CURRENT DEVELOPMENTS IN COST ACCOUNTING AND THE DYNAMICS OF ECONOMIC CALCULATION

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The role of accounting as articulated in Austrian economic theory is securely fastened to the task of economic calculation. Ludwig von Mises distinguishes between prospective or anticipative calculation involving the "precalculation of expected costs and expected proceeds" relating to a planned course of action and retrospective calculation that establishes the results of past action, the "accounting of profit or loss" (1949, p. 229). And his devastating argument that the inability of the socialist planners to calculate the costs of alternative courses of action renders socialism impossible and establishes the critical role of cost accounting in business decisions under capitalism.

The history of cost accounting dates back to the 1800s with the emergence of large enterprises like textile mills, railroads, steel companies, and retail companies. The need for measuring efficiency and determining the cost of converting raw materials and transporting goods or passengers gave rise to management accounting systems to support the profit-seeking activities of entrepreneurs. By the late nineteenth century, cost standards for improved efficiency and pricing were developed. And by 1925, according to Johnson and Kaplan, virtually all of the traditional cost accounting[1] practices prevalent today had been developed, including "cost accounts 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" (1987, p. 12).

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[1]The term "cost accounting" is often used interchangeably with the term "management accounting." However, the latter term is a broader term whose meaning typically includes "cost accounting" as well as other topics such as budgets, sales analysis, and return on investment measures.

One of the long-standing difficulties in cost accounting has been the allocation of "indirect costs" to various objects such as products, departments, divisions, etc. For example, traditional cost accounting has long depended on predetermined overhead rates in order to apply the indirect cost of manufacturing to different products by means of some base such as direct labor cost or direct labor hours. Mises was well aware of the problem of assigning indirect costs for purposes of departmental profitability analysis:

> The elaborate methods of modern bookkeeping, accountancy, and business statistics provide the enterpriser with a faithful image of all his operations. He is in a position to learn how successful or unsuccessful every one of his transactions was. With the aid of these statements he can check the activities of all departments of his concern no matter how large it may be. *There is, to be sure, some amount of discretion in determining the distribution of overhead costs.* But apart from this, the figures provide a faithful reflection of all that is going on in every branch or department. (Mises 1962, p. 32; italics added)

During the past decade cost accounting has come under vigorous attack on the grounds that traditional approaches to allocating costs are fraught with considerable arbitrariness and contain substantial errors which can lead to misguided decisions dealing with such matters as pricing, outsourcing, capacity planning, and profitability analysis for various product lines and other segments of business activity. For example, a costing program at a Whirlpool Corporation appliances plant revealed that a traditional overhead allocation per unit of a particular product was $65.46 when a more accurate cost tracing should have assigned $728.92 (Greeson and Kocakulah 1997).

Such distortions stem from the fact that cost structures in many companies have undergone profound change. Escalating overhead and other *indirect* or "support" costs accompanied by a major diminution of direct labor cost as a proportion of total product cost have resulted from the increasing degree of skilled labor, automation, and computerization in manufacturing and other areas of business activity. In a typical plant today you will often find extensive sophisticated equipment with virtually no "direct labor" workers, i.e., workers who literally touch and handle each unit of product. Workers, now described as "knowledge workers," are busy overseeing computerized machines and "interfacing" with the production process through computer terminals located throughout the plant. At the same time other support activities beyond the factory, such as quality control, supply chain management, information technology, customer service, engineering, and new product development, have also risen significantly and become more complex, further increasing the level of *indirect* costs. As a result there are fewer variable direct costs and

increasing pools of fixed indirect costs. This shift necessitates a far greater level of indirect-cost assignment and raises the potential for significant error in cost assignment under methods of traditional cost accounting which fail to reflect these cost structure changes.

The problem is exacerbated by the increase in cost objects.[2] Manufacturing technology now enables companies to produce customized products more readily, resulting in an increasing proliferation of products and services with fast-shrinking life cycles. In 1999 Michelin started selling some color-streaked tires and, commencing in the following May, shoppers could log onto the company's website and order *customized* color tires. This capability has expanded both volume diversity and product dversity across a wide range of products and services. As will be explained in more depth, product costs differ materially depending on volume or lot sizes and upon the degree of complexity associated with the production of different products. Also products and services are being delivered through multiple and, often, technologically new channels of distribution, like the internet, to different market and customer segments. To achieve competitive advantage, companies now place greater emphasis on determining not only *product* profitability but also profits relating to different *channels*, *territories*, and *customers*. This expansion of profit calculations across many product lines and other operational segments further elevates the impact of cost allocation.

