Volume Title: Inside the Business Enterprise: Historical Perspectives on the Use of Information

Volume Author/Editor: Peter Temin, editor

Volume Publisher: University of Chicago Press, 1991

Volume ISBN: 0-226-79202-1

Volume URL: http://www.nber.org/books/temi91-1

Conference Date: October 26-27, 1990

Publication Date: January 1991

Chapter Title: Managing by Remote Control: Recent Management Accounting Practice in Historical Perspective

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Chapter URL: http://www.nber.org/chapters/c7178

Chapter pages in book: (p. 41 - 70)

2 Managing by Remote Control: Recent Management Accounting Practice in Historical Perspective

H. Thomas Johnson

Businesses need information to operate. Informal methods are adequate as long as enterprises are small enough for a single person to gather and process all or almost all the needed information. But when the industrial revolution gave rise to larger productive units, some way had to be found to communicate information about activities in one part of the business to decision-makers in another.

There are many different ways to organize these information flows. Choices need to be made of which variables to observe, how often to observe them, and how to combine them into summary measures. The route that information takes within the business enterprise needs to be specified, whether horizontally or vertically, generally available or privately held. And the reverse flow of information—feedback—can emphasize or exclude any or all of the information gathered or forwarded.

It should be obvious that the nature of the information system within a company can affect its operation. As Daniel M. G. Raff and Peter Temin explain (chap. 1 in this volume), information is the key to action. One need only think about how a business would fare if it had no information at all about its internal operation—that is, if it had an information system that did not collect or communicate data about operations. This business would not fare well except by chance.

It is also true, although not so obvious, that businesses do not always have the best information system they could. Competitive pressures are not strong enough to ensure that only the fittest survive. It is possible for businesses with

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For their comments and suggestions on earlier drafts of this paper, the author thanks Anthony Atkinson, Donna Philbrick, and all participants in the 1990 NBER Conference on Microeconomic History, especially Peter Temin and Daniel Raff. None is responsible for the views expressed here.

inappropriate information systems to survive and even prosper for years. If information systems have some uniformity in a country, competition within that country may not press any single business enterprise to change. Only when international trade brings this information system—and other characteristics of production—into competition with others, will Darwinian selection ensue.

This paper demonstrates these propositions by a historical account of the most pervasive information system in business: accounting. It describes how accounting systems in the United States have changed over the past two centuries and how these changes have affected the operations of businesses. It argues that current American management accounting is a poor guide for business decisions, that accounting has lost its relevance for the control of business operations. Only with the opening up of the international economy in the past two decades has this become apparent, as American businesses and their management accounting practices have had to compete with other businesses guided by different information.

2.1 Introduction: What Accounting Does

For nearly two centuries, businesses have used accounting and nonaccounting information to direct management decisions at the three levels articulated by Raff and Temin: to direct the work of individuals, to direct subordinate production units, and to plan the extent and financing of the enterprise as a whole. Until about forty years ago businesses generally used financial *accounting* information to plan the extent and financing of the firm as a whole. They used *nonaccounting* information, both financial and nonfinancial, to direct the work of individuals and production units. In the 1950s, however, businesses began to use financial accounting information to direct management decisions at all three levels: to control workers and subunits in addition to planning the extent and financing of the enterprise as a whole. Using financial accounting information to control people as well as to plan financial consequences is what present-day accountants refer to as management accounting (Johnson and Kaplan 1987, 140–42).

Present-day accountants consider it natural and inevitable that a company's financial accounting system should be its primary source of management information. They assume that businesses first created accounting systems to collect and report information on financial transactions, and that businesses began to use that accounting information to manage internal activities when those activities reached a requisite level of complexity, which in most cases occurred, apparently, after World War II.

However, recent historical research casts doubt on the idea that financial accounting systems provided the first source of sophisticated financial management information. Businesses, especially in manufacturing, created very sophisticated financial and nonfinancial management information systems be-

tween the early 1800s and the 1920s (Johnson 1987). The financial management information referred to here was not necessarily derived from accounting records—even though it sometimes was reconciled with account data. Rather, it consisted of cost and margin information derived primarily from data about work processes and other activities, and it was used to control workers and to evaluate the performance of companies' subunits.

Historians now believe that following World War II financial accounting information intruded upon and distorted the financial and other information companies had used for decades to manage not only operating activities at the worker and the business unit levels but also strategic product choices at the enterprise level. Contrary to popular opinion, new management accounting developments after World War II do not indicate financial accounting's increased relevance to decision making inside complex organizations; instead, they reflect a fall of management accounting from relevance (Johnson and Kaplan 1987). Indeed, many authorities now believe that using financial accounting information to plan and control business activities contributed to declining competitiveness and profitability in many American manufacturing companies after 1960 (Hayes and Abernathy 1980).

Financial management information arose before World War I primarily to simulate market prices that disappeared when companies internalized and managed transactions at the first two levels—workers and business units. For example, reports showing the cost to convert raw materials into finished products arose as soon as businesses began to manage the work of individuals who previously supplied output at spot prices in the market. Later, systems to forecast cash flows, to budget financial results, and to track gross margins, inventory turnover, and return on investment, appeared when companies began to manage "vertical" transactions between diverse production units that previously exchanged through the market (or not at all).

Before 1920 most businesses—especially manufacturers—felt no pressure to provide elaborate information for managing financing decisions at the level of the company as a whole. The people who financed the company tended to be the same people who managed the company—owner-managers epitomized by business leaders such as Andrew Carnegie, John D. Rockefeller, Augustus Swift, Pierre du Pont, and Cyrus McCormick. These people and their close associates understood a business and its customers. These owner-individuals, perhaps because they were so close to their businesses, seemed to operate as though desired financial results emanated from driving workers and business units to "do the right thing," not from driving them to do things that would achieve desired overall financial targets. While they all kept books from which to periodically compile information about their companies' overall financial results, they kept such information close to their vests. The cost and margin information they used to manage decisions at the worker and the business unit levels was not defined by, nor was it necessarily a by-product of, accounting information used to portray overall financial results.

This gradually changed, however, as companies became more and more concerned with the need to communicate with external financial backers after World War I. External financial reporting became an issue when companies turned to capital markets for financing. Few American businesses, other than railroads, entered capital markets before the early 1900s. But manufacturers turned to capital markets in droves after 1900. To help those companies raise capital at the lowest possible cost, investment bankers urged their clients to give the public annual audited financial statements. The need to design and audit the contents of such statements sustained decades of explosive growth in accounting practice, writing, and education.

The financial cost accounting systems accountants designed in the early 1900s to help manufacturers compile information for external financial reporting would eventually intrude upon and distort the financial information companies used to manage decisions at the worker and business unit levels. Before the era of financial reporting, internal financial information used to organize the work of individuals and to organize production units does not seem to have impaired manufacturers' abilities to identify and pursue sources of competitiveness and profitability. By the 1950s, however, the primary source of information to organize the work of individuals and to organize production units was the financial accounting system designed to supply information about results to external backers. Managing costs at the worker and the business unit level with accounting information designed for reporting financial results at the company level—in other words, managing by remote control—undoubtedly contributed to many manufacturers' declining competitiveness and profitability in the past thirty years.

The research discussed in this paper draws a critical distinction between financial accounting information used to report the global financial results of business activities and management information that influences local actions. These local actions will eventually affect global results, but the connections between them often are not direct. Nevertheless, accounting systems that were designed primarily to report financial results to outsiders provided most of the financial management information companies used after the 1950s. That was not always the case, however, and understanding the difference in financial management information before and after the era of financial reporting adds an important dimension to understanding the recent history of American business.

