Potential Design Flaws in ABC Systems and Suggested Safeguards

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Abstract

ABC systems have received extensive attention in the last decade. The ABC literature has convincingly demonstrated that traditional cost systems systematically distort product costs. It is less widely recognized, however, that ABC systems can also distort costs if improperly designed. One notable cause of distortions in ABC systems is the assumption of constant average costs of all activities. This assumption and the design choices concerning the aggregation and the allocation procedures create great potentials for product and service cost distortions. The present article examines this problem and provides some solutions to enhance the accuracy and power of ABC systems. It will be argued that: (1.) Activity and product costs are not neutral to the process of cost aggregation and allocation; (2.) Many activity costs follow step or other nonlinear patterns. The ABC system designer should examine all activities for these patterns; (3.) Where activities are not proportional to cost drivers, pooling should be avoided; (4.) As product volume and product mix change, unit activity costs and other initial system parameters may change and render the ABC system less reliable. Frequent updating of the system is crucial under these conditions; and (5.) Frequent revisions and updating of the ABC system is equally crucial for companies that operate under rapid technological changes.

Introduction

The promised benefits of activity-based costing systems are conditional on a set of strong assumptions. Noreen [1991] demonstrates that for ABC systems to be able to overcome cost distortions of the traditional systems, three conditions must be satisfied. These are: “(1) all costs can be partitioned into pools, each of which is solely a function of a measured activity; (2) the amount of cost in each costs pool varies in *direct proportion* to its activity; and (3)

all activities can be attributed to products in the sense that if a product is dropped then the activities associated with that product can be avoided.” Noreen and Soderstrom [1994] empirically test the proportionality assumption in Washington State hospitals and find that it can be rejected for most overhead accounts. Datar and Gupta [1994] provide a theoretical argument that incremental improvements in a cost system, including better specification and more disaggregation may *increase* cost distortions compared to traditional costing systems. They argue that although more detailed cost systems “often reduce specification

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and aggregation errors, they may not *always* do so if the individual specification and aggregation errors in product costs in the more aggregate costing systems offset each other". Cost system improvements, however, frequently consist of such incremental changes. These studies suggest that several strong conditions have to be satisfied before ABC systems can be relied upon for pricing, product-mix and process improvement decisions.

An important cause of distortions in ABC systems is the assumption of constancy of average costs for all activities. Further, design choices such as the right number of cost pools, choice of activities included in each pool and the appropriate cost drivers lie at the heart of an ABC project. The relevance and reliability of activity and product cost estimates depend on system designers' answers to these decisions. The present article addresses some of the problems arising from ABC system design decisions. Specifically, the following issues will be examined: (1.) Does the process of aggregation of ledger accounts into activity cost pools and their subsequent disaggregation into product costs influence the accuracy of ABC results?; (2.) What criteria should be used in setting up activity cost pools and in selecting their corresponding cost drivers; (3.) What are the consequences of non-proportionalities in the underlying activity cost functions?; and (4.) How do ABC systems perform as production processes or product mix and volume change.

Interrelated steps in designing an ABC system

The belief about the superiority of ABC as a costing system is based on the greater level of detail that is involved in ABC. It is argued, or at least implied, that identifying more activities and attributing them to products will necessarily lead to better product estimates. Sharman [1994, p.B6-6] states "Accuracy in ABC is a function of the desired level of detail and depth of activity disaggregation. The greater the detail, the higher the level of accuracy". While this statement may be correct in an environment where the condi-

tions specified by Noreen [1991] hold, there is no a priori reason to believe that a more disaggregated system will increase accuracy. Datar and Gupta [1994] demonstrate this point rigorously. Frequently a more disaggregated indirect cost allocation system may result in measurement and specification errors offsetting one another and producing more accurate results. Accuracy in cost systems is a function of careful decisions at the design stage which may or may not be the case with current ABC practices.

Let us examine the influence of design choices on the accuracy of cost estimates under ABC and traditional systems. The design of an ABC system typically involves the following five steps (See Eiler and Ball, 1994; Sharman, 1994): (1.) Identify the activities performed to produce a product or service; (2.) Map the usage of economic resources or general ledger expenses to these activities; (3.) Identify first-stage cost drivers and *aggregate* the cost of economic resources to activity cost pools using these drivers; and (4.) Identify the cost objects or cost attachment point, such as various products. Identify the second-stage cost drivers and *allocate* activity costs to the cost objects using the second-stage drivers.

