

WHAT PRODUCTION MANAGERS REALLY WANT TO KNOW . . .

Management Accountants Are Failing to Tell Them

BY SHARON M. MCKINNON, CMA, AND WILLIAM J. BRUNS, JR.

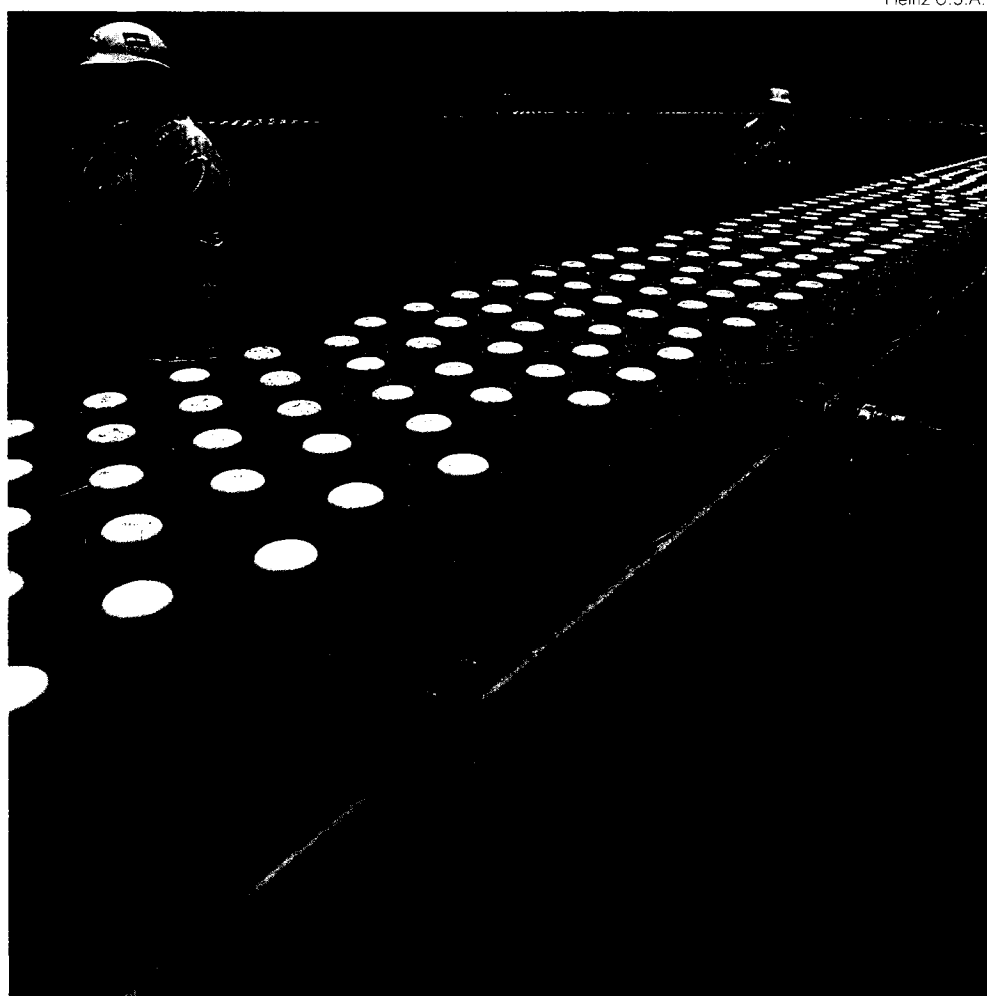
Does the information management accountants provide to functional areas such as manufacturing and sales represent a major chunk of the most valuable information for daily operation control? Is it important to increase the speed with which operating reports reach managers' desks or perhaps to increase the precision of financial measurements?

We recently conducted a study¹ to determine the usefulness of accounting information. We found that the actual information used for daily operating control usually does *not* come from the accounting area.

Years of teaching in executive programs has taught us that numerous successful executives do not have a basic understanding of accounting concepts and principles. Consequently, we began to wonder what information managers were really using on a day-to-day basis.