This paper explores and describes how businesses for nearly two centuries have used financial information to guide the "visible hand" of management. The discussion that follows is divided into four parts: the first part describes financial management information in American companies before financial reporting became important, during the century or so ending in the 1920s; the second part compares pre-financial-reporting cost information with the financial cost accounting information developed in the early 1900s that became the

main source of management accounting information after World War II; the third part describes how companies have used this financial cost accounting information to manage costs since the 1950s; finally, the fourth part examines reasons for and consequences of business migrating from pre-1920s management information practice to the post-1950s practice of using financial accounting numbers to manage by remote control.

2.2 Financial Management Information in the Era before Financial Reporting

In the era before financial reporting, until World War I, top managers seemed comfortable with having accounting information to portray overall financial results and with not also using that same information to manage the operating activities that produce those results. Managers in charge of nineteenth- and early-20th-century companies seemed to understand the difference between viewing financial results reported in accounting records and managing the underlying activities that cause cost, profit, or return on investment (ROI). Top managers in nineteenth- and early-twentieth-century businesses compiled financial information, especially cost information, to make sense of their efforts to manage resources. Although organizations had carried out trading activities for centuries, the idea of internalizing market activity and managing it inside a company was new in the late eighteenth century. But the concept evolved rapidly, from simply manufacturing establishments that supplied small, local markets in northern Europe and North America around 1800 to complex multi-industry enterprises that served world markets by the early 1920s (Chandler 1977).

Accompanying that evolution of managed business enterprise was the development of virtually all the financial management tools used in modern times—cost records for labor, material, and overhead; budgets for cash, income, and capital; flexible budgets, sales forecasts, standard costs, variance analysis, transfer prices, and divisional performance measures (Johnson and Kaplan 1987). Companies created and modified these tools as needs arose for information to plan and control their actions.

Financial management accounting tools developed from 1800 to the early 1920s largely in response to one force—the transfer of economic exchange from market settings into managed business settings. Before the early 1800s, market prices in "arm's length" transactions between individuals guided virtually all economic exchange outside the household. Then around 1800 people began to "internalize" economic activity and manage it in a business. In the nineteenth and early twentieth centuries, companies engaged in mining, manufacturing, transportation, and distribution decided to internalize numerous opportunities for exchange that went begging in the marketplace. Results of these decisions included, for example, managing workers' time to stabilize

and increase output of textiles and metal goods; ownership by steel-making companies of raw material sources; and ownership of distribution channels by producers of oil and processed beef.

As these businesses soon discovered, managing economic activity inside a company destroys price signals that people take for granted when they exchange in the marketplace. Without those signals, managers are at a loss to evaluate the profit consequences of choices in order to plan. The development of financial management information between the early 1800s and the early 1920s reflects efforts by companies to simulate market price information and to judge whether their economic activity is conducted as profitably as it might be in another company or in the marketplace. These developments can be grouped roughly into two categories: first are the systems for cost information to control workers in operating activities; second are systems for information to plan and evaluate the profitability of organizational subunits.

2.2.1 Controlling Workers in Operating Activities

Some of the earliest financial management information discovered to date in manufacturing enterprises was in textile factories—establishments where people found it more lucrative to conduct simple raw material conversion in a managed setting than through continual exchanges in the marketplace. Having substituted hired workers for subcontractors to process raw and intermediate materials, these enterprises lacked prices with which to evaluate comparatively their managed processes. Intermediate goods were not purchased on the market. Instead of choosing which type to buy—the cheapest of a given quality—managers had to decide which processes needed improvement. Lacking a clear price signal, they developed systems for compiling information about the cost of converting raw materials into finished output. These systems produced summary measures such as cost per hour or cost per pound produced for each process and for each worker. The chief goals of the systems were to identify different costs for the output of the company's internally managed processes and to provide a benchmark to measure the efficiency of conversion processes.

Examples of these systems come from the records of American textile companies, many of which copied the Boston Manufacturing Company's innovative management methods. One such company was Lyman Mills Corporation, an integrated water-powered cotton textile establishment built during the 1840s in Holyoke, Massachusetts. From its inception, Lyman Mills used cost information to manage the processes by which they converted raw cotton into yarn and finished fabric (Johnson and Kaplan 1987, 30–31). Lyman Mills drew information from manufacturing cost statements to evaluate and control the one aspect of their operation not governed by market exchange prices, the conversion of raw materials into finished goods. The company did not need information systems to derive the market prices beyond their control, such as prices for finished goods, raw cotton, supplies, and workers' time. They used

cost information to evaluate and control their main managed activity—workers converting raw cotton into yarn and fabric. Such information included the labor and material cost per pound of output by department (i.e., picking, carding spinning, weaving) for each worker.

Information from the Lyman Mills cost statements also offered incentives and controls to mitigate slack behavior that might otherwise dissipate the productivity gains inherent in mechanized, multiprocess systems. Workers had a natural inclination to use their time efficiently when paid in the market for each unit of output they produced; they had no automatic incentive to pursue the same goal when paid a fixed wage per period. Periodically, Lyman Mills managers used cost information to monitor employee performance. They compared productivity among workers in the same process at the same time. In addition, they compared productivity for one or more workers over several periods of time. This comparative information helped managers evaluate internal processes and encourage workers to achieve company productivity goals.

The transportation industry provides other examples of nineteenth-century companies that developed financial management information to evaluate their internal activities. Railroads such as the Pennsylvania and the Erie invented systems to compile costs per ton-mile, operating margins, and other statistics to evaluate the efficacy of their far-flung and diverse operations. The railroads, like manufacturers, devised cost reporting systems to evaluate and control the internal processes by which they converted intermediate inputs into transportations services. Using the ton-mile as a basic unit of output, they created complex procedures to calculate the cost per ton-mile.

Perhaps the first railroad manager to use cost per ton-mile information was Albert Fink, general superintendent and senior vice-president of the Louisville & Nashville in the late 1860s (Johnson and Kaplan 1987, 36–37; Chandler 1977, 116–20). Fink constructed sixty-eight sets of accounts grouped into four categories according to the different ways that costs varied with output. One category included maintenance and overhead costs that did not vary with the volume of traffic; another category included station personnel expenses that varied with the volume of freight, but not with the number of miles run; a third included fuel and other operating expenses that varied with the number of train-miles run; the fourth included fixed charges for interest. In the first three categories, Fink kept track of the operating expenses on a train-mile basis for each subunit of the railroad. With formulas he worked out to convert costs in each category to a ton-mile basis, Fink not only could monitor costs per ton-mile for the entire road and each of its subunits, but he also could pinpoint reasons for cost differences among the subunits.

The great complexity and geographic scale of a railroad suggest why managers such as Fink felt compelled to develop more elaborate cost reports than one finds in manufacturing concerns before the 1800s. The railroads did not simply appoint one person to manage the integration of several specialized

processes in one physical location, as was the case with early textile factories. In railroads, the division of specialized tasks was carried out on such a vast and complex scale that there also had to be division of management tasks as well. American railroads were the first businesses in the world in which there was a hierarchy of managers who managed other salaried managers. Cost information in the railroads became, then, more than just a tool for evaluating internal conversion processes; in the hands of Fink and those who followed him, it also became a tool for assessing the performance of subordinate managers.

