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Do Different Cost Systems Make a Difference?

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A survey of 130 U.S. manufacturing companies finds few differences in the internal and external environments of ABC, traditional, and variable-cost system users, but ABC and variable-cost systems better serve users' needs.

Many articles have been written about activity-based costing (ABC) since it was introduced in the United States during the mid-1980s. ABC is often described as the only cost system that accurately portrays product cost in complex environments. It is also portrayed as a system that identifies nonvalue-added activities and highlights areas where costs can be reduced. Linked with activity-based management (ABM), ABC is one means of connecting a company's strategic objectives with its product costing system. If ABC systems provided the advantages touted by their proponents, it seems likely that most companies would have adopted ABC over the last 15 years. Survey results, however, indicate that the use of ABC is not widespread. In one study, only about 20% of firms reported they had adopted ABC, and another study reported a 21% adoption rate.[1]

Why do so many companies continue to use other types of cost systems? One possibility is that there are differences in the nature and scope of information generated by each system. For example, the cost systems may differ in their ability to provide information about performance measurement, revenue enhancement, or cost-reduction efforts. Given the internal and external pressures a company faces, one cost system may be better suited to serve its needs than another. Factors such as the complexity of the production process, frequency of operation at capacity, or the nature of competition may favor the adoption of a particular type of cost system. If this is the case, we would expect to see systematic differences in both the quality of information provided by cost systems and the frequency of usage across industries.

To determine if such a relationship exists and whether managers within companies that use different cost systems believe the information provided by those systems differs, we surveyed accounting personnel at U.S. manufacturing companies. The results indicate that most managers believe their cost systems are adequate for decision making. In certain circumstances, managers evaluated their cost systems as more effective than those using other cost systems. Activity-based costing systems were evaluated as somewhat more useful, but we found no evidence that either the external or internal environment of the firm was correlated with the choice of cost system.

Cost Systems and Costing Issues

Product costing is simple when there is no overhead.

Material and labor can be traced more easily to specific products than can overhead costs that benefit many products and product lines. Unfortunately, overhead often comprises a significant percentage of product costs. For example, one survey found that overhead equaled 34.6% of product costs.[2] How this overhead is assigned to the various products significantly changes the product costs and has the potential to influence product promotion, pricing, and production decisions. Different costing systems approach the overhead allocation decision in very different ways. Traditional costing systems allocate the overhead using some simple measure, for example, total labor or machine hours. ABC systems rely on cost pools and cost drivers that separate and assign costs to products in a way that approximates their usage. Unlike traditional and ABC cost systems, variable-costing systems do not assign overhead; in these systems, overhead is treated as a collection of costs that are incurred to support all operations.

In economic terms, these competing approaches to overhead allocation can be thought of in terms of short-run versus long-run analysis. In the short run, all that matters is variable cost when determining the tactical production and pricing strategies. Fixed costs are ignored as managers think at the margin in determining whether or not to produce one more unit or change their price slightly. This is consistent with variable-costing systems. In the long-run, however, all costs are variable and are assigned in some way, consistent with traditional or ABC costing systems. Decisions made in this environment are considered to be largely strategic as opposed to tactical. Thus, another way to think of the overhead allocation issue is in terms of how to move most effectively from short-run to long-run analysis.

Traditional cost systems are often associated with a financial accounting focus and include direct materials, direct labor, and manufacturing overhead in their determination of product cost. For simplicity, we will assume here that overhead is allocated to individual products using a plant-wide overhead rate, although different companies may compute various departmental overhead rates. There is often no causal relationship between the way in which overhead is allocated and the actual production process. Rather, overhead is allocated based on the number of units produced or the number of labor or machine hours used in production. Critics of traditional costing claim that this approach overcosts simple products produced in large batches and undercosts more complex products produced in smaller batches. These cost issues result from the averaging nature of traditional cost system overhead allocation. These systems also overcost products that rely on high usage of the allocation base, such as labor hours, but low usage of other factors, such as machine hours. This mismatch between the way costs are incurred and overhead is assigned is particularly salient when the production process is capital intensive but the overhead is allocated based upon labor hours. Here the overhead is assigned to products that least generated the cost. Critics of traditional systems claim that the improperly applied overhead leads to inaccurate product costs that result in inefficient product continuation and pricing decisions.