Considerable judgment is required in each of the above steps. Little problem is caused by activities or resources directly traceable to a product. The real problem arises where the *actual* consumption of activities by cost objects can not be objectively measured. While there are fundamental difference between traditional and activity-based costing systems, they both involve the process of aggregation of activity costs (or indirect costs) into cost pools and their subsequent disaggregation (allocation) to cost objects. The judgment employed in these processes influences the outcome of an ABC system. At each step, the designer should carefully examine the conditions determined by Noreen [1991]. Further, the designer should find the right balance between accuracy, simplicity, relevance to decision-making and ease of interpretation. These broad considerations rapidly expand into a

series of specific design choices with complex tradeoffs. The complexity of these decisions often leads to a total disregard of some of the underlying ABC assumptions and their potential consequences. In the following sections, the interaction between the underlying cost functions, design choices and the accuracy of the ABC results will be examined.

Design choices before the data collection stage

The first important design question is whether the measurement and classification methods used in the preparation of general ledger are also appropriate for ABC purposes. For instance, most companies use accelerated depreciation for tax and external reporting purposes. The designer may believe that some other depreciation method will produce better cost estimates. For example, in a technologically stable environment, the usage method of depreciation would better reflect the actual "consumption" of equipment. Where production volume is stable from one year to the next, the straight-line method provides an adequate resource consumption estimate. To the contrary, if product life cycle is short and production technology is subject to rapid changes, depreciation over a much shorter period may be desirable. The designer may question the relevance of depreciation costs for product costing. Plant depreciation is frequently not attributable to individual products, jobs or customers and its allocation to cost objects can only follow an ad hoc procedure. The designer may decide to simply expense plant depreciation and the cost of unused capacity of other activities.¹

A second design decision implicit in the present database, is the choice of the appropriate cost driver. Should plant depreciation be allocated to various cost objects (say, production departments) based on the square feet of space they occupy, or on their general operating expenses? The choice of square feet, though arbitrary, appears reasonable in this case. The main problem, however, is that depreciation is not an "activity" whose consumption and cost increase with pro-

duction volume. Attributing "space" activity costs to units of products using volume of production effectively converts depreciation costs into variable (and indeed proportional) costs. But there is no cause and effect relationship between a *unit* of output and plant depreciation. This design choice renders unit product costs highly sensitive to volume and product-mix changes and produces unreliable cost estimates. A more appropriate treatment of depreciation, as well as any other costs that are not attributable to cost objects, is to expense them periodically.

TABLE 1
Average and Total Depreciation under MACRS

Year	Total Annual Depreciation	Average Cost per Mhrs.
1	\$ 66,660	\$ 33.30
2	88,900	44.40
3	29,620	14.81
4	14,820	7.50
5	-	0.00
Total	200,000	-

The designer should be aware that using the externally reported depreciation numbers in conjunction with a particular cost driver builds the proportionality assumption into the model. This unintended assumption distorts the meaning attributed to the ABC activity and product costs. Consider a piece of equipment with a depreciable base of \$200,000 and a useful life of five years or 10,000 machine hours. Assume that the company owning this machine plans to use it for 2,000 hours each year. However, it classifies the machine as a 3-year property and uses MACRS with the half-year convention for tax purposes.

Table 1 shows the average depreciation of the machine and its annual depreciation expense. For both numbers, the externally reported depreciation expense is treated as the true cost of using machine capacity. Clearly, the average unit cost of machine depreciation is characterized by a step function and the assumption of constancy of average activity cost is no longer valid (see

Figure 1). The problem is twofold. First, the current-period activity costs based on externally reported expenses are incorrect. Second, activity costs derived in this manner change from one period to the next. ABC systems thus require constant updating for this type of information to remain meaningful for different volumes and peri-

Numerical Illustration 1

Company A manufactures two products in two plants. The two plants use different processes in the production of the two products. As Table 2 illustrates, eight overhead expense accounts (activity costs) have to be aggregated into cost pools. Assume that all activities can be *attributed* to products, i.e., the actual space occupied by each product line and the depreciation of machines in each line can be accurately measured. Table 3 shows the actual consumption of space and machinery by the two products in each plant under four independent scenarios.

Table 4 demonstrates six possible methods of pooling the resource costs. System 1 is structured as an ABC system with four activities. Systems 2 and 3 represent traditional cost systems with a single overhead cost pool. Systems 4, 5 and 6 are ABC systems with two activity cost pools. While some systems may appear intuitively more reasonable than others, no accepted guidelines exist for selecting the appropriate number of activities and pooling method. Ultimately, system designers' judgment and experience will determine the final structure of the cost system.

ods. Even so, trend reporting of certain activity and product costs becomes futile because costs will no longer be comparable across time periods.