Still other examples of nineteenth-century businesses that developed cost-reporting systems to control internal processes come from the distribution industry (Johnson and Kaplan 1987, 41). Like the cost management systems devised by manufacturers and railroads, the distributors' systems simulated market prices with which to evaluate the efficiency of internally managed processes—in this case, processes for reselling purchased goods. Giant urban and regional retailers such as Marshall Field's and Sears compiled gross margin and turnover statistics to measure the effectiveness and efficiency of their purchasing, pricing, and selling activities.

Field's, for example, collected departmental information on both gross margins and inventory turnover. The information on gross margins (sales receipts minus cost of goods sold and departmental operating expenses) was analogous to the information railroads used to calculate operating ratios. Gross margin information measured each department's performance and provided a means of comparing departments with each other and with the company's overall performance. The information on turnover, however, was probably unique to mass distributors. Inventory turnover (cost of sales divided by inventory) was for the mass distributor a crucial determinant of profitability. Unlike the traditional merchant, who considered markup on cost as the determinant of profit margins, the new mass distributors were driven to make profit on volume. Hence, they placed enormous importance on the rates at which departments turned over their stock each period.

2.2.2 Planning and Evaluating the Profitability of Organizational Subunits

These nineteenth-century financial management developments were largely independent of companies' financial accounting systems. Almost all companies kept a transaction-based bookkeeping system that recorded receipts and expenditures, and they often produced periodic financial statements for owners and creditors—usually distributed privately, but sometimes publicly. Before the 1920s, however, no rules or laws shaped the contents of those statements. Management information systems and financial accounting systems could operate independently of each other, or they could be one and the same—a company was free to decide for itself.

Top managers in most companies before World War II would have blanched at the idea of using financial accounting information to control operations

(Johnson and Kaplan 1987, chaps. 2 and 4–6). They often used it to plan and evaluate results. But financial plans and budgets were secret documents that top management usually kept under lock and key. Their contents were not used to control the actions of subordinates. Managers below the top level were not made to think about conducting operations with an eye to overall profitability. At most, plant and departmental managers were apprised of direct operating costs and were pressed to keep them under control. But it went without saying that those cost-control efforts would not be at the expense of customer satisfaction, employee morale, or product quality.

Indeed, nineteenth- and early-twentieth-century top managers usually were intimately familiar with their companies' customers and technologies. They did not have to hide behind a facade of accounting information to converse with subordinates. They could use financial accounting information to plan and make decisions and at the same time use nonaccounting information to control operations.

A case in point is Andrew Carnegie. Carnegie was obsessed with production costs and output. He drove his plant superintendents to continuously improve their costs and their output (Wall 1970, 337). But he did not drive for high output in order to achieve low costs. He knew that low costs and high output were no guarantee of profits without satisfied customers. "Carnegie insisted . . . that he be provided with a quality product to sell, for he knew that one adverse comment on his rails circulated by word of mouth among the railroad offices could offset a dozen testimonials in writing that he might distribute throughout the country" (ibid., 350). There was little chance that plant managers would achieve cost savings by cutting corners that might risk quality. Moreover, Carnegie could inform his plant people about customers' expectations because he knew his customers very, very well and understood what they expected. "There was not a railroad president or purchasing agent in the entire country with whom he was not personally acquainted and few with whom he had not had business in some capacity or other" (ibid., 348). And he also knew the steel- and iron-making processes so well that he could evaluate his plant managers' cost-cutting efforts and, in turn, keep them apprised of new developments in the world. "The daily communiques [to his partners and superintendents], dealing with every detail of the manufacturing process from the amount of limestone to be used in the blast furnace charge to the relative merits of hammered versus rolled blooms for rails, left no doubt in their minds that Carnegie knew his product probably better than most of the workmen" (ibid., 352). In short, a keen concern for his company's financial condition never led Carnegie to manage operations by remote control, by driving subordinate managers to achieve financial targets at any cost.

The same spirit was voiced many years later by Alfred Sloan, chairman of General Motors from the 1920s to the 1950s, when he said, "The chairman's job is to control the purse strings, not guide the hands of the artisans" (Lee 1988, 90). Sloan, like Carnegie, obviously appreciated the value to top man-

agers of having a broad financial view of a company's affairs. Like most of his contemporaries before World War II, however, Sloan also seemed reluctant to focus the attention of operating managers on the same financial targets.

Three sets of cases, drawn from opposite ends of the time spectrum from the early 1800s to the early 1900s, indicate how companies in the era before financial reporting used financial accounting results to provide a window for top management, but different information to provide marching orders for operating personnel. The earliest example comes from the records of Lyman Mills, the Massachusetts cotton textile manufacturer discussed above (Johnson and Kaplan 1987, chap. 2). The company's top managers, located in the Boston home office, prepared fully articulated income statements for each of the mills located in Holyoke. However, top management does not appear to have shared the information in those statements with the mill managers in Holyoke. Only the treasurer and his peers in Boston saw the mill revenue and net income figures. Correspondence between the home office and the mill manager suggests that top managers focused the mill managers' attention on local mill operating costs, meeting customer delivery schedules, the condition of cotton inventories, mill safety and housekeeping, the condition of workers, and mill productivity measured in terms such as output per worker and labor cost per pound (or yard). It seems the mills were not viewed as profit centers, nor even as cost centers.

As we noted previously, the cost information reported to mill managers at Lyman Mills focused almost entirely on the mill's consumption of cotton and labor time. The mill cost reports paid no attention to so-called fixed costs. Consequently, the mill manager had no incentive to produce output for output's sake, simply to minimize total costs per unit. He had no incentive to influence reported costs by building inventory. His main concern was to run the mill efficiently, not to use its capacity fully. Top management in Boston seems to have assumed responsibility for the impact of excess capacity on profitability.

Over seventy years later, around 1910, one finds similar differences between the financial information viewed by top management and the operating information used by subordinate managers in the company that virtually invented modern management—E. I. du Pont de Nemours Powder Company (Johnson and Kaplan 1987, chap. 4). A notable feature of the Du Pont management information system was the way it used and transformed the cost information devised earlier in the nineteenth century by companies engaged in single functions. Thus, Du Pont's manufacturing units compiled regular information with which to evaluate the costs of converting raw materials into gunpowder and dynamite. And its marketing units compiled information on gross margins and inventory turnover. But having integrated these functions into one company, Du Pont pushed further and developed a unique formula that combined margin and turnover information into a global analysis of ROI.

In effect, the information in Du Pont's ROI system simulated market prices

for capital in a complex company that had internalized the market for capital. To simulate market prices with which to evaluate a diverse internal market for capital, the Du Pont Powder Company developed systems before World War I to plan and monitor ROI in every corner of its complex business. Vertically integrated enterprises such as the Du Pont Powder Company, having concluded that their top managers could allocate capital among diverse operating functions more efficiently than the marketplace, proceeded to design information systems that simulated information provided by the capital market itself.

However, Du Pont seems not to have controlled operating managers with the financial information from its early ROI planning budgets. In the decade before 1920, top managers at Du Pont had detailed monthly statistics on the net income and ROI of every operating unit in the company. But they seem never to have imposed net income or ROI targets on managers of their explosives manufacturing plants. Instead, plant managers followed targets dealing with direct operating costs, timeliness of delivery to customers, product quality, plant safety, customer training (to use a very dangerous product), and comparative physical (not dollar) consumption of labor, material, and power among plants. Secure in their knowledge that plant managers would look after those key determinants of competitiveness, top managers took responsibility for the company's financial performance.