Activity-based costing begins with the companies' products, determines the activities used in the production and delivery of those products, and computes the costs of the various activities.[3] The costs of the activities used in the production of a product are then assigned to that product in a manner that approximates a causal relationship. As a result, advocates insist that ABC systems provide more useful information for cost-management purposes than traditional systems do.[4] These differences are significant for companies with large amounts of overhead, multiple products, and high product diversity.

Many companies developed ABC systems outside the financial accounting system that were designed to meet the needs of management decision making. As a result, costs included in ABC systems vary by company and application. Some ABC systems limit their cost analysis to the direct material, labor, and manufacturing overhead costs found in traditional systems. Others include research and development, marketing, and distribution costs.[5] Some systems separate overhead into the amount appropriate given current production levels and the amount incurred because of excess capacity.[6] ABC has also been expanded from determining product profitability to determining the profitability of individual customers and marketing efforts.[7]

Not all companies have been satisfied with the

results of their ABC adoption, however. The systems have been criticized for being "owned" by the accounting department, for using canned software, and for not being strongly linked to quality and delivery strategies or to performance evaluation and reward systems. Manufacturing vice presidents have reported that ABC implementation had the second-lowest payoff of 26 different innovations.[8]

Variable costing includes only variable costs, generally material costs and certain labor costs, within product costs. Fixed costs are treated as a lump sum that must be "covered" by the products' contribution margins.[9] Because there is no need to assign the indirect, fixed costs to individual products, variable costing avoids the problems of cost assignment that are present in both traditional and ABC systems. Although variable costing does not receive much attention within accounting journals, two surveys found that 17% and 12% of the respondents relied on variable-cost data for pricing decisions.[10]

Variable costing is often downgraded within the accounting community and described as a cost method that focuses on short-term decisions. John Shank said, "If the problem is small enough so that contribution margin analysis is relevant, then it can't have a very big impact on a company. And if the possible impact in a decision setting is major, if it can really affect a company in a major way, then it's silly to consider most of the factors to be fixed."[11] Others, however, support the use of variable costing when overhead does not vary with units, batches, products, or customers. "This occurs in capital-intensive environments where a significant part of the overhead structure is machine depreciation, not labor-related overhead. Many paper companies also treat direct labor as fixed because the workers remain on site during downtime slack periods of production."[12]

Variable costing most recently has been associated with the theory of constraints (TOC) literature. Within seven companies that adopted the theory of constraints philosophy, many had TOC experts on staff and had matched a TOC operating philosophy with TOC accounting.[13] The TOC approach to costing clearly distinguishes between fixed and, therefore, short-run unavoidable costs (including direct labor costs) and truly variable costs.[14] Sales revenue less the truly variable costs results in "throughput," similar to the contribution margin computed under variable-cost systems.

Competitive Considerations

Traditional, ABC, and variable-cost systems all include material cost as product cost. They differ in what other costs are included or excluded within cost computations. The accounting literature indicates that companies adopt ABC systems to obtain information useful in cost management, to improve profitability, to more accurately assign the cost associated with high levels of operating complexity, to deal with capacity issues, and to develop more appropriate pricing schemes. But articles also suggest that variable costing can be used to address some of these issues. Perhaps, rather than viewing ABC, traditional, and variable-costing systems as good or bad, or better or worse, companies should work to capture information in a form that is useful within their decision models. Different models may require different input while creating the same output. Let's look at examples of how the decision models can differ.

Operating complexity. Cost systems may differ because of differences in company operations. For example, when a company produces and sells only one product, there is little need to introduce a complex cost system. All overhead is incurred to support the one product. Assuming that the company estimates product volume appropriately, both traditional and ABC systems will develop similar product costs. Variable-cost systems will determine the variable costs and total overhead associated with the single product.

Multiple products, however, complicate cost system decisions. Companies must decide whether variable- or full-cost information will be most useful. If full costing is desired, management must choose between the volume-based traditional costing system or ABC. Under either full-costing system, overhead must be assigned to the various products, but not all overhead costs can be traced to specific products. For example, occupancy costs, including utilities, taxes, depreciation, and maintenance, are incurred for the entire production facility. Both cost systems must develop a means of assigning facility costs to individual products and to develop ways to inform cost system users about the components and the relevancy of the cost figures. Variable-costing systems avoid issues related to cost allocation by limiting

product costs to the variable costs incurred. As manufacturing complexity increases with additional products, the cost system remains extremely simple.