The growing concern over cost assignment is related to the new era of dramatic global expansion of markets and phenomenal advances in information technology. With competition among business enterprises greater and more intense, customers continually raising their expectations, businesses devoting meticulous attention to the quality of products and services they provide and to developing strategies for competitive advantage, and ever-thinner profit margins, costing accuracy becomes more critical. While Mises apparently viewed the discretionary assignment of overhead as more or less innocuous, the drastic change in cost structures and the myriad of cost objects present a quite different picture today.

Does the current indictment of traditional costing suggest that economic calculation, so central to Austrian economic analysis and manifested in the cost accounting practiced in the day-to-day world of business, harbors at least glimpses of "just a system of groping in the dark" (Mises 1949, p. 700) that the socialist is doomed to use? Can we continue to refer blithely to economic

[2]The term "cost object" refers to any facet of the business which decisionmakers are interested in costing, including products, departments, divisions, activities, distribution channels, customers, and territories.

calculation as "the compass of man embarking upon production" (p. 229) amid the *substantial* costing errors and inadequacies being discovered today in actual companies? These questions are not answered by the fact long stressed in Austrian analysis that entrepreneurs can and often do make errors in their judgments concerning the future, leading to lower profits or even losses. The latter errors are bound to occur due to the uncertainty everyone faces at every moment. Neither can they be answered by citing the calculation errors arising from monetary inflation which Mises has also addressed. The costing errors we are faced with here lie not in the uncertainty of the future or in the effects of money supply expansion but in approaches to costing which have been shown to be invalid, irrelevant, and inadequate under changing market conditions.

The answer to these challenges rests in the fact that economic calculation emerges in an evolutionary fashion by which traditional concepts and methods of costing can undergo dramatic change as a result of market competition—that while the *essence, idea,* or *concept* of economic calculation remains inviolate, approaches to its application are subject to refinement, improvement, and even fundamental alteration. The process of change emanating from market competition leaves no stone unturned, and even the very approaches to determining the monetary effects of market activity, either anticipated or actual, are not permanent. Thus economic calculation, indispensable to market relations, is no different from other resources of business activity in being subject to assessment and change to assure proper performance of its role in contributing to enterprise profitability. Shifts in the form or method of economic calculation in no way vitiates its critical role—in fact, as will be argued, it but confirms the absolutely indispensable role it plays. The essentiality of cost determinations to economic calculation, arguably the central pillar of Austrian economics, makes this issue of paramount concern.

The remainder of this article will discuss more fully the problem of traditional cost allocation as widely practiced today, and explain how some leading companies are implementing fundamentally new approaches to cost assignment and how these approaches create more effective tools for entrepreneurial decisions.

THE PROBLEM OF TRADITIONAL COST ALLOCATION

The assignment of *indirect* costs to products, departments, and other cost objects has been a long-standing problem in cost accounting. *Indirect* costs are distinguished from *direct* costs in the fact that *indirect* costs require some intervening factor or basis for being assigned to cost objects. Assigning the cost of manufacturing to various products offers a typical situation. Items like raw or direct materials and direct labor are directly traceable to different products,

and, consequently, their costs are referred to as *direct* costs. On the other hand, the depreciation cost of the equipment used to produce the different products can be assigned to the products only through some method of allocation using a charge per unit of some intervening allocation base. For almost a century now traditional costing has resorted to predetermined "overhead rates" whereby such *indirect* costs are first related to a specific factor like direct labor hours or direct labor dollars.[3] To illustrate, if for a given period of operations the anticipated total overhead cost of items such as electricity, machine setups and repairs, depreciation, supervision, and insurance is $400,000 and the total direct labor hours is expected to be 100,000, an overhead rate of $4 per direct labor hour would be predetermined. The rate would then be used to assign the indirect cost of production to the different products according to the amount of direct labor hours charged to the different products. A given product or batch of product that consumed 800 hours of direct labor would be charged $3,200 of overhead in addition to its direct materials and direct labor costs.