73 MANAGERS INTERVIEWED

We interviewed 73 top managers of production, sales and marketing, general management, and information systems in 12 manufacturing companies. Six operate in the United States and six in Canada. We asked these managers about their daily activities, the types of information they need to fulfill these activities, and how they gather or receive the information. Table 1 describes the



Managers at consumer foods companies, such as H.J. Heinz Co., above, rely on daily output measures.

firms in the study and the positions of the managers concerned with production and manufacturing.

Manufacturing and production encompass numerous supportive activities such as research and development, maintenance, safety, and quality control. The major activity areas, however, can be defined as the actual production of products, purchase of raw materials, and distribution of finished products. Although we talked to managers involved with all of these activities, we will focus on the three major activities concerning information needs.

INFORMATION FOR DAILY MANUFACTURING

The needs of a manager who is responsible for the efficient daily operations of a manufacturing facility are affected by:

- The production factors that are most significant to the process in terms of cost, quality, and availability;
- The time frame in which the information is needed; and
- The channels of communication through which the information flows from the floor to the manager and back.

The level of finished goods inventory maintained and available to fill orders is a major factor in determining the most valuable information for daily manufacturing control. In companies that maintain significant levels of ending inventory, manufacturing operations are spared many of the shocks of frequent changes in production plans and disruptions of schedules.

Table 2 displays the categories of plant we encountered in our study and their inventory levels in relation to one another. Companies try to maintain low inventory levels for many reasons. Even those labeled as high-inventory plants try to maintain as low a level of inventory as possible to avoid tying up much of their working capital in inventory. Investment or expense for storage facilities, product obsolescence, and problems with physical deterioration of products are other reasons companies try to minimize inventory levels regardless of their production strategy.

High-inventory companies in our study fall into two subgroups: those that produce large quantities of standard unit output, and those in which conversion of raw materials produces products that are relatively easy to store. Low-inventory companies also can be divided into two groups: those that use continuous manufacturing processes with highly volatile, frequently toxic products that are difficult and expensive to store and those that produce specialty products, a good many of which are tailored to a customer's detailed specifications.

Companies with relatively *high finished goods inventory levels* work less to everyday orders. Instead, they place more emphasis on following a master production plan, usually prepared annually, with rolling revisions monthly or quarterly. Usually there is some reporting of what is happening on the floor on a daily basis. The reports may run the spectrum from computer printouts of process yields to handwritten memos on minutes of downtime. In our study, the common characteristic of the information deemed most valuable by the production managers in these companies was the emphasis placed on controlling or monitoring what we will call the "key production limiting factor."

John F. Rockart described a concept known generally as the "critical success factors" (CSF) approach to providing information to executives.² If this approach is followed, a company's information system should be focused to ensure that the few areas vital to the success of corporate goals are reported on an accurate, timely basis. Our key production control factors relate directly to this CSF concept in that each defines a vital production factor that must be monitored daily to meet the annual production plan.

Many production control factors for high-inventory companies revolve around ensuring continuous output. Labor, materials, and some other costs are a function of the number of units produced. Those managers in our study who focused on daily output measures relied solely on primary measures, or counts, rather than on financial data. Output

TABLE 1/FIRMS AND MANAGERS IN THE STUDY

Firms (In order of size)

- Manufacturer, seller, and servicer of computer hardware and software.
- Producer, refiner, and marketer of petroleum materials and products.
- Manufacturer and distributor of branded consumer food products.
- Producer and distributor of industrial chemicals, coatings, and explosives.
- Iron and steel manufacturer for construction and manufacturing industries.
- International manufacturer of communications equipment.
- Specialty producer of rubber, latex, and polymer products.
- Manufacturer and distributor of wire and cable products to industrials.
- Producer and seller of specialized lines of branded consumer foods.
- Producer of electronic instruments for sales to worldwide market.
- World competitor in creation, sales, support in computer-aided design.
- Major supplier of paper filters for air and fluid systems.

Positions Held by Production Managers

Distribution Manager (2)	Production Manager
Division Manufacturing Manager	Purchasing Manager
General Foreman-Steelmaking	Regional Manufacturing
Manager, Coke/Iron Production	Manager
Manager, Distribution/	VP Logistics
Transportation	VP Operations (3)
Manager, Engineering Services	VP Product
Manager, Engineering/	Manufacturing (2)
Maintenance	VP Quality
Manufacturing Manager	VP Regional
Plant Manager (4)	Manufacturing (2)
VP Steel Operations	VP Technology

measures such as tons of steel produced or numbers of air filters assembled were considered vital, and physical measures also frequently were used to assure the continuous output of product, regardless of its nature. Downtime per shift or per machine was a common such measure.