Capacity considerations. Variable-costing techniques have often been associated with maximizing income when capacity is constrained. This is accomplished by determining the sales mix that maximizes the contribution margin, given the level of the constraint. Some academics, however, have suggested that when capacity is constrained, fixed-cost allocations should be included in product cost because they act as surrogates for opportunity costs and lead to more efficient production decisions.[15]

When there is excess capacity, companies face a different decision. When the cost of excess capacity is included within product costs, the costs are higher than they would be without the excess capacity costs. These higher costs may lead managers to push for higher selling prices, thereby reducing the volume of product sold. Peter Turney termed the interactions between the costs of excess capacity, increased product costs, increased selling prices, reduced sales volume, and higher costs of excess capacity the "death spiral."[16] ABC advocates suggest that the cost of excess capacity should be removed from cost pools, eliminating these nonproductive costs from product-related decisions.[17] Similar procedures could be used in both traditional and variable-costing systems.

Nature of competition. A firm may face both price and nonprice competition in the marketplace, and the costing system affects how it competes in both of these dimensions. When companies set their selling prices in accordance with prevailing market price, their cost systems influence product margins and decisions regarding whether or not to continue to produce and sell the products. When companies determine selling prices under competitive bidding or various forms of cost-plus pricing, the product costs determined by the cost system directly impact the selling price. Incorrect selling prices result in revenues that fail to maximize potential profitability. ABC proponents claim that ABC costs provide the best representation of actual product costs. Variable-cost advocates can make the same claim. Pricing becomes more complicated when the decision moves from individual products to segment or division profitability. If facility and equipment costs are shared across various products, variable-cost advocates would say that sufficient margin must be earned across the product line to cover the fixed costs and provide adequate profits.

In addition to price competition, a firm may face significant nonprice competition (for example, quality and innovation). Product costs influence the timing and frequency of new product introductions, both of which are strategic choices with long-run implications.

The Survey

To determine what types of cost systems U.S. manufacturing companies use, we mailed survey questionnaires to financial or accounting personnel at 670 manufacturing companies. Some of the surveys were mailed to members of the Institute of Management Accountants (IMA). Other surveys were mailed to companies and individuals identified through directories of manufacturing operations. We received 130 usable responses, a response rate of approximately 20%. The survey included questions about the cost system, the operating environment, and the respondent's satisfaction with the output of the cost system. Each participant was also asked to provide professional background information.

The survey also included questions about the adequacy of the cost system, product and production complexities, and factors related to competition and profitability. Each of the responses was in the form of a seven-point Likert scale. A 1 indicated the most negative response (for example, not at all adequate, never, not at all, or none). A 7 was the most positive response (very adequate, always, very, and extreme). A 4 was the mid-level response, indicating neither strong negative nor strong positive associations.

Within the 130 companies, 46 (35%) reported using only traditional cost systems, 11 (8%) used ABC systems, 39 (30%) used both ABC and traditional cost systems, and 34 (26%) used variable-cost and TOC systems. Within the variable-cost/TOC group, 29 companies indicated they used traditional variable-cost systems, and five used TOC-based systems. When we analyzed the results, the companies that used only ABC were grouped with the companies that used both ABC and traditional cost methods. This resulted in 50 companies (38%) classified as ABC users. These results sug-

