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CORPORATE MODELS: THE NEXT STEP?

A look at a new management tool for assisting in the decision-making process.

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We are almost always surprised at financial difficulties in companies with good product lines and adequate sales levels. Perhaps, however, we shouldn't be. It isn't really unusual these days to read about "good" companies in financial trouble or even bankruptcy. And perhaps more often than not, the cause behind many such cases of business distress is inadequate financial control. When management cannot gain access to accurate, meaningful financial information in sufficient time to take appropriate actions, severe losses—and even failure—may be the ultimate result.

A Case In Point—The Securities Industry

Recent history in the securities industry bears testimony to the importance of financial control. Of the brokerage houses that have recently failed, the majority had more than adequate sales levels. Sales volumes, in fact, were so high in the late 1960s that trading hours were restricted in an effort to curtail volume. Such an action would be considered extreme in almost any industry. The fact is that inadequate financial systems were not keeping up with the volume of transactions. Client accounts became hopelessly confused. Financial control was lost. Then, with the advent of a severe bear market and rapidly declining stock values, many firms were unable to recover. In the span of a few years, many reputable, old-line brokerage firms simply disappeared.

The whole point is this: Accurate and timely knowledge of the financial position of an enterprise is one of the principal requirements of management. Traditionally, management looks to accountants to provide such information.

Traditional Financial Systems

Through the years, accountants have used several basic financial systems to assist them in keeping management informed. Although there are variations on each, three basic systems are

commonly used: general accounting, budgeting and long-range planning.

General Accounting Systems

First and foremost among traditional financial systems is the general accounting system. A company simply cannot exist without it. The purpose of general accounting is to record the company's actual financial transactions in a consistent and conservative manner. General accounting, in effect, is a company's financial history. It provides a means for generating balance sheets, income statements and other historical business documents that provide information for the use of management, stockholders and creditors. Because it is historical in orientation, however, the general accounting system cannot provide all the information which management requires.

The Budgeting System

The budgeting system provides a vehicle for estimating future account values—usually for one year into the future, by the month. Actual values, provided by the general accounting system, can be compared against budgeted amounts as the budget year lapses. Analysis of resulting variances can then disclose areas requiring management attention. The budgeting system is, then, a way to provide management with an effective means for improving a company's tactical position.

Long-Range Planning Systems

Management must, of course, concern itself with a more distant time horizon than one year. A means for setting out a strategic plan that a company will follow for several years is needed. For this reason, long-range planning systems have evolved. Perhaps the most common time span for such systems is five years. There are, however, systems in use that cover time periods of three, eight and ten or more

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years. The time span is geared to company operations. Long-range plans should not be as detailed as budgets, although compatibility should be established between the first year of the long-range plan and the total of the budget year.

Budgeting and long-range planning both tend to be fairly formalized procedures entailing a considerable amount of manual data input. Further, such efforts are usually performed only once a year and resulting estimates remain frozen until the next annual planning cycle. Management, however, is continually confronted with solving problems which have significant impact on company operations and profitability. Unfortunately, challenges and opportunities do not time themselves in regular cycles. Without something more than general accounting, a budget and a long-range plan, management may find that it is trying to make today's crucial decisions on the basis of yesterday's information (or the information of eleven months ago). Budgets or "official" plans can be modified, of course; but, by the time the required information is generated, the time for decision-making may have already passed. Management needs something new in the way of financial systems to assist in answering "what if" questions. This is where corporate models come into the picture.

Corporate Models

The corporate model is not easily defined. The reason for difficulty in definition is that models differ widely in time span covered, in scope and purpose and in type.

We may accurately state that models are tools to assist management in determining the effect of various courses of action on the financial and operational aspects of an enterprise.

Management may wish, for example, to evaluate the impact that a plant construction delay of a year or more would have on future sales and profits. Or it may wish to evaluate the impact of a cash dividend increase on future long-term debt requirements. Providing such information via traditional financial systems can be a major project—almost like drawing up a new budget or long-range plan. Corporate models, however, provide the means for answering these and similar questions with speed and accuracy.

Time Frame of Corporate Models

Corporate models may cover a short time frame—the same as a budget, for example—or longer periods comparable to those for long-range plans. They may, in fact, cover both short and long time periods.

The corporate model differs from the traditional financial systems in the amount of data input that is required. Only the independent variables that management may care to manipulate—sales volumes, prices, investments, etc.—need be furnished for use by the model. Other data—the dependent variables such as long-term debt, net income, taxes, and the like—are generated by the model through mathematical formulas. The model's output may assume many forms. Usually, standard financial statements and operating reports are generated at the consolidation level as well as at divisional, plant and lower levels.

Scope and Purpose of Corporate Models

Corporate models vary considerably in scope and purpose. Some models are intended only to generate highly summarized, consolidated information while others cover organizational levels all the way down to individual cost cen-

In the future the accountant will no doubt have undergraduate courses in industrial engineering, production scheduling, marketing and many other functional areas that will be part of his body of knowledge and training for an integrated approach to auditing. It may well be that such courses will be mandatory for candidates for a CPA certificate. The operational audit approach must come to the profession on an evolutionary rather than a revolutionary basis because of the cost of retraining and refocusing the auditor's traditional objectives to include the expansion of the audit work into the areas of operational control and authority.

At the same time, it behooves present professionals to recognize the great potential and opportunity offered the profession in operational auditing in meeting the critical need of business management for more comprehensive and reliable information on how its plans, policies and programs are being carried out.

Joseph W. Dodwell, CPA,
"Operational Auditing: A Part
of the Basic Audit,"
THE JOURNAL OF ACCOUNTANCY
June 1966

ters. Some models treat variables such as cost of goods sold as a single item while others break them down into volume and unit cost factors such as material, labor and overhead. In some models, a composite tax rate is used. Others employ complex tax algorithms giving cognizance to differing depreciation rates, inventory valuation methods, depletion schedules and other factors. Corporate models may be as simple or as complex as their intended use warrants.