Low-automation companies often find that the limiting factor defining output is tied to labor costs. The "cost" of labor proves a difficult item to track on an immediate basis. The daily labor measures used most frequently are basic counts of how many personnel worked on production during recent shifts. These counts enable production managers to estimate effects on output and costs and to take steps to increase the number or change the mix of workers.

In other factories, we found that the cost of materials running through the plant dwarfed the other factors of production and became the single most important factor watched on a daily basis. Yet like labor costs, materials costs themselves are tracked on a short-term basis by counts of scrap or reworked materials.

Whether unit output, downtime, scrap, or some other measure is the vital daily data item, these companies are similar in that their daily operations are driven more by a long-range production plan than by a response to daily sales. This is not to say that sudden changes in sales circumstances

have no impact. They frequently do, and they call for immediate action. But the usual mode of operation in these companies is steady production in conformance to a plan. When production volume and effort remain fairly constant over a period of time, sales and finished goods inventories may differ from plan, which leads to the need for the higher-volume inventories that characterize this group of firms and that separate them from low-inventory companies.

Even companies that keep *low finished goods inventories* generally work from a long-range production plan. These plans, however, are subject more frequently to revision on a short-term basis. When inventories are low, there must be more flexibility to change operations to meet immediate needs.

Several characteristics of production processes lend themselves to low inventory levels. The nature of the product frequently demands quick distribution—perishable goods being the obvious example. In our study, three companies produce liquid or semi-liquid products that are not only difficult to store but have toxic properties that dictate fast, safe, and efficient movement from source to customer.

A second product characteristic leading to low inventories is the specialization typical in high-technology, low-volume industries.

The third results when the product is tailored to the customer's needs. This leads to a much closer relationship between production and customer in terms of both specifications and time between order, production, and delivery.

The information needs of production managers in low-inventory companies are not totally different from those of managers in companies with larger inventories, particularly in the need to monitor key production limiting factors. However, in low-inventory companies the key production control factors tend to be related less to volume. What most characterized managers' need for information here is their daily interest in and reliance on some measure of bookings or or-

Numerous successful executives do not have a basic understanding of accounting concepts and principles.

ders. This reliance introduces a major issue into the need for information, that of interdepartmental communication and cooperation.

When production is a high-volume process, this communication and cooperation must exist on a daily basis, to the extent that, in some firms, production levels actually may be set by managers in nonproduction departments. For example, we found marketing managers determining output levels in a chloralkali plant because of the need to balance sales with two byproducts of the same process. When specialized orders must be filled on short notice, plant managers must depend on the immediate availability of knowledge about customer quality specifications and time requirements, inventory levels, plant capacity, and distribution schedules. Naturally, much of this information is found in a plant's databases, but the nature of the immediate need depends on communication with and through the sales force.

In other low-inventory companies, the production cycle is more lengthy because large specialized products are tailored to customer specifications. Production cycles often span days or weeks. In such cases, reports of daily production quantities are supplemented by fuzzier measures that show how orders, projects, or products are generally progressing. Although production is still driven by orders, there is no need for daily changes in production because each order takes longer to fill. The importance of daily production or sales reports is diminished, while other measures take on more significance. Particular emphasis goes to measures that ensure customer satisfaction, such as quality and product innovation.

TABLE 2/KEY PRODUCTION CONTROL INFORMATION

High Levels of Finished Goods

Branded Food Products	Labor counts; units of output
Filters	Labor counts; units of output; scrap
Steel	Output; quality
Cable	Scrap; labor time

Low Levels of Finished Goods

Latex	Order quantity; product specifications
Chemicals and Explosives	Order quantity; inventory availability
Petroleum Products*	Order quantity; inventory availability
Electronic and Telecommunications Equipment	Order quantity; product specifications quality
Software	Order quantity; specifications; quality

* Note: Although petroleum refiners often hold large inventories of some finished products, the diversity of products and specifications often leads to situations where product must be produced or blended to fill a specific order. In addition, the use of large transportation vehicles, such as tanker ships, creates a need to create enough product for shipment at a specified time to achieve economies of scale in transport utilization.