The attack on this traditional approach to cost assignment rests on the valid argument that in two critical respects it is totally out of touch with reality in many companies today. First, direct labor is typically an insignificant factor in the total cost of a product, often less than 10 percent of the total. Second, direct labor is not a *causal* cost driver for most, if not all, manufacturing overhead. For example, machine setups and product inspections are not correlated with direct labor hours. With the mounting cost of overhead, stemming largely from increasing automation, indirect fixed labor, and computerization, along with the insignificant level of direct labor cost, the traditional method creates absurd overhead rates, like 1,000 percent of direct labor cost. As a result, managers are motivated to focus on reducing direct labor cost where small savings can have a huge impact on cost allocations and product costs rather than focusing on cutting overhead costs, which are increasing rapidly! (Could this explain some offshore outsourcing for labor-intensive processes, thereby mistakenly biasing the make-or-buy decision in favor of buying? Incidentally, offshore buying is not free of its own overhead cost elements relating to shipping, inventory tracking and management, etc.)

In their 1987 pioneering book, *Relevance Lost: The Rise and Fall of Management Accounting*, Johnson and Kaplan contend that by the 1980s cost accounting had abandoned, for some sixty years, the focus of early cost accounting (up to around 1925) on providing management with information relevant to strategic decisionmaking. In pursuing the question as to why traditional cost accounting has persisted in using inappropriate and inadequate approaches to

[3]The use of labor-based allocations of overhead has been widespread for decades.

cost allocation for so long, they speculate that more accurate and strategically oriented costing failed to emerge due to the confluence of several factors: (a) the prohibitive cost of tracing costs more accurately in the early years; (b) the fact that early on direct labor was a substantial part of total manufacturing product cost and assigning overhead costs based on direct labor provided acceptable accuracy in product costing—meanwhile overhead costs were less prominent before the surge in automation and computerization over the past two decades; (c) from the early 1900s the dominance of financial accounting and the public auditing profession in reporting to outsiders—virtually equating cost accounting to determining the cost of inventory and cost of goods sold for disclosure in balance sheets and income statements; and (d) the acquiescence on the part of academia in defining the purpose of cost accounting "in terms of valuing cost of goods sold and inventories for financial reports, not for managerial decisions and control" (Johnson and Kaplan 1987, p. 135). This acquiescence has been manifested in both simplistic textbooks and other published writings—despite insightful works still pertinent today by a few academicians, such as J.M. Clark in 1920s, Ronald Coase during the 1930s, and William Vatter in the 1940s, which unfortunately went unheeded at the time. And so the question is raised: "What have management accounting practitioners been doing for the past sixty years?" Johnson and Kaplan sadly answer their own question: between 1925 and 1980, "virtually no new ideas have affected the design and use of cost management systems" (p. 176).

The dominance of the financial accounting mentality, strengthened by "generally accepted accounting principles" (GAAP) emerging from the Financial Accounting Standards Board (FASB) and mandates emanating from the Securities Exchange Commission (SEC) and the Internal Revenue Service (IRS), is also reflected in the usual treatment of costs incurred outside the factory. While manufacturing costs may be significant, there are many costs that relate to other facets of the business, including research and design, marketing, distribution, and customer service. Based on traditional financial accounting practice, these costs are aggregated and written off to the period as expenses; that is, as *period*, not *product*, costs. The errors arising from arbitrary overhead allocations to products are compounded by this failure to attribute to products the costs associated with nonmanufacturing resource consumption. The whole area of marketing and distribution costs has been glaringly neglected in cost accounting. It can be argued that the mandatory treatment of these costs, for financial reporting as well as tax purposes, as period costs and not product costs can be held responsible for this neglect.

In the task of evaluating the performance of different profit centers such as product lines, territories, and departments, the arbitrariness of traditional cost

allocations is no less present than in the case of manufacturing overhead. To illustrate, the author recently participated in a costing project at a large hosiery division of a multinational corporation. The resulting study revealed that the current costing system was assigning the cost of new product development, an expensive engineering activity, to the different product lines based on dozens of product units sold. The preponderance of the engineering design activity actually could be traced to the complex, fashion lines sold in much lower volumes than the standard simpler styles. This meant that the complex styles were being grossly undercosted while the simpler lines were being overcosted using this costing approach. Distorted product-line profitability determinations were the inevitable result. The arbitrary assignment of indirect expenses based on relative sales is widespread in segment profit reporting. Of course, profitability distortions can lead to wrong decisions regarding the continuation, expansion, or discontinuation of different segments of the enterprise.