Figure 1: Unit Manufacturing Cost Breakdown

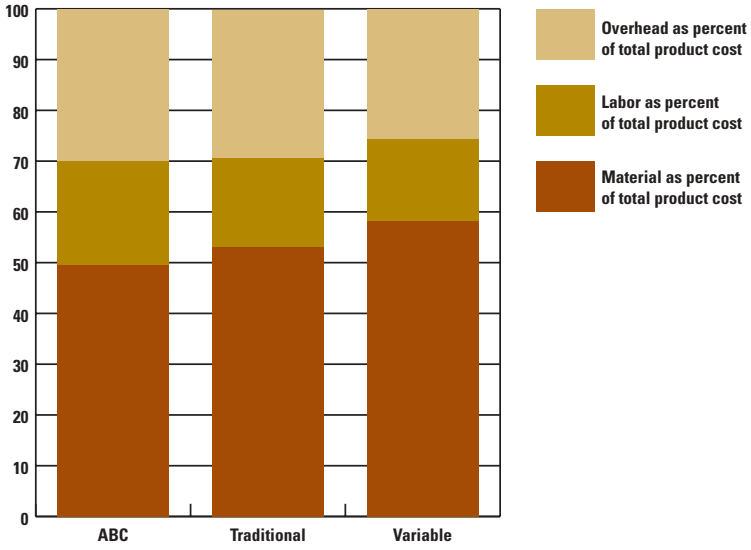
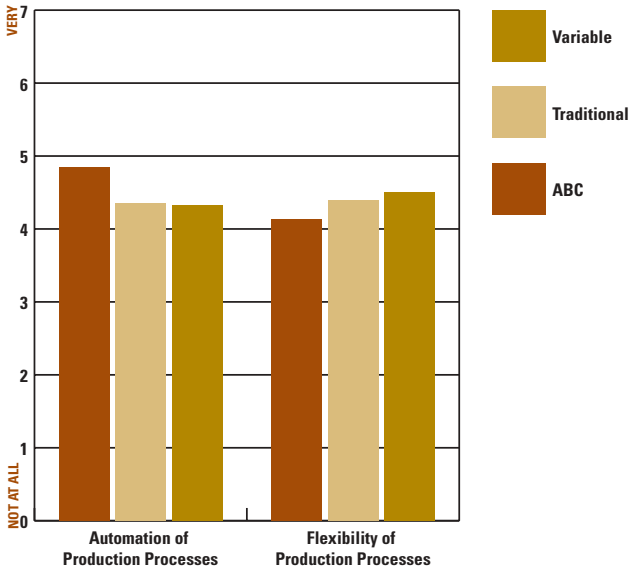


Figure 2: Automation and Flexibility of Production Process



gest that ABC systems are used by a higher percentage of companies than reported in earlier studies.

Our results indicate that cost systems are very stable. Only five companies reported that their cost system was in place for less than one year, six companies had used their system for one to two years, 29 companies had used the system for three to five years, and 92 companies reported their cost system had been used for more than five years.

The companies were involved in 18 different industries. At least five companies were included within the food and tobacco, textiles, chemicals, primary metals, fabricated metals, industrial machinery, and electronic equipment industries. Companies within all of these industries used traditional and ABC systems; variable-cost systems were used within all but the textile industry. It is interesting that although the textile industry reported the highest level of overhead, much of which must come from machine depreciation that does not vary with volume, it is the only industry in which no company reported using a variable-cost system.

Operating complexity. To determine if differences in company operations affect the choice of costing system used, we measured three aspects of the company's internal environment: breakdown of unit manufacturing cost, degree of automation and flexibility of the production process, and level of complexity of the product and production process. Across all 130 companies, material costs averaged 53%, labor averaged 18%, and overhead averaged 28% of product cost. Figure 1 provides a breakdown of these costs overall and by the three different cost system users. There are no statistically significant differences in the amounts of material, labor, and overhead included within the product costs of the three cost systems. Analysis of variance (ANOVA), with responses grouped by traditional ABC and variable-cost systems, was used to test for differences between groups in this and other comparisons. Post-hoc tests using least-significant differences tests helped determine where the differences between the groups occurred.

In analyzing responses that relate to production flexibility, specifically the extent to which the production process is automated and the flexibility of that process, we see that the responses to both questions are above the midpoint of the response range for all responses (see Figure 2). We found no statistically significant differences in the levels of automation or production flexibility within the three different cost systems.

Our third measure of the internal environment related to product and production complexity. The questions focused on the complexity of the production process, the complexity of the products, the clarity of the cost of idle capacity, variation in the product complexity, and variation in production volume. The results, shown in Figure 3, indicate that all cost system users believe their products and production process are slightly more complex than the midpoint. The level of complexity does