Companies by 1925 put these ROI-based systems for monitoring capital allocation decisions to a new use—evaluating managerial prowess in organizations that had, in effect, internalized the market for managers. In the early 1920s the Du Pont ROI system was modified and used to evaluate and control a decentralized market for managers at both Du Pont and General Motors. Du Pont, for instance, faced the need after World War I to administer a diverse array of new product lines created in large part by the company's efforts to use by-products of their wartime smokeless gunpowder production. By 1919 the company no longer made just explosives. Now they were on the way to producing paints, plastics, synthetic fibers, and gasoline additives. However, they found it too complicated and chaotic to manage such diverse technologies and product markets inside the explosive company's old departmentalized functional structure. So they partitioned the organization into multiple multifunctional divisions, each defined by a distinct product line or technology (Chandler 1966, chap. 2). A similar reorganization, orchestrated largely by Du Pont executives, occurred at General Motors between 1921 and 1923 (Chandler 1966, chap. 3; Johnson and Kaplan 1987, chap. 5).

In the new multidivisional arrangement, managers of divisions performed the same role as top managers did earlier in the multifunctional vertically integrated companies. The difference was that divisional managers did not answer to the capital market—they reported to a still higher group of managers who answered, ultimately, to the capital market (Chandler and Redlich 1961). But top managers began using financial accounting information—especially

ROI information—to monitor the performance of divisional managers. Here is the first time top managers unequivocally used financial accounting information to control the actions of subordinate managers. Managers of very large multifunctional enterprises—corporate divisions—were now hired, trained, and disciplined by other managers—not by the capital market or its representatives. To insure commitment and companywide loyalty among divisional managers, top managers also created incentive devices, such as the Managers Security Company bonus plan at General Motors that Raff and Temin describe in chapter 1.

2.3 Cost Accounting for Financial Reporting after 1900

As mentioned above, companies in large numbers began to disclose financial information to third parties after 1900, when manufacturers turned to financial markets for capital for the first time. In disclosing financial information, companies ultimately followed reporting rules mandated by accountants—auditors—and by public agencies. In the United States these rules evolved in the 1920s and 1930s in somewhat different details among various agencies (e.g., the Securities Exchange Commission, the Internal Revenue Service, and numerous regulatory authorities); however, the public accounting profession's rules for audited public statements provided the framework for most financial reporting by World War II.

Most public financial reports contain at least two items—a statement of financial condition, popularly known as the balance sheet, and a statement of financial results, usually referred to as the income statement. A balance sheet lists the stock of assets and claims on those assets at one moment—usually the last day of an accounting period. An income statement reports the total flow of revenues and expenses over a period of time. Net income reported in the income statement usually equals the change in balance sheet net worth (assets minus claims) from beginning to end of the period.

Public accountants' rules for financial reporting affect management cost information in two important ways. First, they require costs to be classified in the income statement by functional areas of the business (e.g., purchasing, production, marketing, selling, administration, and finance). Those functional classifications usually conform to subdivisions in a company's organization chart. They do not reflect underlying categories of work, or activities, that cause costs. In other words, these classifications tend to identify costs with locations where accounting transactions occur, not with locations where activities occur that cause the costs. However, companies tend to sort costs used for all purposes according to these ubiquitous financial accounts classifications. As we shall see later, transaction-based cost information is not as relevant and reliable as activity-based cost information for making most management decisions.

The second major influence public accountants' rules have on cost infor-

mation results from two rules for preparing balance sheets and income statements. First, balance sheet assets must be valued at historical cost, not current market price (unless market price is lower than cost). Second, production expenses deducted from revenue in an income statement must relate specifically to (i.e., "match") revenues generated in the period. To fulfill the historical cost rule, accountants derive all cost information for financial reports from original transactions recorded in a company's double-entry accounts. To fulfill the matching rule, they attach those original transaction costs to manufactured products, using cost accounting systems they designed around 1900.

Accountants designed product costing systems in the early 1900s to divide manufacturers' production costs between goods sold (an expense deducted on the income statement) and goods still on hand (an asset listed on the balance sheet as inventory). If expense deducted on the income statement includes outlays to produce goods sold in prior or later periods—violating the matching rule—then income for the period is misstated. This need to divide production costs between output sold and output still on hand does not arise in service organizations, where output is produced and sold at the same moment, or in a manufacturing establishment that never has any inventory of unfinished or unsold production at the end of an accounting period. In those cases all production expense incurred during a period is deducted from revenue as a cost of the period—a simple matter requiring no special accounting system. Therefore, accountants did not develop product cost accounting systems for industries that do not manufacture products, such as service companies in banking, insurance, telecommunications, health care, and so forth. Presumably they would not have developed product costing systems even for manufacturers, except that a manufacturer's production in one period almost never equals the amount sold in the same accounting period.

To value unfinished and unsold inventories of manufactured products at their original (i.e., historical) transaction costs, accountants after 1900 devised product costing systems to attach direct and indirect production costs to products. Procedures for attaching direct costs are straightforward, since each product's consumption of direct resources (e.g., raw materials, purchased components, and touch labor) is clearly visible. Indirect production costs (often referred to as production overhead), where the consumption of resources in production is not visibly connected with a specific product, are attached to products using various arbitrary—but relatively inexpensive—allocation procedures, the most common procedure being to prorate them over the direct labor hours expended on each product. For convenience, businesses often use a single plantwide rate for allocating overhead to products, regardless of the diversity of their products and processes.

It is interesting to observe that manufacturers before the era of financial reporting concerned themselves very little with the subject of product costing—arguably the topic that contributes most to managerial accounting's fall from relevance after World War II. This inattention occurred simply because

they did not feel compelled to "cost" products for financial reporting purposes. Indeed, to prepare in-house financial statements they were content to value unsold and unfinished inventories at market prices. Nevertheless, they did experiment with techniques for estimating product costs—especially near the end of the nineteenth century—for reasons other than financial reporting.

The development of managerial costing systems passed through three stages between the early 1800s and the 1950s (Johnson 1987). In the first phase, to about 1885, manufacturers' systems for monitoring factory conversion costs were not also used to cost products. From a managerial standpoint this is understandable. Although these companies often managed several internal conversion processes, they tended to produce fairly homogeneous lines of output that were sold in competitive markets. They did not require product cost information to evaluate profitability. To assess the profitability of alternative choices facing them, managers simply needed good information about conversion costs in processes, and that is the information their cost management systems were designed to deliver.

Although not required to report financial information to outsiders in this period, manufacturers often prepared financial statements for internal use. As we noted previously, their efforts to prepare these statements did not include costing products. Their income statements simply deducted from revenues all production costs of the period, adjusted by the change in market value of unsold and unfinished inventories from the beginning to the end of the period. By valuing inventories at market, they had no need for systems to attach costs to products. An obvious and simple solution to valuing inventories and to matching costs with revenue, market-price valuation was a casualty to historical cost rules that twentieth-century accountants imposed on financial reporting in the name of consistency and objectivity.

In the second phase, between 1885 and World War I, managers in some industries showed enormous interest in the issue of product costing. However, this interest did not reflect any desire to compile product cost information for financial reporting. Rather, the interest reflected a need for information to evaluate prices and profitabilities of diverse, often custom-made products made in complex metalworking shops. Facing diverse lines of products that consumed resources at widely varying rates, managers in those firms sought accurate product cost and profitability information, primarily to help them bid on custom orders.