Traditional cost accounting then has been found obsolete and deficient for today's demands for greater cost accuracy. Arbitrary cost allocations do not recognize the actual causes of costs and thus fail to attribute costs to objects based on cause-and-effect. The seriousness of the problem has reached such proportions that in the past ten to fifteen years there has arisen a growing interest in another approach involving a radical departure from traditional cost allocation: *activity-based costing* (ABC). In the following section, ABC will be explained, followed by a discussion of how some leading companies are implementing ABC in order to achieve more strategically competitive decisions. Efforts to achieve more accurate cost information demonstrate the critical role of economic calculation and how market competition forces change in its methodology once its inadequacy calls for it.

ACTIVITY-BASED COSTING

Activity-based costing (ABC) restates the relationship between costs and the objects to be assigned costs. Unlike traditional cost accounting, which sees cost objects like products and divisions as directly causing the consumption of resources, ABC holds that costs, except for materials costs, are caused by the *activities* that make up business operations. Cost objects necessitate the performance of certain activities. It is the activities that consume the resources. By determining the costs of different activities as a first stage in the costing process, objects can ultimately be assigned costs according to their demands for activities. Separate predetermined activity rates are thus used rather than the amorphous overhead rates of traditional cost allocation.

ABC is fundamentally different from traditional costing because it insists upon explicit *cause-and-effect* connections between the various activities and

costs (or consumption of resources) as a first stage; assigning costs to objects follows in a second stage involving the linkage of objects to activities through the use of activity cost drivers. An activity cost driver is "a quantitative measure of the output of an activity" (Kaplan and Cooper 1998, p. 95). To illustrate, consider the activity of setting up a machine to process different batches of materials. The activity cost driver would be setups or setup hours. Assume that total setup cost is $44,800 for a specific period of production. If the projected total number of setups is 70, then an activity rate of $640 per setup would be used to cost different products depending on the number of setups required. Obviously, products manufactured in small lot sizes will be assigned disproportionately more of the setup cost than those produced in large runs. To illustrate further, assume that 1,000 units of Product A are produced each period requiring 30 setups to accommodate the small individual orders of customers. Also, Product B is a large volume item involving the production and sale of 20,000 units and only 40 setups each period. Applying the setup rate of $640 per setup, Product A would be assigned $19,200 and Product B $25,600 for a total setup cost assigned of $44,800.

The important point to be observed is the significant amount of setup cost assigned to Product A *in view of its relatively small total quantity (1,000) in comparison to the total quantity of Product B (20,000).* Product A involves less than 5 percent of total volume, yet it has been assigned almost 43 percent of the total setup cost. This disproportionate cost assignment is attributable to the fact that Product A averages only approximately 33 units for each production run or setup while Product B averages 500. This observation is important because traditional overhead allocation methods based on direct labor hours or dollars or machine hours are *volume-driven* or *unit-driven*. They ignore the real causes of costs and simplistically treat all resource consumption *as if* it is a function of volume—as if each unit produced causes an equal increment of activity and thus warrants an equal proration of indirect cost. This *unit-level* treatment may correctly depict the nature of some activities that are performed for each unit, for example, machining operations. But most activities are not at the unit-level. Many activities are done at what is called the *batch-level*, meaning the activities affect batches of product irrespective of the number of units in the batch. The same setup activity that might apply to a batch of five units would also be performed for a batch of 5,000 units. And still some activities are conducted at the *product-level* referring to activities that occur due simply to the very existence of specific product brands or product lines—for example, activities performed by a particular machine or engineer dedicated to a specific product style or line. For example, a given engineer is employed because the company produces a particular type of motor and seeks to make continuous

improvements in its design. Both batch-level and product-level or product-sustaining activities are clearly not influenced by unit volume, the underlying basis for traditional overhead cost allocation. Their costs can be controlled only by modifying batch- and product-level activities. Then there are *facilities-level* or *facilities-sustaining* costs. These relate to costs of resources that provide general production capabilities such as a plant manager and plant security. These types of costs are less traceable to objects beyond the facility and are unrelated to the number of units, batches, or product types.