DAILY PURCHASING ACTIVITIES

Control of production is tied inextricably to two other major functions: purchasing the raw materials needed to ensure a continuing production process and distributing the finished products. Purchasing managers rely on many different types of information to achieve their objectives. Some of these data are similar in nature to information for production control. For example, needs, orders, and promises are expressed in the form of physical counts. The key financial indicator of material prices as an operating control accounts for the major difference between the type of information valued most by purchasing managers versus production managers on a daily basis.

The nature of purchasing is such that dealing with prices and transportation costs is an integral part of the job description. Purchasing managers are evaluated on price efficiencies and must deal with prices in addition to quantities on a day-to-day basis. The importance of price and quantity information to a purchasing manager is a function of relationships displayed in Figure 1.

Six major categories of information are necessary to run a purchasing department in support of a production facility. Although all these items are necessary to purchasing, some are more vital than others to everyday control.

1. A production plan outlines the intent to produce certain products at certain times;
2. A bill of materials defines the materials required for production of each product;
3. Knowledge of the production cycle indicates when and where in the process the material is needed;
4. Inventory levels provide cues as to when more materials should be purchased;
5. Knowledge of supplier lead time enables materials to be ordered in time; and
6. Knowledge of the prices of materials allows choice of low-cost suppliers and subsequent analysis of the effectiveness of the purchasing function.

Production plans, bills of materials, and knowledge of cycle times and supplier lead times all can be characterized as part of a generally stable, slowly changing knowledge base. The remaining two information categories, inventory levels and prices, comprise the most valuable information for everyday control of purchasing because of their changing nature and because the purchasing manager can affect the cost of operations directly by controlling them.

In any production operation, the major challenge to a purchasing manager is maintaining an appropriate amount of materials inventory. Interlocking goals put into play opposing forces: Too much inventory will tie up capital, and too little inventory can result in losses. The relative importance of each force and the value of the information associated with inventory levels and prices are a function of the nature of the production process and the cost and nature of the raw materials.

A relatively stable production process is characterized by predictability of future materials requirements. Production plans are changed infrequently, and needs are known in time to be satisfied easily. Stable production schedules lend themselves well to purchasing through a materials requirements planning (MRP) system, which keeps track of inventories and forecasts needs for purchases with enough lead time to negotiate contracts and prices well in advance.

We talked to purchasing managers in several companies who enjoy these circumstances. In each, the key information needed daily was knowledge of open purchase orders—ma-

terial that had been purchased but not yet received. Overdue shipments represented a tangible data item on which action could be taken that would have an immediate effect in ensuring that inventory levels remained at necessary levels. Prices were monitored over longer horizons because of the ability to forecast and plan. Less stable production environments shorten the horizon for monitoring inventory and prices.

Several of the managers in our study emphasized the importance of the relative cost of raw materials as a key factor in whether they maintained high inventories. When raw materials are commodities, their value fluctuates with market conditions, and this volatility leads to minimization of inventories where possible, with a continuing eye on the market price in order to take advantage of perceived opportunities.

When materials are particularly expensive, more attention is paid to minimizing the levels. Not only do expensive materials tie up capital, but they also are more susceptible to loss the longer they remain unused in storage.

In our study, purchasing managers dealing with expensive materials, such as some materials used in semiconductor test systems, focused on daily observation of the level of expensive components. Despite the significance of the cost, the actual cost was a long-range factor compared to assurance of immediate availability. When inventory items are inexpensive, the emphasis of the purchasing function appears to be ensuring their continued supply with the least effort. A good system which automatically puts in place a purchasing process obviates the need for everyday control by purchasing managers.