Figure 3: Complexity of Production Process

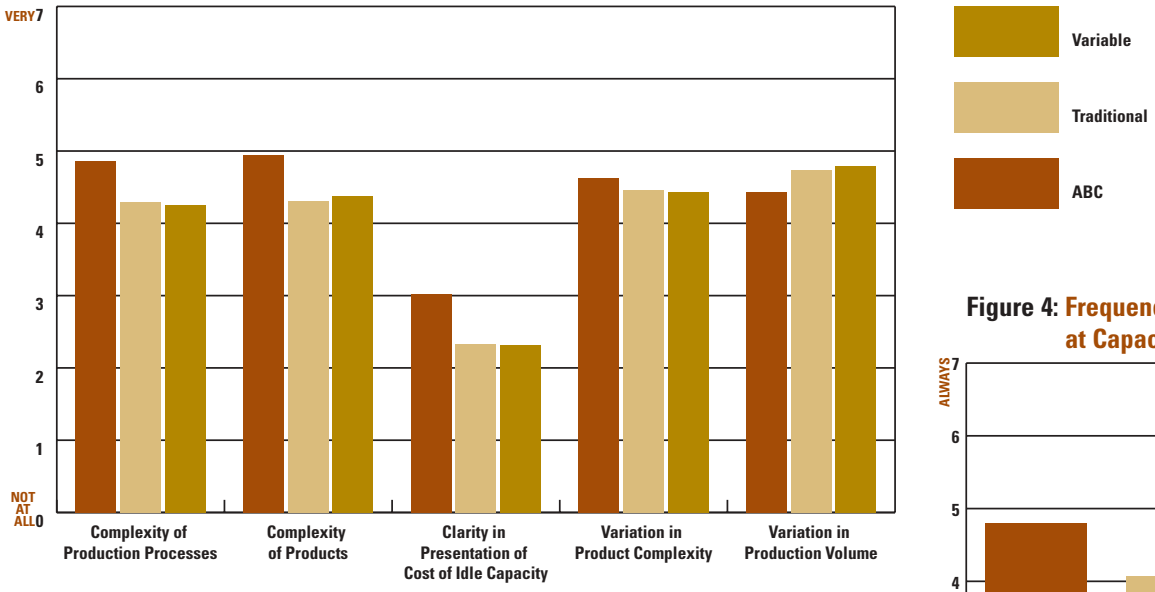
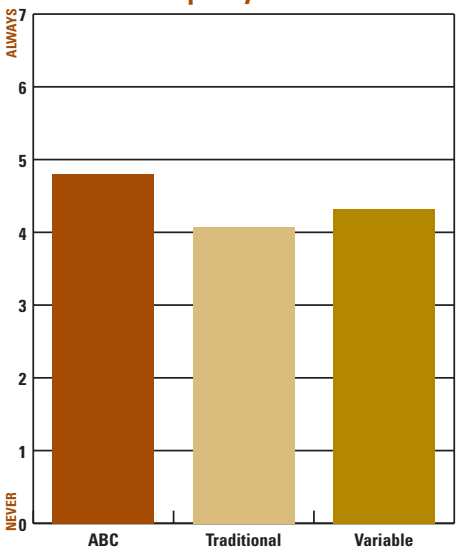


Figure 4: Frequency of Operation at Capacity



not differ statistically among the cost system users. None of the cost system users believes their cost system does an adequate job of presenting the cost of idle capacity, but more ABC users than users of traditional and variable-cost systems believe their cost systems do a better job of presenting the cost of idle capacity. There was no relationship between the extent to which companies operated at capacity and the ability of the cost systems to present the cost of idle capacity. The overall mean response for operating at capacity was 4.39, slightly more than the midpoint.