Let us return to the illustration above and now use the traditional approach of cost allocation based on direct labor hours. (For the sake of clarity, assume that overhead cost consists only of setup cost.) Assume further that Product A requires four direct labor hours per unit of product and Product B three hours of direct labor per unit. At the same projected volumes of 1,000 and 20,000 respectively for the two products, the total overhead cost of $44,800 would be spread over a total of 64,000 direct labor hours for an overhead rate of $.70 for each direct labor hour. Using this rate Product A would be allocated $2,800 and $42,000 would be allocated to Product B. The traditional approach assigns Product A only about six percent of the total cost due to its low proportion of direct labor hours. Conversely, Product B is burdened with almost 94 percent of the overhead cost simply due to its large volume.

If these cost assignments based on the traditional approach and on ABC are in turn averaged over the total quantity of each product to give average setup cost per unit, the difference between the two approaches is even more dramatic. The setup cost per unit of Product A is $2.80 ($2,800 / 1,000) using the labor-based allocation; it is $19.20 ($19,200 / 1,000) under ABC, an increase of 586 percent. Consider the misleading implications of this distortion in product profitability analysis and pricing decisions. Product A is likely to appear profitable when it may be a loser and vice-versa for Product B. The new cost picture might warrant dropping Product A and expanding Product B or even cutting its price. The setup activity could also be targeted for drastic reduction in order to make Product A more viable.

The above illustrations reveal the arbitrariness and inaccuracy of traditional cost allocation. The fallacy in traditional cost allocations is that costs are being assigned based on factors that have no connection to the actual incurrence of those costs. Thus, setup costs have no causal relationship to direct labor hours. Kaplan and Cooper summarize the critical issue in stating that:

> When arbitrary allocations are used, no cause-and-effect relationship can be established between the cost object to which the cost has been

> assigned and the resources whose cost has been assigned. In an ABC system, every cost assignment to an activity, or a product, service, or customer, should be transparent and traceable, via cause-and-effect relationships, to the demand for resources by the cost object (whether an activity, product, service, or customer). (Kaplan and Cooper 1998, p. 100)

ABC nonetheless has to deal with the fact that most costs of business operations today are fixed. In manufacturing, often the only purely variable costs relate to direct materials and to utilities such as electricity. The issue is not unique to ABC, for even traditional overhead allocation cannot avoid the necessity of applying fixed overhead costs to products. The solution revolves around the determination of the amount of capacity ascribed to the resources assigned to each activity. To illustrate, assume engineering resources cost $280,000 each period and have the capacity to produce 4,000 engineering change orders (the activity driver) each period. The activity rate of $70 per change order would be used to charge different products lines for using this engineering service. If during the period only 3,800 change orders were generated, a five percent reduction in activity levels, then $14,000 of engineering costs would not be assigned to products but would be reported as an unfavorable volume variance and written-off to the period as an expense of waste. Over time, a pattern of this type of underutilization of resources would suggest the need to reduce the resources dedicated to this activity.

THE BENEFITS OF ABC FOR THE MISESIAN ENTREPRENEUR

Entrepreneurial decisions depend upon economic calculation, the "precalculation of expected costs and expected proceeds" and the retrospective "accounting of profit and loss." Decisionmakers expect the information stemming from accounting to present "a faithful image" of enterprise operations. Thus, as mentioned earlier, the costing project conducted in the hosiery division of the large multinational corporation revealed major distortions in the recent profit figures across the division's many product brands. The author observed the presentation of these revelations in a meeting of brand managers who for the first time saw their numbers recast using ABC. Bonus compensation for brand managers in this division is based on the profitability of the brands. The presentation of these new disclosures created an atmosphere of both relief and anguish. The managers of the simple standard brands, which they "knew had been subsidizing" the more complex fashion brands due to volume-based allocations of indirect costs, were understandably pleased. On the other hand, the managers of the fashion brands openly expressed bitter resentment. The information pointed to new directions for brand emphasis and the need for dramatic cost reduction in the fashion lines.

At a Whirlpool plant with a product line of 333 different refrigerator and vertical freezer models, the managers sought more accurate unit product costs in order to improve "identification of profitable products; competitive analysis; cost reduction; investment analysis; budget development; and make-versus-buy analysis" (Greeson and Kocakulah 1997, p. 16). As a result of an ABC pilot program, they found that their traditional overhead allocations, using only volume-related allocation bases, had *undercosted* low-volume products and *overcosted* high-volume products: the ABC system "allocated two or three times more overhead than the traditional cost accounting system to many of Whirlpool's low-volume products" (Greeson and Kocakulah p. 18).[4] The project also demonstrated that volume was not the only factor affecting product costs—complexity was also found to play a significant role. Not surprisingly, it was discovered that high-complexity products were being undercosted while the traditional allocations were overcosting low-complexity products. "One extremely complex product had a traditional overhead allocation of $65.46 versus $728.92 under the ABC system" (p. 19). (The critical connection between complexity and costs will be explored below.) Additional analysis revealed an interactive relationship between volume and complexity. Most of the products in the low-volume groupings were also found in the high-complexity groupings; conversely, the high-volume products tended to be in the low-complexity classifications.