In summary, the importance of certain types of information in the daily control of a purchasing function is dependent on several factors. Continuous planned production processes with stable suppliers and relatively low-cost homogeneous raw materials form one end of a spectrum of circumstances for purchasing. In this situation, daily actions are geared to those that will help keep an MRP system functioning smoothly and are typified by close scrutiny of open purchase orders. Continuous planned production processes with volatile or perishable materials require close control over inventory levels and prices. When production processes use high-cost materials or consume large quantities of commodity materials, greater efforts are made to reduce the investment in inventories through coordination of deliveries at the right time. Emphasis varies from prices to inventory levels depending on the nature of the process and materials.

We found that financial data about the effectiveness of purchasing was used more and more as the time horizon was extended. In particular, purchase price variances on a per-unit basis were seen as significant for evaluating short-term success, but most managers found that monthly total variance analysis was necessary for a realistic assessment of the effectiveness of purchasing. Routine efforts were devoted to minimizing daily price increases, while most non-routine efforts were concerned with evaluating how total cost variances above budget could be minimized over longer time periods.

DAILY DISTRIBUTION ACTIVITIES

The types of information used to coordinate daily distribution activities can be categorized in several ways. Distribution managers are highly focused on the levels of finished goods inventory and the logistics through which this inventory reaches the customer. Figure 2 displays a matrix of some of the types of data that are associated

FIGURE 1/FACTORS AFFECTING THE VALUE OF INFORMATION USED IN THE PURCHASING FUNCTION

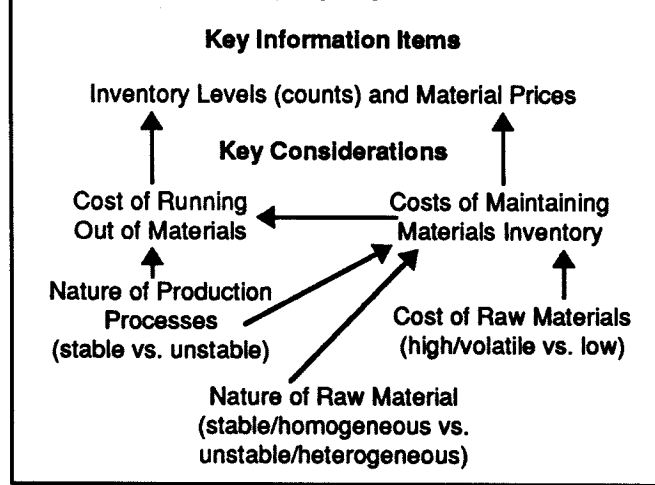


FIGURE 2/INFORMATION USED IN DISTRIBUTION

	FG Inventory	Logistics
Customer Service	Days in inventory Availability Back orders	Location of carriers Fill rates Due dates
Distribution Costs	Financial decisions Space constraints	Freight rates Lease versus buy

with inventory levels and logistics, divided into two major categories: customer service and distribution costs.

Customer service. Daily information needs are dominated by customer service demands, particularly in those industries characterized by a rigorous competitive environment. Managers are involved in a highly complex logic problem. When solved successfully, the finished goods inventory is available in a timely manner, orders are filled completely and shipped to customers at their desired date by the least expensive, reliable carrier. At each stage in this process, problems can produce bottlenecks that have ramifications through the systems.

The level of finished goods inventory is one factor affecting what information is vital for distribution control. Companies that produce large, discrete products, frequently to order, have low finished goods and compete mainly on the quality of their products. Neither distribution costs nor highly reliable delivery services serve as major determinants of profitability. Therefore, distribution activities play a minor role in operations management. At the other end of the low inventory spectrum is a process company (for example, chemicals) that produces volatile products that are difficult or dangerous to store. Finished goods exist mainly in transit. The present and prospective future location of trucks or railroad cars is the most important daily information for the distribution manager.

Companies that have higher levels of finished goods inventory face unique problems. Inventory is expensive to maintain, so even companies with relatively high levels face the challenge of availability, particularly if they produce "lots of different things" such as soup varieties or filter sizes. Risks associated with a failure to fill a customer's order when desired vary with the size of the customer and the competitive situation.

Distribution costs. In some companies, control of distribution costs is the key to profitability, particularly if there is a low contribution margin percentage and transportation is expensive or complex. When numerous backorder situations exist, there is a high potential for an order actually to be unprofitable. Distribution costs also assume added importance when alternative transport opportunities exist and there is a highly competitive market for the product.