A noteworthy aspect of this search for reliable product costs is the careful treatment these late-nineteenth-century metalworking firms gave to overhead costs. Epitomized by the writings of A. H. Church, a contemporary of Frederick W. Taylor, they advocated meticulously tracing resource costs to the products that cause the consumption of resources (Vangermeersch 1986, passim). Unlike accountants who were beginning to write about product costing for financial reporting at this time, Church and his peers were not content to simplistically prorate overhead costs over the direct labor hours in products.

The accountants and Church, of course, had very different reasons for costing products. Accountants merely wanted an easy and low-cost way of attaching overhead costs to products in order to match historical costs against revenue. Church and other managers of complex machine shops wanted reliable cost information to use in bidding.

After a few companies failed at trying to implement his costing concepts, Church's proposals for tracing overhead costs to products fell out of favor and were relegated to the dustbin of history after World War I. The cost of gathering and compiling such information made Church's costing procedures prohibitive in the early 1900s. However, historians have noted how Church's costing methods resembled activity-based costing techniques made possible in the 1980s by the advent of powerful personal computers.

The third phase in the development of managerial product costing between the early 1800s and 1950s began around 1914. At that time, companies in some industries desired product cost information to make decisions, but their wishes were thwarted by the high cost of processing information. These companies, all producing diverse lines of products, faced a dilemma. They knew not to use accountants' financial cost information to evaluate product mix and pricing decisions. But the high cost of processing reliable information precluded installing alternative product costing systems, such as the ones advocated by Church (Yates 1989). Instead, these companies resolved the problem with alternatives other than costing systems.

A solution for some companies, especially hardware-making and metalworking companies, was to ignore product cost information and charge ahead with a strategy of producing and selling "full product lines." They did not question an individual customer's special product demands as long as total profitability of the entire company seemed assured. To know total profitability did not require information about costs of separate products—only the total cost information that was already available at no extra cost in the financial accounting system.

Other companies in the 1920s, especially large firms whose product diversity cut across technological lines (e.g., Du Pont) or industry markets (e.g., General Motors), solved the problem of high information-processing costs by creating decentralized multidivisional organizations. Du Pont, as discussed above, divisionalized to cope with the complexity brought on by new product technologies at the end of World War I; General Motors, as discussed by Raff and Temin, divisionalized by creating a strong corporate staff to coordinate and direct a diversity of product offerings. Both companies coped with the complexity of product diversity by placing the activities of each distinct product line into separate compartments that were subject to the financial discipline of a strong corporate staff. By lowering the cost of coping with diversity, divisionalization extended the horizontal boundaries of companies such as Du Pont and General Motors.

These multidivisional structures were an alternative to investing in a sys-

tem, such as A. H. Church's, that could reliably trace costs to separate product lines. Presumably it was less costly in the 1920s to restructure than it was to implement a Church-style costing system. However, modern computer technology probably makes the information-processing alternative less costly than restructuring as a way to manage the complexity of diversity today. The unbundling of many diverse conglomerates in the 1980s suggests that is the case. Perhaps multidivisional structures would never have become popular if the computer hardware and software technology of the 1980s—the wherewithal to make A. H. Church's product costing scheme practical—had been available in the early 1900s.

2.4 Managing with Financial Accounting Information after 1950

Businesses in the past forty years have used financial accounting information not only to plan the extent and financing of the business as a whole and to report results to outsiders, but also to manage operations inside the company. Thus, accounting information intended primarily for reporting the financial *results* of business operations is used to shape decisions and actions that determine those results. This use of financial accounting information may not be surprising. Unlike management information, which is subjective and process-oriented, financial accounting is objective and rules-oriented. Indeed, financial accounting information provides "an aggregate test of the efficacy of the operational control systems in achieving their objectives," and financial accounting systems "provide the aggregation and summary necessary to reduce complex operations data to comprehensible scores of performance" (Armitage and Atkinson 1990, 141).

However, financial results do not "provide the basis for understanding what needs to be changed and how." They merely "provide a diagnostic of whether there has been a failure in the operations control systems that needs to be discovered and corrected" (ibid.). Consequently, the practice in the past forty years of using accounting information to manage operating activities is problematic. As many believe, the practice may have impeded competitiveness and impaired profitability in recent years. For evidence to support this claim, consider two managerial tasks that have been particularly affected by the practice of managing activities with remote accounting information: planning and decision support, and control of operations.

2.4.1 Planning and Decision Support

In running a business, managers need information about the financial consequences of intended actions. As a guide for planning, and to choose among alternatives, managers need profitability information. They especially need reliable cost information. Cost information serves in many planning and decision support roles, such as estimating profit margins of products and product lines, evaluating decisions to make or buy components, preparing departmen-

tal cost budgets, and charging administrative services to production departments.

An important source of cost information in American business since the 1950s has been the financial cost accounting system. As we mentioned above, these costing systems were designed originally to attach production costs to manufactured goods in order to divide an accounting period's total production costs between products sold and products still unfinished or unsold at the end of the period. They were not intended to provide information about costs of individual products. Moreover, companies rarely used them to gauge individual products' costs before World War II. But companies everywhere used information from the financial cost accounts to evaluate costs of products after the 1950s.

An example can be drawn from this history of a regulated public utility. AT&T was a regulated monopoly for many years during which accounting techniques were designed to measure the overall rate of return of the company and, as time went on, to separate revenues and costs into interstate and intrastate categories. Competition was allowed into a small corner of AT&T's business in 1959. AT&T responded by cutting its prices for the affected services, and the new entrants complained to the regulators.

The regulators asked AT&T if the new prices covered AT&T's costs. The problem was that no one had ever calculated the cost of an individual service before. The question had not arisen in the previous eighty years of AT&T history. AT&T had followed the pattern of selling a full product line, as described above. This large and sprawling business had been managed by a variety of specific indicators that did not involve the allocation of overhead to specific activities. There consequently were no rules or guidelines with which to allocate AT&T's huge fixed costs to individual services. The quest for a solution to this problem—still controversial today—would consume vast amounts of legal and regulatory time of the next twenty years (Temin 1990).

Financial accounting systems provide poor information to evaluate product costs in manufacturing as well as in regulated telecommunication companies (Johnson and Kaplan 1987, chap. 8; Cooper and Kaplan 1988). The manufacturing cost accountants' traditional approach to allocating overhead costs, in proportion to direct labor hours, systematically distorts the costs of individual products. Attaching overhead costs in proportion to volume of output is a convenient and economical way to insure that production costs are properly matched against revenues at a macrolevel in financial statements. But at the microlevel of the individual product this allocation technique provides reliable cost information only if we assume most overhead costs are caused by or vary in proportion to units of output (Cooper 1990).

This assumption is probably never true, and certainly was not in American manufacturing companies after the 1950s. Indeed, a steady—some would say explosive—growth in manufacturing overhead costs after the 1950s accompanied an equally steady *drop* in the usual overhead allocator—manufacturing

direct labor hours. Moreover, products that consume relatively large chunks of direct labor—established lines of commodity-type products that are mass-produced with older labor-intensive technologies—did not cause overhead to grow after the 1950s. Causing overhead to grow were less labor-intensive products that were custom-made with newer, less familiar, and more expensive materials and equipment, as well as rapidly proliferating varieties of new products that demanded expensive design, scheduling, and rework time—all sources of overhead cost. By allocating overhead on direct labor hours, products that caused indirect costs to increase were systematically undercosted, and products not responsible for the increase were systematically overcosted.