Whirlpool uses the ABC-generated information in reaching make-or-buy decisions. When capacity constraints arise, outsourcing is no longer simply a matter of splitting the production of components with suppliers. Now more reliable cost data affords a basis for evaluating supplier proposals and choosing "the best candidates for outsourcing" (p. 20). The improved cost data also pointed to opportunities for considerable reduction in cost. For example, having determined that the setup cost in manufacturing a particular component called a spider ring was more than $1,000, a realignment of the machinery reduced costs by more than $12,000 per month.

At Tycos Instruments, a maker of blood pressure gauges and stethoscopes, ABC has enabled senior management to know "which product lines are truly profitable. This information is vital, because to protect a company's core business and expertise, investments must be directed to where they will do the most good" (Drumheller 1993, p. 26). Improvements were also made in make-or-buy

[4]An interesting extreme result was a product typically produced in an annual quantity of one. Under the traditional approach, this product was allocated $64.48 of overhead; ABC assigned a staggering $25,447.11! So much for the significance of decimal places—it's the left side of the decimal that is of concern.

analysis and cost forecasting. In addition, ABC has altered the company's approach to analyzing capital spending. Prior to ABC, capital expenditure requests were based only on anticipated savings in direct labor. "Now, cost savings throughout the factory are incorporated into the analysis" (p. 26). The estimated reductions in the number of vendors needed or in defects and rejects are factored into the analysis—a focus on *all* cost repercussions.

Like Whirlpool, Tycos also found ABC instrumental in determining the cost of complexity associated with unique as opposed to common parts. Using less unique parts can reduce the cost of inventory as well as warehouse space while realizing economies of scale in procuring raw materials. In designing a certain new product, purchasing personnel at Tycos had pointed out how a cheaper material, i.e., lower priced, could effect substantial cost savings. However, ABC traced the cost of providing manufacturing support, adding a new vendor, and additional receiving and accounting activities that the new part would require. The cheaper part would actually have led to higher *total* costs, a fact unrecognizable without the cost tracing afforded by ABC.

It should be clear that ABC offers not only improved cost accuracy but reveals opportunities for cost reduction. Carrier Corporation, one of the world's largest manufacturers of air conditioning and heating products, found that *complexity* is a dominant cause or driver of its manufacturing costs. Seen as synonymous with diversity, complexity was manifested in expanding product lines requiring more unique parts and processing options. Employing ABC as a key element of a "complexity reduction" initiative, Carrier classifies "all batch and product-sustaining as 'costs of complexity'" (Swenson 1998, p. 21). Financial measures now used to monitor the cost of complexity (COC) include COC as a percentage of overhead, of total product cost, and of revenue.

ABC can be used in transfer pricing where real market price data are not available and other traditional methods are considered unacceptable. Teva Pharmaceutical Industries Ltd., an Israel-based company, reorganized its operations into decentralized cost and profit centers, including an operations division comprised of four manufacturing plants as cost centers and three marketing divisions organized as profit centers (Kaplan, Weiss, and Desheh 1997). For purposes of charging the profit centers for products made in the operations division, traditional transfer pricing approaches based on market price, full cost, marginal cost, and negotiated price were considered and rejected. Inadequate market data precluded a market price-based method. Traditional overhead allocations for full-cost pricing did not reflect the actual cost structure in Teva's plants and also would encourage the marketing divisions to push aggressively more low-volume custom orders while seeking

less high-volume orders. Using short-run marginal cost would include only the expense of ingredients and packaging materials. This was deemed inadequate for their purposes. And negotiated transfer prices were seen as a source of endless and nonproductive debate among the different division managers. Implementing a system of ABC-based transfer prices using prospective calculations, the market divisions now receive charges based on separate unit-level, batch-level, product-sustaining, and facilities-level costs. These prices in turn altered the decisions of the market division managers in ways that have improved company profitability. For example, producing sample packages of six tablets was now seen as very expensive, making it cheaper to just give physicians the regular twenty-tablet packages. At one point when initial ABC analyses revealed that several of Teva's products were unprofitable, there was still a reluctance to drop these because many of the costs assigned to them, especially the product-level and facilities-level costs, would not immediately go away if they were dropped. But in the early 1990s growing sales volume put a strain on production capacity. The decision was made to sell thirty low-volume products and to shift the product mix away from unprofitable products. This released capacity of people, machines, and facilities for producing new products and increasing sales of existing profitable products.