Types of Corporate Models

Corporate models may be classified in several ways. One of the most common methods is to differentiate them on the basis of their mathematical abilities. On this basis, models may be classed as deterministic, statistical, probabilistic and optimizing.

The **deterministic** model accepts a single set of data values as input and generates a single set of output reports through relatively simple algebraic formulas. For example, input may consist of sales and cost projections and various growth factors for one year. The model could generate profit and loss projections for the next five years. It is not uncommon to run such models with data for several assumption bases—most likely, optimistic and pessimistic. A new set of output reports would be generated in each case.

The second type of model is characterized by its **statistical** capability. In such models, historical rather than forecast data are used as input. The model, through regression or another statistical technique, generates forecasts of key variables by analysis of the historical data.

A third type of corporate model is **probabilistic** in nature. In such models, ranges of data values, weighted according to probability, may be input so that the model may generate ranges of output with probabilistic weighting. For example, a sales forecast may be input in three components: a most likely value, a pessimistic value that is likely to occur 10 percent of the time and an optimistic value that is also likely to occur only 10 percent of the time. The model would generate the expected value of earnings in view of the probabilities in all three categories. It would also generate the range of possible earnings, showing the probability of each value.

The fourth type is classified as an **optimizing** model. In these models, a series of possible alternatives may be input and the model will select the best subset of these, based on various optimizing criteria. For example, input may consist of several possible production orders that must compete for limited production

capacity. The model would select the specific orders to produce in order to maximize earnings.

In practice, corporate models are hybrids—mixtures of the four types described. The overwhelming majority of today's corporate models are deterministic and/or statistical in nature. Relatively few companies have advanced to the point of using probabilistic or optimizing corporate models.

Data Processing Considerations

Extensive computations are characteristic of corporate models. Not only are many of the required data generated from key input variables, but also the running of multiple case studies is usually the norm. Models of any significant scope, therefore, must utilize effective data processing techniques as a matter of practicality. As in the case of any other major system application, a corporate model must be designed and implemented with consideration given to several important data processing considerations.

Batch Processing or Time Sharing?

Fundamental in data processing for corporate modeling is a choice between batch processing or time sharing. A batch processing system processes input data in a group or "batch." Normally, input is through the computer's card reader and output is on the computer's line printer. In batch processing, only one (or very few) applications may be processed at a time. Accordingly, a queue usually develops, causing the time between submission of the run and processing of the run to require at least several hours. In a time sharing system, data may be processed a little at a time. Data are normally input through a teletypewriter-type device with output on the same unit. In time sharing, many applications can be processed at the same time, significantly reducing the turnaround time that is characteristic of batch processing applications. Unfortunately, because of the relatively slow input and output of time sharing devices, time sharing is best suited to applications that require very little data input and output. Most corporate models, therefore, are usually designed to operate in a batch processing mode.

File Management Techniques

Another prime data processing consideration is that the model utilize effective file management techniques. The system should have the capability for storing the model's data in a computer file so that all data need not be in-

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This information includes:

- (1) Agency name and address
- (2) Project director's name and address
- (3) College and department
- (4) Subject of project
- (5) Dates of project period and current period
- (6) Amounts of application and award for project period and current period
- (7) Amount of future support committed by agency
- (8) University cost sharing amount and percentage
- (9) Overhead code
- (10) Amendment codes, date changes, and amount changes

By capturing this information chronologically on tape, we can get an historical readout of the project when requested.

With this information, studies can be made

of the percentage of award by various agencies to applications to that agency. This can be valuable in the decision as to where applications should be submitted. These applications take many man hours and the effort should not be wasted.

An infinite variety of reports can be prepared to the desires of the users in almost any type of format. By preparing a series of programs for the most desired reports, they can be prepared on request or periodically as needed.

Plans have also been made to gather information for annual financial reports required by some agencies as well as for billing via computer listings on a monthly basis on certain contracts.

We feel we now have a system that meets the most vital needs of grants and contracts. This is a new system and only time will tell how well we anticipated our needs. However, we have had one vote of confidence. One of our project directors who has a large number of contracts told me "Now I can throw away my set of books."

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put each time the model is run. File management, of course, should include capabilities for adding new data, deleting old data or modifying existing data in the files.

Somewhat akin to file management for entering data into the model is a report writing capability for extracting data from the model. The report writing system should be able to generate routine reports on user request. In addition, the system should have the capability for producing special purpose or "one time" reports through the use of simple-to-use report specification cards.

Flexibility in Design

A final consideration in corporate modeling is flexibility of design. Corporate models—like the companies they represent—should be evolutionary in nature. Accordingly, the system should be designed to facilitate change. A model must obviously be able to accommodate the addition of new divisions, new plants, etc. It should also be capable of operating with an expanded time horizon if longer looks into the

future are desired in special situations. Models should be designed with sufficient capacity to permit the addition of new variables and processing techniques in the future and should, of course, be able to adapt to changing taxation, accounting and other regulations.

It is important that these and other data processing principles be adequately addressed in the design and implementation of a corporate model. The most brilliantly conceived model will be doomed to failure if it is implemented in a poor data processing framework.

Conclusions

Corporate models, although relatively new in concept, are achieving rapid acceptance among forward-thinking companies. They afford an excellent vehicle for aiding top management in determining the best strategies for achieving corporate goals. Because of the pressures of competition, corporate models will become far more commonplace during the 1970s. More sophisticated models—using probabilistic and optimizing techniques—will evolve. It stands to reason that companies gaining early experience in the use of corporate models will fare significantly better than those who simply follow the trend.