Despite these scenarios, the actual costs themselves are not followed extensively on a daily basis, even in companies where they are "make-or-break." Instead, managers try daily to minimize costs through physical surrogates that can be controlled, such as decisions on rail car movements between plants or judgments about which orders to delay or fill. Often these decisions are based on experience as to what the underlying cost consequences will be. Daily variations in costs

may be caused by special circumstances that level out over time, and it is over time that cost analysis becomes a major activity.

WHAT IS USEFUL?

According to our research, production managers make more use of physical unit data than dollar or financial data in their control of daily operations. In 12 varied manufacturing companies, we found no instance of a key daily production indicator being a cost or financial number. This was as true in the three companies that had embraced activity-based costing systems as in the others.

What we did find, however, was that financial numbers do play a significant role in production control. First, there is an underlying knowledge of the financial implications of physical counts and counting data implicit in the analyses and actions of many managers. Second, when considered on a longer time dimension, financial indicators transcend physical counting measures in the importance managers place on them.

Many plant managers have a seemingly odd pattern of responses to our questions on useful data. They talked about daily control of operations as their most important tasks and about the physical measures they follow each day. When asked later about their "most valuable report in general," however, they cited a monthly income or expense report. One plant manager explained this seeming contradiction:

"At this company you live or die by the numbers. One of the reasons I've been successful is that I know how to move and groove and bake and shake the numbers. I know what affects them. I don't mean that I play with the numbers ... but when you push something down I know where it pops up. The reason I talk about production in terms of quantities is that I know the underlying effect of quantities on the dollars and cents and how volume covers the overhead in this plant."

Operating managers will take action on variables that have two major characteristics: The variables are significant in terms of moving toward a desired goal, and the variables can be altered or controlled by the manager. If production managers or their units are evaluated on a basis that includes profits, the managers will seek opportunities to increase the profitability of operations under their influence. Yet it is the physical units that managers can actually control and relate to on a daily basis.

Three characteristics are required to make information useful: timeliness, accuracy, and relevance. This is nothing new, and yet the failure of much information circulated within firms to fulfill these three criteria continues to plague managers.

We found that, in their attempts to obtain information that meets these criteria, managers have constructed their own

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Managers need timely data right from the factory floor. Above, a technician works on an IBM AS 400.

networks to supplement those created by management accountants and information specialists. These networks are composed of both formal and informal information items and channels such as:

- Internally generated—often handwritten—reports of daily activities such as downtime or units produced;
- Personally designed spreadsheets managers use to massage the data they receive or collect themselves;
- Personal observation through walking around or calling individual managers; and
- Personal or supervised collection of external environmental or economic information.

Why has traditional accounting failed to meet the daily needs of production managers? After all, accuracy, timeliness, and relevance are primary characteristics specified in the conceptual framework of accounting project of the Financial Accounting Standards Board. It would seem that accounting information, properly prepared, would indeed fulfill these characteristics. But there are numerous reasons

use and our observations about the inadequacies of management accounting, we can make several recommendations. Some are specific and some general.

Management accountants should aid in providing physical unit data to managers.

Inventory levels appeared repeatedly as vital information items in our study. Finished goods levels determined short-term production changes and the ability to coordinate distribution and sales quickly. Despite this fact, most information on finished goods inventory was provided to managers on a piecemeal basis or a monthly basis. Managers complained consistently that accounting reports on inventories suffered by being out-of-date and frequently inaccurate or poorly classified.

Some managers complained that the accounting function tried to impose its financial accounting responsibilities on the management reports with conventions (such as valuation methods) that obscured either the time periods or physical flows useful for them. Most had simply given up on formal accounting reports and developed their own systems.

These observations about inventories imply that there is

why this is not the case.

First, many accounting data are considered old news by the time they are reported to operating managers. Accounting recognition and measurement criteria delay recognition of events until uncertainties have been resolved.

Second, accounting information is frequently organized and presented in forms that limit its usefulness. Aggregations and allocations tend to obscure details that managers consider important.

Third, most accounting data continue to be reported on a dollar or cost basis. Operating managers, however, take actions daily based on physical units.