When a new division of a Fortune 500 company was on the verge of committing $50 million to a "cybermall" in the new electronic marketplace based on a broad strategic analysis with only a few details, the CEO successfully argued for a closer look. An ABC model of the proposal was developed and used for capital budgeting analysis. The resulting forecasts differed significantly from the picture painted by the initial broad analysis. For example, "the ABC model forecasted that an additional $10 million of capital costs would be needed" (Coburn, Grove, and Cook 1997, p. 38). Also startup costs estimates were increased. As a result of the ABC analysis, senior management reversed its initial decision and dropped the idea. In addition to improving the long-standing measurement of product and service profitability, ABC is extending profitability measurement to other objects. Companies can now determine more accurately the costs of serving different customers who make varying demands on the company. Kaplan and Cooper found a company which, after implementing ABC, learned that surprisingly its two most unprofitable customers were in the top three in sales volume (p. 185). Underlying activity analysis revealed that the special processing required to fill the orders received from these customers was unusually costly. By making substantive changes in the manner in which the sales orders were processed, significant

cost reductions were realized and the customer relationships were maintained rather than broken.

ABC AND TARGET COSTING

Since the mid-1990s another new approach, "target costing," which originated in Japan in the 1960s, has received increasing attention from American companies in reaching decisions regarding new products. Target costing is integrated into the ABC paradigm as a proactive means of effective cost management. Unlike the traditional approach to pricing, target costing approaches costing in a fundamentally different way. Rather than moving from cost to price, target costing starts with the expected market price and works back to determine allowable cost. Thus, for a new product under consideration, the target cost equals the anticipated selling price, derived from market research and analysis of competitors' products, less the desired unit profit. For example, if the competitive price for a given product is expected to be $100 and the company aims for a 15 percent profit margin on sales, then the target cost for this product is set at $85. Analysis is then undertaken to determine the feasibility of achieving this cost level. If indications are positive, then efforts by teams of individuals from all areas of the company are devoted to establishing the specific steps to launch the product without exceeding the total allowable costs. This is a proactive, price-driven approach to costing in contrast to the customary method of cost-driven pricing. Projected costs are compared to projected market prices. Costs are managed before they are incurred; cost minimization is sought ahead of production rather than later.

There are two critical reasons for the development of target costing. First, from the viewpoint of many companies, the anticipated market price is taken as given due to intense competition and the amount that customers are expected to be willing to pay for the new product. The company cannot simply calculate the costs, add in a profit margin, and then expect to sell the product at that desired price. And second is a critical point regarding the nature of costs today: a large proportion of the ultimate *total* cost of a product is committed or "locked in" at the design stage: "Target costing focuses on product design because most costs, nearly 70–80 percent, are *committed* at the design stage, while only 10–20 percent of the costs are *incurred* at this stage" (Ansari et al. 1997, p. 4). In other words, the opportunity to control costs is far greater before undertaking the manufacture of the product than once production is underway and all components and processes have been set.

The relevant expected costs include *all* costs that can be identified across the "value chain," which refers to the various functions that add value in the process of providing products and services to customers. The value chain

begins "upstream" from manufacturing in engineering design and development. Manufacturing then makes the product in accordance with engineering requirements, and subsequently, "downstream" functions of marketing, distribution, and customer service attend to selling and delivering the product to customers and providing post-sale customer support. Target costing thereby looks at the entire gamut of costs *proactively in the design stage.* This is why "cross-functional teams"—comprised of representatives from engineering, purchasing, manufacturing, cost accounting, marketing, distribution, and customer service—are essential throughout the process from the very beginning.

