an exaggeration. The technical control system ordinarily states what action should be taken; it makes the decisions. As with any operation, management vigilance is required to detect an unforeseen "foul-up" in the operation, or a change in the conditions on which the technique is predicated. And management will be seeking ways to improve the technique. In general, however, the degree of management involvement in technical control is small, whereas in management control it is large.

As new techniques are developed, there is a tendency for more and more activities to become susceptible to technical control. In the factory, the production schedule that was formerly set according to the foreman's intuition is now derived by linear programming. And, although not too long ago it was believed that technical control was appropriate only for factory operations, we now see models and formulas being used for certain marketing decisions, such as planning salesmen's calls and planning direct mail advertising. This shift probably will continue; it is a large part of what people have in mind when they say, "management is becoming increasingly scientific."

Following are statements illustrating the consequences of failing to make a distinction between management control and technical control:

"Computers will make middle management obsolete." (Although computers can replace human beings in technical control, they are not a substitute for the human judgment that is an essential part of the management control process.)

"Business should develop a management control system like the SAGE and SAC control systems that work so well for the military." (The military systems mentioned are technical control systems. They are not related to the management control problem in the military, let alone that in business.)

"The way to improve the management control process is to develop better management decision rules." (This implies that mathematics, rather than human beings, is the essence of management control.)

"Transfer prices should be calculated centrally." (This gives no recognition to negotiation and the exercise of judgment by divisional managers.)

"If you follow the planning and control techniques described in this book, your profits are a near predictable certainty." (This implies that the technique, rather than the quality of management, is the principle determinant of success.)

Summary

We have described several subsystems that come under the general heading, "planning and control systems." Although related to one another, they have different purposes and different characteristics; different ways of thinking about each of them are therefore required. Generalizations about the whole area are, if valid, so vague as not to be useful. By contrast, useful generalizations, principles, and techniques can be developed for each of the subsystems. Mistakes are made when those valid for one subsystem are applied to another.