Fourth, many companies' accounting or controllership departments have ceded the responsibility for providing daily operating data to either individual plants or factories themselves or to an information systems function within the firm. Thus, the link between the eventual financial reports and the operations that formed their genesis has been partially or completely severed.

WHAT SHOULD YOU DO?

Based on what information production managers say they

a void in many companies that accountants are uniquely qualified to fill, if they will break from some traditional reporting molds. Many accountants express the belief that speeding up the monthly closing process is the most valuable improvement they can make in reporting to their managers. We believe if management accountants truly want to help production managers, they should play major roles in metering and measuring physical flows and supervising their communication.

Management accountants should play major roles in assuring effective interdepartmental communication flows between sales and production.

The links between these two functions were important in most of the companies where we interviewed. Yet frequent problems exist in several areas.

First, information flows tend to be irregular or informal even in circumstances where fast, accurate flows are vital to daily production scheduling. Some of these informal channels were very effective, but they tended to depend upon individuals themselves and suffered from problems when the individuals were unavailable either temporarily or through leaving the position.

Second, even when formal daily reporting between sales and production existed, it often suffered from incompatibility of data from one function to another because of distributed databases. Our recommendation that management accountants become involved in improving communication between these two vital areas is closely tied to our belief that management accountants should regain their roles as information specialists in companies.

Management accountants should redefine their roles to include management of information systems development and implementation.

Traditionally, the management accountant was the information specialist. As computer technology evolved, many accounting functions allowed the primary responsibilities for developing information channels to slip into the hands of computer information systems departments. Too frequently, their inherent biases were toward the technology rather than the information content.

Extensive resources have been expended toward computerizing information flows between managers and functions with varying degrees of success. Management accountants have the expertise in terms of information content to improve systems development. In most companies they already have responsibilities to collect, maintain, and distribute financial information to others. Optimally, they are trained to understand the relationship between managerial actions and the desired outcomes expressed as measures of financial performance.

REAL TIME DATABASE

According to the operating managers we interviewed, management accountants need to enhance the capture of operating data and speed the process by which this information is made available to production managers. If they do this, they will regain their place as primary information providers.

None of the 12 companies we visited had a comprehensive corporate management accounting system designed to provide the day-to-day information needs of operating managers. To be effective, such a system would need to be built around the identified information needs of particular operating managers in each company. Information would need to be collected by a means as timely as the personal reports

of participants in function activities. It would have to be available to managers on command.

To capture operating data more quickly, management accounting systems have to be linked to measuring devices that will report activity as it takes place. In plants, meters might be used to provide continuous information on production activity, output rates, and inventory levels. Measurements of daily activity can be collected easily or distributed by telephone or electronic mail.

This suggests to us that the management accounting system of the future should include a large, real time database into which information is flowing continually. It must be accessible and friendly and must allow managers to format output in any desired relationships. The goal should be to enable any manager to work with the data in any way he or she chooses with full confidence that the information obtained will be current and reliable.

The failure of accountants and controllers to break from the accounting paradigms of information and financial reporting has led to separate management information departments in many firms. In these companies, careful coordination and reintegration will be required between the accountants or meters and monitors from whom the raw data originate and the technology specialists who send them through the system.

It is impossible for management accountants to provide for the information needs of managers unless they are directly involved with the operation of the data collection and reporting system. If specialists are required because of the nature of communication and electronic data processing equipment, the management accountant must not relinquish responsibility for the data collection or output functions to the technology specialists.

Management accountants should be at the center of every management information system. Understanding data processing and communication technologies is critical because the value of even the right information is conditional on the medium through which it is received.

This belief has implications for the education of management accountants in the future. The line between the data and their transmission has blurred to the point that accountants can no longer afford to be technologically ignorant. The management accountant of the future must be skilled in both systems strategy and technology, in addition to being proficient in the collection and interpretation of data. Only then can the artificial and costly separation of the management accounting and information operations be eliminated successfully. ■

Sharon M. McKinnon, Ph.D., CMA, is associate professor at Northeastern University. William J. Bruns, Jr., Ph.D., is professor of Business Administration at Harvard University. They are members of IMA's Boston Chapter.

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²John F. Rockart, "Chief Executives Define Their Own Data Needs," *Harvard Business Review*, March-April 1979, pp. 81-93.

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