These distortions tend to cancel out at the macro level and therefore do not affect income and asset totals reported in financial statements. But they give a misleading picture of individual products' margins, as many American and European manufacturers discovered in the 1970s and 1980s when, using financial cost accounting information to measure product costs, they erroneously assumed they could improve their company's profitability by proliferating varieties of newer "high-tech" lines. In one well-documented case a manufacturer of automotive components in the 1970s, Schrader Bellows, added a dizzying array of complex new products that its accounting system said were quite profitable. In fact, the strategy depressed earnings and led the company to the edge of bankruptcy by the early 1980s (Cooper 1985).

Recognition of this problem grew during the 1970s, and a solution to the problem, known today as activity-based costing (ABC), began to appear in the early 1980s (Cooper 1987; Johnson and Kaplan 1987, chap. 10). Advocates of ABC tell companies, in effect, to cost products differently for financial reporting information than for planning and decision-support information. For strategic planning information, ABC costs the activities, or work, that cause overhead costs and then assigns overhead costs to products by adding up costs of activities that each product consumes. Simple in concept, ABC was a practical impossibility until the advent of low-cost microchip technologies in the 1970s made it economic to collect and compile activity-based cost information.

2.4.2 Control of Operations

Companies always had used accounting information to view results of operations, but accounting targets generally were not considered a tool for controlling operations until after World War II. By the 1950s, companies began to evaluate and motivate the performance of operating personnel at all levels in terms of accounting results such as costs, net income, or ROI.

An analogy that helps clarify the difference between using financial accounting information to "see" results and to "manage" results is the giant electronic display board controllers use to monitor activities in a modern oil refinery, chemical plant, or power-generating station. If they followed the logic implicit in managing by the numbers, top managers of power-generating sta-

tions or oil refineries would tell personnel in each department to come in from the plant and run things "by the lights" on their respective sections of the control board. Following those instructions, which people are likely to do if an incentive scheme links their compensation to the performance of lights on the board, people will forget what they must do to fulfill the plant's original purpose. Instead, they will take to conducting operations in the plant with an eye to manipulating their department's lights on the board. While that does not portray how electronic control boards are used in processing plants, the following two examples suggest it may accurately depict how companies used accounting information to control operating performance after the 1950s.

The first example shows how cost accounting information often confounds efforts to manage costs simply because it shows only where money was spent, and how much, not why it was spent. A hypothetical company's production department in Cleveland records costs in two separate lines for resin and maintenance incurred in running extrusion machinery. These cost accounts do not indicate, however, that resin and maintenance consumed in the production department reflect a policy, carried out by the company's purchasing department in Baltimore, to "buy in large quantities from vendors that quote the lowest price." A dumpster full of defective extrusions and extra maintenance to unclog gummed-up extrusion machines simply show up in the accounts as extra costs of production in Cleveland, not as the price paid for a Baltimore purchasing agent's efforts to win a bonus by acquiring raw material at the lowest cost. Attempts to manage the costs recorded in such accounts will not affect purchasing policies executed in Baltimore. Instead, favorable price variances on raw material purchases will encourage more of the same policies, while unfavorable production cost variances will focus attention on "inefficiencies" in Cleveland, perhaps prompting a decision to reduce costs by outsourcing extrusion to a Third World country.

The second example showing how "managing by remote control" caused harm after the 1950s involves the use of standard cost targets to control the performance of operating personnel (Hall, Johnson, and Turney 1990, chap. 3). Almost all American manufacturing companies for the past forty years have used cost targets from top-level planning budgets to set standards for operating personnel. These cost targets are seen as an important tool to control the operating performance of plant managers and department supervisors. Like the setting for desired room temperature on a thermostat, cost targets are a setting to compare against actual costs. Variances between actual and desired costs provide "feedback" that is supposed to prompt operating personnel to adjust what they are doing, as a furnace adjusts in response to feedback from the thermostat.

Standard cost variance systems monitor costs in each and every process of a company's production system. For direct costs, labor and machine tracking schemes report direct costs per hour or per unit of output. For overhead costs, reporting schemes track the percentage of overhead "covered" or "earned" by

units produced. The goals of these reporting schemes is to have all recorded direct labor or machine hours go toward production of standard output and thereby "absorb" or "cover" direct and overhead costs—a condition referred to as "efficient."

Department managers beat this system by scheduling workers and machines to produce output in long runs, so less time is charged to categories of indirect or "nonchargeable" time such as changeovers or setups. Because output enables a department to "earn" the direct hours incurred each reporting period, supervisors keep workers and machines busy producing output. Every unit produced—including the equivalent of full units in partially finished work—entitles the department to a standard allotment of machine or person hours. If a department produces enough equivalent finished output to "earn" all the direct hours reported in the period, it is declared "100 percent efficient." It does not matter if the output is saleable. In fact, hours spent on "allowable" rework are often considered to be "efficiently covered." With so flawed a system, people sometimes put in hours creating defects, just to build inventory and to create more rework.

Ironically, managers' efforts to achieve high standard cost efficiency ratings have tended over time to increase a company's total costs and to impair competitiveness (Johnson 1990; Kaplan 1985). Achieving standard direct cost efficiency targets leads to larger batches, longer production runs, more scrap, and rework—especially if incentive compensation is geared to controlling standard-to-actual variances. Pressure to minimize standard cost variances, by encouraging department supervisors to keep machines and people busy producing output, regardless of market demand, often causes unnecessary inventories of finished and in-process merchandise to accumulate, product lead times to increase, and dependability at keeping schedules to decrease. Standard cost systems reward personnel for meeting independent finance-driven targets, not for satisfying customers, internal and external. Indeed, customers scarcely fit into the world of standard cost performance. The customer is merely someone the company persuades to buy the output managers are driven to produce, at prices it is hoped exceed variable costs.

Managing costs with accounting information in standard cost systems impedes companies' competitiveness and long-term profitability primarily because it motivates people to sustain output in order to achieve cost targets. It encourages managers to achieve financial cost targets by producing output for its own sake, instead of encouraging them to focus on the one key to competitive operations and long-term profitability—namely, empowering people to efficiently satisfy customer wants.

This impetus to produce output for its own sake, rather than to concentrate on the work needed to satisfy customers, also results from using net income or ROI targets to control operations—another example of managing by remote control that appeared in the 1950s. Moreover, managing profit or ROI goals, just as managing cost numbers, also motivates managers to produce

output for its own sake because of the "matching" rules that require accountants to attach production overhead costs to manufactured goods. Only overhead costs attached to products sold are deducted against revenue in the income statement. Therefore, the more units of output produced in a period and the more of those units that remain unsold (but marketable) at the end of a period, the less overhead cost is deducted from revenue in the period. Smart managers who need to temporarily boost income know what to do: go into overtime, rent temporary warehouse space, and get busy producing output.

Obviously this practice has a backlash. In the next period, unless selling prices rise, income is reduced by prior period's costs carried forward in inventory sold in the next period. But managers usually assume they can build inventory to boost income in one period and then spread the effect of the backlash over several future periods, meanwhile hoping no one notices the added inventory carried over from the first period.

Actions taken by operations managers who are driven by remote financial controls will impair companywide competitiveness and long-term profitability not just because accounting rules drive them to produce output for its own sake. Other steps they take to manipulate financial performance that impair a company's long-term economic health include deferring discretionary expenditures for research and development, postponing maintenance programs, encouraging employee turnover as a way of holding down direct labor costs, cutting back employee benefit programs, purchasing materials and supplies only from vendors who bid the lowest prices, cutting employee training programs, postponing capital investments in expensive new technologies (i.e., scrape by as long as possible on old, fully depreciated assets), and more.