In many cases the team also includes outside suppliers of product inputs. At one of the world's largest manufacturers of automobile components such as antilock brake systems, ITT Automotive, "key suppliers are considered an integral part of the target costing team. These suppliers should be consulted early in the product life cycle, and they should play a significant role in product design and development" (Schmelze, Geier, and Buttross 1996, p. 26). This close collaboration with suppliers extends the cost reduction process beyond the walls of the company to create what some refer to as the "extended enterprise" (Ansari and Bell 1997, p. 80).

Target costing entails *life-cycle costing,* meaning that "all the costs of owning a product over its life, such as purchase price, operating costs, maintenance and repairs, and disposition costs" are considered (Ansari and Bell 1997, p. 15). This means that the company looks beyond its own costs by also considering the customer's *post-purchase* costs of use and final disposition of the product. Minimizing total costs from the customer's viewpoint provides a competitive advantage. For example, the efficiency and durability of the product affects the customer's operating cost. Product disposal and recycling have increasing cost implications for customers.

The target costing process involves determining specific ways to close the gap between estimated cost under present capabilities and the allowable cost. At ITT Automotive, a cross-functional team undertakes an iterative process of "value engineering" to determine means of cost reduction *without compromising the quality and functionality of the product.* The objective of value engineering is to establish the optimal processes, materials, personnel, and equipment needed in order to achieve the target cost. Activities that do not add value to the product from the customer's point of view, such as machine setups, are candidates for reduction or elimination. Unnecessary complexity, such as excessive parts, is targeted for reduction, as undertaken at Carrier Corporation. If it is determined that the target cost is ultimately unachievable, the

company has various options including postponement, alteration of the product's features, increasing the target cost, and abandonment.

Activity-based costing (ABC) is a key tool of target costing. Its underlying activity analysis, applied across the entire value chain and beyond to suppliers, can discern those activities that add no value to the product or service and, hence, can be eliminated. Cost estimation is facilitated through cost tracing using the cause-and-effect linkage of activity costs to the product. Carrier Corporation has eliminated "cost-plus" pricing and uses ABC to establish the target cost of a new product under consideration. If present estimates of cost based on the initial design exceed its target cost, "engineers will attempt to either design costs out of the product or improve the manufacturing process" (Swenson 1998, p. 27). If in the end, the target cost is deemed out of reach, the product will not be undertaken. By connecting ABC with target costing, engineers are encouraged "to control costs by designing products that use common components and standard manufacturing processes. Gone are the days when engineers prided themselves in developing unique, elegant parts" (1998, p. 27).

Changing market conditions propelled by phenomenal advances in technology and information flow and decreased barriers to conduct business globally have led to accelerating innovations and shorter product life cycles. With the rush to maintain a constant stream of new products, companies today have a greater need to act swiftly and with more insight into the still uncertain future. For example, Texas Instruments, as a supplier of memory chips to PC manufacturers,

> must understand that the relative price range for PCs in the market will determine the ultimate price it can charge for any improved memory chip. . . . The sharing of experience and technical expertise by value chain members pervades all stages of the target costing process. (Ansari and Bell 1997, p. 81)

At Texas Instruments target costing has been instrumental in one of the largest investments the company has ever made in new product development, revolutionary digital imaging technology. Facing intensely competitive market conditions, "reducing production costs before full-scale production begins is crucial for product profitability" (Dutton and Ferguson 1996, p. 38).

CONCLUSION

The problem of cost is the cornerstone of economic calculation. Entrepreneurs act upon the cost implications of their decisions and depend on cost data that represent the actual pattern of resource consumption. These theoretical generalizations are essential; however, they do not elucidate the complexity of cost

assignment and how cost accounting is driven to change when cost structures shift and operating segments multiply. Neither do they provide concrete illustrations of how actual decisions are influenced by the available cost information. Cost determinations, whether accurate or not, have their say about the way resources are actually directed in our economy by myriad companies like Whirlpool and Carrier. The need for improved output from cost accounting is a result of changing market conditions. More accurate costing and strategic cost management are now required and made available through advances in information technology. More costs are indirect and not unit-based—that is, more costs are fixed and tied to resources bought in large chunks of serviceability. More sophisticated cost analysis is needed to "slice and dice" cost data across diverse segments or objects. By examining fundamentally new approaches to cost accounting, we see the operation of competitive market forces upon the quality of economic calculation itself. A critical facet of Austrian analysis is elucidated and clarified, showing that economic calculation is not perfunctory or static.

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