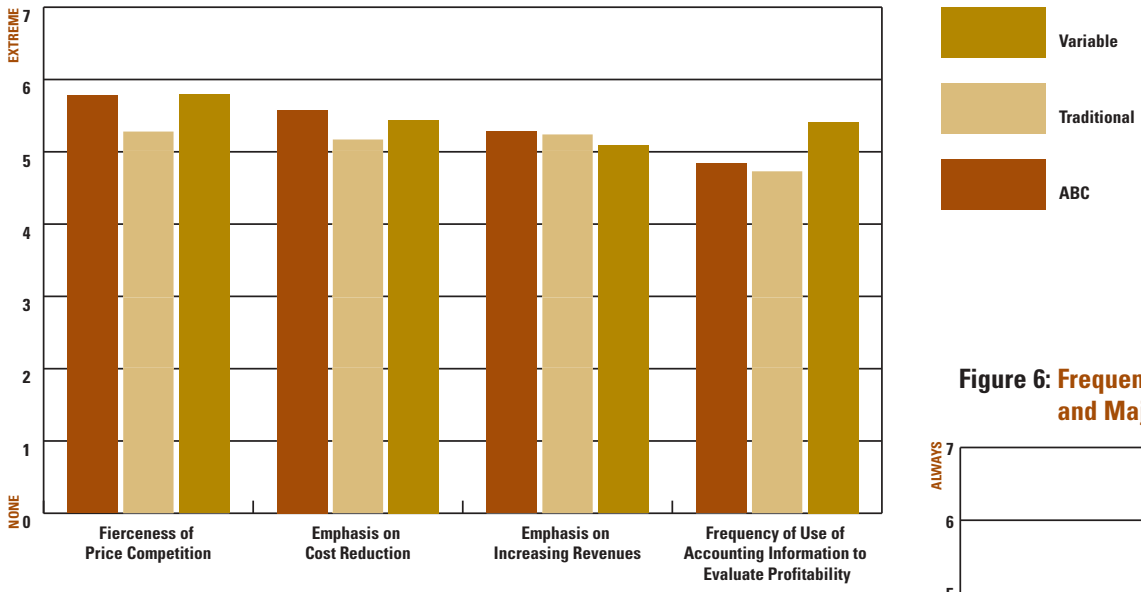
Capacity considerations. As we have seen, choice of cost system may be affected not only by the nature of the production process but by the level of utilization. Figure 4 shows that all cost system users report the frequency at which their facility operates at capacity as slightly higher than the midpoint. Again, frequency of operating at capacity does not differ statistically among the cost system users.

Nature of competition. Turning to external environmental factors, we next considered the impact of price and nonprice competition on choice of cost system. Most of the companies (62%) set their selling prices in accordance with market prices. Competitive bidding was used by 14%, cost-plus by 17%, and contribution margin by 6% of the companies.

The survey found that there is a positive relationship between the fierceness of industry price competition and the emphasis companies place on cost reduction. This is logical because high levels of price competition force companies to improve their profitability through cost reductions, additional sales volume, and new product offerings. Figure 5 summarizes the responses to the questions related to profitability issues. Variable-cost system users reported the highest levels of price competition, cost reduction efforts, and use of accounting information to analyze profitability. They reported the lowest emphasis on increasing revenues. Yet even though it appears there are differences among the cost system users, the differences are not statistically significant.

Although respondents were not specifically asked to assess the degree of nonprice competition faced by the company, the frequency of new product introductions and major design changes serves as a proxy for this external factor. In a market in which nonprice competition is fierce, we would expect to see more frequent innovation as companies strive to differentiate themselves from each other. Although product differentiation softens price competition in the market, it is a costly

Figure 5: Competitive Environment



strategy to pursue, especially when cost increases associated with product improvements cannot be passed on to the customer. Figure 6 shows that all cost system users reported approximately the same level of frequency of new products and major design changes, suggesting no statistically significant differences exist in the amount of nonprice competition faced by companies that use traditional, ABC, and variable-cost systems.

Our results seem to suggest that cost system users appear to face approximately the same set of internal and external conditions. Given this observation, the next issue to consider is how effective each cost system is in generating information.

Perception of cost system adequacy. The survey asked respondents to evaluate how adequately the cost system calculates product costs, generates performance measurement information, provides information for revenue enhancement, and provides input to cost-reduction efforts. The responses to these four questions are highly correlated. These results indicate that companies that found their cost systems adequately computed product cost also believed that the systems provided input to cost-reduction efforts, generated perfor-