The practices spawned by using accounting numbers to manage business operations culminated by the 1970s in people viewing a company as a "portfolio" of income-producing assets. Strategists who adopted that view saw top managements' job as maximizing the value of a company by properly balancing the risks and returns of a company's asset portfolio. While appropriate for managing portfolios of marketable securities, such strategies are totally misapplied when used to manage a business. Managers of conglomerates who followed such strategies turned their attention completely away from internal operating activities and customer satisfaction and attempted to create value out of thin air by "acquiring stars," "milking cash cows," and "divesting dogs."

The consequences of managing operations with financial targets are revealed in the recently published history of a company swallowed up in the conglomeration boom of the 1970s. The company, Burgmaster, was the largest American machine-tool maker west of Chicago when it was bought out by a conglomerate in the mid-1960s. Fifteen years later the conglomerate became the nation's first large leveraged buyout. Burgmaster's history falls into two phases: twenty years of excellent growth and profitability in the hands of a brilliant, customer-focused engineer who founded the company, followed by

twenty years of decline into bankruptcy in the hands of finance-driven, numbers-oriented professional managers. Burgmaster's demise, mirrored by countless other companies whose stories have yet to be documented, can be attributed in no small way to the disinterest in people and customers associated with an obsessive push to manage operations with accounting numbers by remote control (Holland 1989).

2.5 Management Accounting's Lost Relevance after 1950: Reasons and Consequences

Underlying modern management accounting—and the cause of its lost relevance—is the belief businesses can both plan and control their affairs with financial accounting information (Johnson 1988). This belief was not widespread before the 1950s. Indeed, before World War II companies rarely viewed financial accounting information as anything other than a compilation of results (after-the-event information) or as data that could be used to project, or simulate, the financial consequences of proposals and plans (before-the-event information). Financial accounting information was almost never used to set targets for operating performance.

Businesses have suffered because managers began to take accounting numbers seriously as an object to manage rather than considering them as passive measures of results. By the 1960s, for example, top managers had begun to impose ROI and net income targets on subordinates other than just divisional mangers. They were not content simply to budget and plan based on these financial targets. Instead, financial planning targets were used to control the actions of subordinate managers and operating personnel. Companies drove the profit center concept of responsibility lower and lower into organizations and thereby made it necessary to evaluate growing numbers of people with short-term financial measures like ROI. "Tight financial controls with a short-term emphasis" inevitably impair long-term profitability because they will "bias choices toward the less innovative, less technologically aggressive alternatives" (Hayes and Abernathy 1980, 70, 77).

Top managers after the 1950s took a fateful leap that their nineteenth- and early-twentieth-century predecessors had resisted. They began to use accounting information for a purpose it was not intended to serve. They began using accounting information "to guide the artisans' hands." That practice, more than any other, defines management accounting's lost relevance in recent years. In effect, the decline into irrelevance of management accounting was a case of putting the cart before the horse. Financial information about business results—the cart—became the prime object of managers' attention. Managers quickly lost sight of the horse, that is, the underlying forces that produce financial results. The rest, as they say, is history. Financially oriented managers were poorly equipped to lead companies through the competitive wars of the 1970s and 1980s.

What caused the change that we notice by the 1960s? Usually people blame either the accounting profession, for reporting rules that cause perverse consequences, or Wall Street, for pressuring top managers to achieve market-pleasing quarterly financial results. However, financial reporting information and Wall Street pressures may simply shoulder blame for a much deeper problem; namely, the gradual but relentless power of accounting systems to conquer and shape managers' attitudes. As I said before, accounting is more than just a neutral, technical tool that measures financial outcomes. It also influences the decisions that determine outcomes. Indeed, the history of management accounting in the last fifty years is the story of accounting systems taking on a life of their own and shaping the way managers run businesses.

By the 1960s, the intrusion of financial accounting into management accounting systems was causing top managers' to abdicate their strategic responsibilities. Instead of being broad-gauged integrators—conversant in production, marketing, and finance—many American senior executives by 1970 were forced excessively on the financial dimension of business. They had adopted a "newly managerial gospel" that encourages "a preference for (1) analytic detachment rather than the insight that comes from 'hands on' experience and (2) short-term cost reduction rather than long-term development of technological competitiveness" (Hayes and Abernathy 1980, 68).

In trying to explain how the top managers in American industry migrated during the past century from the likes of Andrew Carnegie to the type of individual just described, one must place a great deal of emphasis on the growing influence accounting information has had on managers since World War II. The proximate origins of this influence probably lie in the increased use of ROI information that accompanied the spread of the multidivisional form of business after the 1920s. In multidivisional companies, the "increased structural distance between those entrusted with exploiting actual competitive opportunities and those who must judge the quality of their work virtually guarantees reliance on objectively quantifiable short-term criteria" (ibid., 70). These diversified organizations were, as suggested earlier, "nurseries" for top-level corporate managers—graduate training grounds, as it were, before there were many graduate business schools. Having been schooled in the virtues of managing through accounting systems, division managers took the same lesson with them when they rose to the top. Eventually, financial reporting dominates managers' attention to the point where they no longer know, or care, about the production, technological, and marketing determinants of competitiveness.

The multidivisional organization is not, of course, the only influence that reinforced and justified the practice of remote management through accounting systems. Another influence was business education itself. Following World War II American business schools adopted the economist's model of the firm as the paradigm for teaching business decision making. Writers of management accounting textbooks also used the model to show how financial

accounting information could be made "managerially relevant," largely by separating fixed from variable costs. This model was appropriate for studying price behavior in market settings, but it was not relevant to understanding the workings of a managed enterprise. Nevertheless, thousands of managers by the 1960s were trained to work with a version of economics that does not deal with activities inside managed firms.

Teaching this economic theory to business students and using it to rationalize management by remote accounting controls tended to reinforce in managers' minds the virtues of the mass-production/mass-market mindset that had shaped the way companies organized their operations since early in the century. A mass-production/mass-market mindset that took root in the last quarter of the nineteenth century was nourished and promoted after World War II by the new management accounting practices.

This mindset tends to be linked to a vertical-hierarchical approach to managing that focuses on the performance of individuals, not groups. It also is associated with the poor competitive performance and falling profitability of American manufacturers in the last twenty years (Aoki 1990). The approach is reinforced, but not necessarily caused, by using financial accounting numbers to control operating activities. An alternative horizontal/team-oriented approach (often associated with Japanese companies) is seen as more conducive to competitiveness and profitability in the global economy. It reaches for enhanced flexibility by building to smaller scale and encouraging people to move constraints, not optimize within them. This approach to management overcomes the real short-term bias, which is not simply thinking in terms of next period's income statement, but refusing to move constraints and believing that the best results are had by "optimizing" inside existing constraints.

To get from the vertical to the horizontal approach, companies must change the way they do business and change the way they organize operations. The lost market share, closed plants, and other ills that we associate with American manufacturing in the 1970s and 1980s were not caused by poor-quality management accounting numbers as much as they were caused by an approach to management that was reinforced by the habit of controlling operations with accounting numbers.

2.6 Conclusion

In short, patterns of production are shaped by accounting information flows in business enterprises. Using financial accounting information to control operations has encouraged the vertical organization of businesses and mass production. Managing by financial accounting and mass production have become intertwined and mutually reinforcing.