Figure 6: Frequency of New Products and Major Design Changes

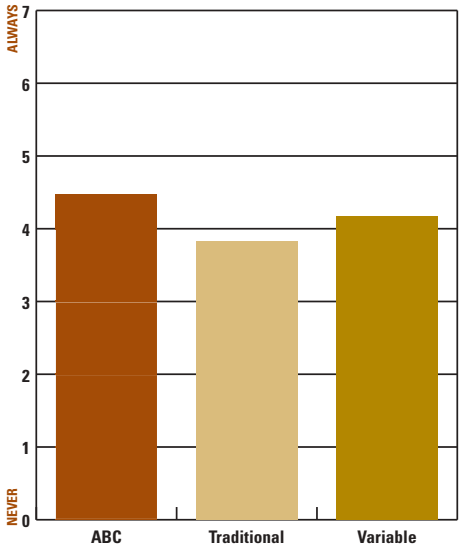
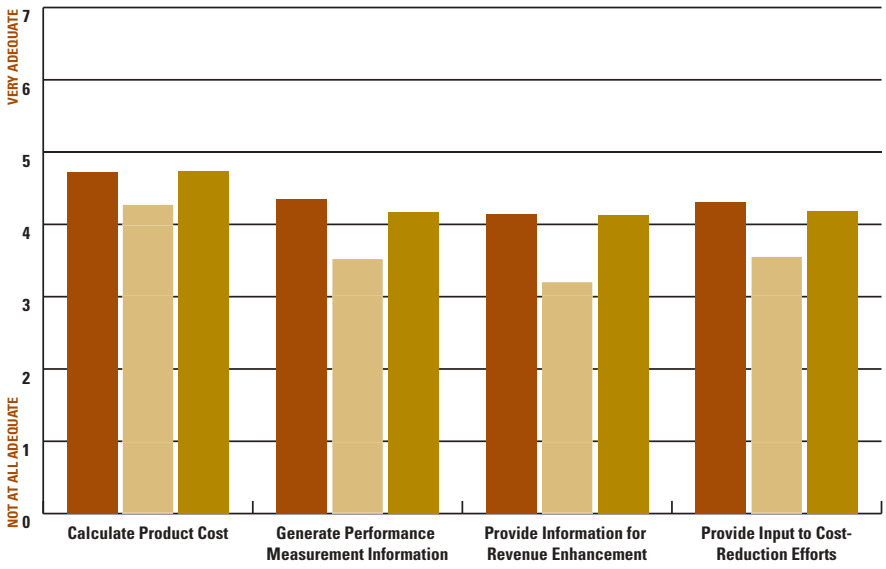


Figure 7: Efficacy of Current Costing System



mance measurements, and provided information for revenue enhancement. Similarly, companies in which the cost information was not adequate for one purpose reported that the information was not adequate for other purposes. Figure 7 shows the evaluations of the ABC, traditional, and variable-cost system users.

ABC, traditional, and variable-cost system users reported their systems were slightly better than adequate in computing product costs. ABC users found their systems more adequate at assessing performance measurement and for cost-reduction efforts than did traditional cost system users. There were no statistically significant differences between the ABC and variable-cost and between the traditional and variable-cost system users. Both variable and ABC system users believed their systems generated information that was more useful for revenue enhancement decisions than did traditional cost system users.

Few Differences

The survey results indicate that there are few differences in the internal and external environments of ABC, traditional, and variable-cost system users. Even though the accounting literature suggests that ABC is desirable when the production process and products are automated and complex, we found similar operating characteristics within the companies that used traditional and variable-cost systems. We also found that the cost systems did not differ with industry pressure. For example, we did not find that high levels of price competition were present only in ABC companies. We did find that ABC systems present the cost of unused capacity more clearly than other systems do. The cost of unused capacity is a relatively recent issue in management accounting and one most often associated with ABC in the accounting literature.

One possible explanation for this lack of statistically significant environmental differences is that our survey does not measure the appropriate internal or external dimensions. For instance, some companies may be able to use the results of their cost systems to achieve the advantages of ABC without incurring the costs of developing and implementing the system. Managers familiar with the cost system results may know that the cost of a product is more or less than the system portrays, and they may build this knowledge into their decisions.

Another possibility is that the results of the current cost system provide information required by the companies' decision and incentive systems. Changes within the cost system could require additional changes in other systems, which would add some complicating factors. Also, some companies may lack the resources needed to implement ABC, and others may be focused on different process or profit improvement programs. Measurement of these other, less tangible aspects of a company and its culture may yield important insights into a company's choice of costing system.

ABC users evaluated their systems as more adequate than the other two systems in providing information useful in assessing performance measurement and cost-reduction efforts. These results appear consistent with the benefits of ABC included in the accounting literature. In addition, both ABC and variable-cost system users believe their systems provide more useful information for revenue enhancement than traditional systems do. ABC advocates the use of product information to evaluate product profitability; variable-cost systems rely on contribution margin calculations to determine which products will provide the greatest impact on net profits. Consequently, it appears that both ABC and variable-cost system users believe the information, although presented in very different ways, is useful in improving revenue.

These results indicate that those cost systems better serve user needs than traditional cost systems and suggest that the best system may integrate ABC and variable-cost system attributes.[18] ■

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