This approach was very successful in the years after World War II. American mass production dominated world production. But accounting information can impede managers' comprehension of changing competitive con-

ditions. American firms by the 1970s were saddled with a management accounting system that did not help them produce for global markets.

It sounds paradoxical to say that managers choose to look at the wrong information. But organizational structures and information systems are fixed investments as durable as any building (Yates, chap. 4 in this volume). Management accounting systems may outlast their usefulness, and it may be hard for practitioners to realize that a massive new investment is needed. The historical examples in this paper suggest that a precondition for an American industrial resurgence is a sharp turn away from existing management accounting practices and toward a new model that focuses operating managers' attention on processes and people (especially customers, employees, and suppliers), not on financial accounting results.

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Comment Peter Tufano

Johnson's essay "Managing Costs by Remote Control" details how accounting information has been used and misused to manage American businesses since the early nineteenth century. He chronicles the early search for relevant data to measure the performance of people and processes, and the later adoption of flawed financial reporting targets. Johnson's work clearly demonstrates how information, incorporated into incentive systems, can dramatically affect managerial decisions.

Accounting systems produce imprecise and sometimes misleading clues to performance. Investors have long recognized this fact. In the nineteenth century, major investment guides gave potential railroad bondholders detailed operating, as well as financial, data with which to judge the performance of the roads. In the late twentieth century, financial reporting and disclosure are extensive, but much of the well-compensated work of security analysts is to look through and beyond financial statements produced by companies. Thus, the financial markets respond to accounting data, but also search for other measures of performance, and use judgment in interpreting audited annual reports in order to make investment decisions.

Contrast how skeptical investors use accounting data with how modern managers use financial information, according to Johnson. Modern managers use *too little* information, specially management accounting information based upon financial reporting data. These data are technically *flawed* in that they improperly allocate costs. Finally, modern managers *mechanically* use these bad measures to produce decisions and create incentives.

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The historical evidence that Johnson cites in sections 2.2 and 2.3 suggests that, until World War I, these three problems were avoided. Managers used a great deal of information, much of it operating statistics, to control firm activities. Thus they did not overlook important nonfinancial variables like product quality. The financial information embedded in operating statistics was not constrained by generally accepted accounting principles such as those that dictate the use of historical cost as a basis for valuation. The most complicated element of the historical picture that Johnson paints is the apparent tension between owners monitoring minute operating details yet providing proper incentives for managers to achieve a wide range of operating goals. Johnson uses the example of Lyman Mills, which apparently developed a useable cost information system that was communicated to mill managers. Somehow, the home office and top managers "focused" the mill managers' attention not only on costs, but also on schedules, inventory levels, safety and employee conditions, and mill productivity.

The example of Lyman Mills suggests that owners must have given managers broad marching orders. Without a better appreciation for how early incentive systems worked, it is impossible to ascertain the impact the quality of data had upon the decision-making process. For example, Johnson condemns modern management accounting for motivating managers to produce excess inventories, in part because it measures costs incorrectly and in part because incentive compensation is tied to standard-to-actual variances. A mill manager intent on meeting all customers' orders and on increasing output per worker may also be guilty of producing high levels of inventories.

People facing multiple objectives must make trade-offs among conflicting goals. They are guided explicitly by orders from top management, or implicitly through compensation, hiring/firing, or investment decisions made by firms. Johnson's historical evidence tantalizes us by suggesting that managers were instructed to address a wide range of concerns, but stops short of telling us how they made decisions.

Johnson claims that financial accounting information was not used to "control" but rather only to "plan and evaluate." First, the distinction between uses of information is quite vague. Second, the prima facie evidence supporting his claim that financial targets were not used to manage firms is that financial results were not communicated to operating managers. However, data that are not directly observable can still influence decisions. For example, a child may never learn her IQ, but that measure can affect child development profoundly if her parents react to their unrevealed knowledge of the score. Much more concretely, Levenstein's work on Dow Chemical, presented in chapter 3 in this volume, suggests that operating managers were indeed evaluated based on financial performance—and acted accordingly—even though they could not directly observe the financial data. This research suggests that companies were indirectly "run by the numbers" well before Johnson suggests our current accounting malaise began, although arguably the numbers used may have

been more relevant. Thus, if top executives were concerned with financial reporting results that measured the changes in their own wealth, they may have transmitted this concern to their subordinates even though the specific data were not revealed.

Sections 2.3 and 2.4 chronicle changes in management accounting practice, specifically the development and use of cost accounting systems. According to Yates's work in chapter 4 in this volume, changes in the cost of collecting information provide a powerful explanation for management accounting developments. In the early period, managers measured what was cheapest to measure; that is, the physical amount of inventories or the throughput of processes. Two trends influenced the cost of information gathering and spurred the adoption of financial reporting information as the basis for management accounting. Over time, production technologies became more complicated, especially in multiproduct firms with many joint production costs. As a result, direct measurements of physical processes became more expensive and less informative. At the same time, investors, auditors, and regulators demanded more standardized financial information. For example, the investment community at the turn of the century began to focus more on a corporation's earnings than on its assets as a basis for valuation. This trend manifested itself in new forms of securities, such as debentures, but in turn required that more information be available so that earnings could be measured. These demands for financial information made the marginal cost of using financial reporting data for management accounting nearly zero. In other words, financially oriented management accounting was a low-cost by-product of the financial reporting system, just as modern activity-based costing is a by-product of lowered computing costs.

In section 2.4, Johnson contends that management accounting systems are not neutral measurement tools. When flawed metrics are used to mechanically motivate managers, wrong decisions are made. Johnson discusses cases where costs are not properly allocated to products or externalities are not identified. He cites field evidence and prior research to support the claim that poor management accounting information leads to incorrect decision making, but he seeks to go far beyond the implications of management accounting for poor shop floor and product-pricing decisions.

It is difficult to draw sweeping conclusions about the impacts of managerial accounting on a company's profitability or a nation's competitiveness. Johnson obviously recognizes this, and therefore in section 2.5 he broadens his focus considerably. He speculates upon the sociological causes for the rise of "finance-driven, numbers-oriented" managers, bound by accounting systems that measure their businesses. Furthermore, he uses these ideas to explain the declining competitiveness of American business. While I find the discussion stimulating, a few pages cannot begin to prove Johnson's arguments regarding the impacts of misguided business education, misused economic thinking, or the development of a new managerial mindset.

In conclusion, Johnson's paper is a valuable contribution that summarizes the changes in management accounting systems over time and that lays out consequences of using poor and narrow accounting measures. As Johnson turns his attention away from history and toward contemporary practice, he offers a provocative set of assertions to account for perceived changes in the performance of American history.

Johnson concludes by exhorting managers to pay attention to processes and people, not to financial accounting results. This advice, while intuitively appealing, seems very difficult to implement. Even a perfect multidimensional measurement system—one that correctly identifies long-term costs of poor quality, customer dissatisfaction, or economic externalities—requires rules to arbitrate how trade-offs will be made when inevitable conflicts arise. The existing system, however flawed, adopts the perspective that financial reporting numbers are meaningful indicators of firm value, which in turn reflect something about the wealth of the owners of the enterprise. Incentive systems that tie managerial rewards directly to value creation as measured by stock prices avoid using imperfect accounting measures, but do so at the cost of introducing a great deal of noise into the system. Giving managers instructions to take care of people and processes, that is, to "do the right thing," may provide managers insufficient guidance and may not result in value-maximizing behavior.

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