Design choices following the data collection stage

Once the necessary information from general ledger and other sources are collected, the question of aggregating them into a manageably small number of cost pools poses the first critical design choice. Activity costs may be allocated to cost pools in different ways resulting in competing cost estimates. Let us examine this possibility using the following numerical example:

TABLE 2
Costs of Resources from General Ledger

General Ledger Account	Account Balance
Depreciation of plant 1 building	\$60,000
Depreciation of plant 2 building	120,000
Maintenance of plant 1 building	20,000
Maintenance of plant 2 building	25,000
Depreciation of plant 1 machinery	200,000
Depreciation of plant 2 machinery	200,000
Maintenance of plant 1 machinery	18,000
Maintenance of plant 2 machinery	12,000
Total Overhead	655,000

TABLE 3
Usage of Space and Equipment by each Product under Different Scenarios

	Driver unit	Product 1	%*	Product 2	%*	Total**
Scenario 1						
Space use in plant 1	Sq. Ft.	90,000	43	120,000	57	210,000
Space use in plant 2	Sq. Ft.	150,000	43	200,000	57	350,000
Equipment use in plant 1	Mhrs	3,750	43	5,000	57	8,750
Equipment use in plant 2	Mhrs	3,000	43	4,000	57	7,000
Scenario 2						
Space use in plant 1	Sq. Ft.	80,000	40	120,000	60	200,000
Space use in plant 2	Sq. Ft.	150,000	43	200,000	57	350,000
Equipment use in plant 1	Mhrs	6,500	57	5,000	43	11,500
Equipment use in plant 2	Mhrs	6,000	60	4,000	40	10,000
Scenario 3						
Space use in plant 1	Sq. Ft.	96,000	44	120,000	56	216,000
Space use in plant 2	Sq. Ft.	150,000	43	200,000	57	350,000
Equipment use in plant 1	Mhrs	4,000	44	5,000	56	9,000
Equipment use in plant 2	Mhrs	3,000	43	4,000	57	7,000
Scenario 4						
Space use in plant 1	Sq. Ft.	90,000	43	120,000	57	210,000
Space use in plant 2	Sq. Ft.	150,000	43	200,000	57	350,000
Equipment use in plant 1	Mhrs	4,000	44	5,000	56	9,000
Equipment use in plant 2	Mhrs	3,200	44	4,000	56	7,200

* All percentages are rounded. Cost allocations in the following tables are based on actual square feet or machine hours rather than on the rounded percentages.

** Each scenario is totally independent from the others. Total space or machine hours need not be identical for all scenarios.

A widely used approach in cost system design is to group activity costs into four categories: unit-related, batch-related, product-sustaining and facility-sustaining groups (see Cooper, 1990). This approach provides a systematic way of filtering out fixed costs from the slew of indirect overhead costs. For instance, overhead costs that vary with the number of batches or the number of products may appear to be fixed when a volume-driven or *unit-level* cost driver is used. Hierarchical method of classification is a means of filtering out facility-sustaining and other fixed costs. If systematically carried out all activity costs must be made up of variable

costs only. This process will not guarantee, however, that average activity costs will all be constant. Alternative methods of pooling activity costs exist and may be used². The ABC designer should be aware, however, that the outcomes of the ABC and other costing systems are not neutral to such design choices.

Table 5 shows overhead costs allocated to product line 1. For each independent scenario, six different costing methods are considered. The allocated costs vary widely between costing systems, except for scenario 1 where identical allocations are observed. The results of scenario 1

TABLE 4
Traditional versus Alternative ABC Systems

Cost System	System Description	Overhead Amount (\$)	Cost Driver
System 1 (ABC)	Activity 1: Depreciation & Maint. Plant 1 Bldg.	80,000	Sq. Ft.
	Activity 2: Depreciation & Maint. Plant 2 Bldg.	145,000	Sq. Ft.
	Activity 3: Depreciation & Maint. Plant 1 Equipment.	218,000	Mhrs
	Activity 4: Depreciation & Maint. Plant 2 Equipment.	212,000	Mhrs
System 2	Single OH Pool for all Plants	655,000	Sq. Ft.
System 3	Single OH Pool for all Plants	655,000	Mhrs
System 4 (ABC)	Activity 1: Depreciation & Maint. of Bldg. and Equipment, plant 1	298,000	Sq. Ft.
	Activity 2: Depreciation & Maint. of Bldg. and Equipment, plant 2	357,000	Sq. Ft.
System 5 (ABC)	Activity 1: Depreciation & Maint. of Bldg. and Equipment, plant 1	298,000	Mhrs
	Activity 2: Depreciation & Maint. of Bldg. and Equipment, plant 2	357,000	Mhrs
System 6 (ABC)	Activity 1: Depreciation & Maint. of both plants' bldg.	225,000	Sq. Ft.
	Activity 2: Depreciation & Maint. of both plants' equipment	430,000	Mhrs.

TABLE 5
Overhead Costs (\$) Allocated to Product Line 1 under Alternative Pooling Systems

	System 1 (ABC)	System 2	System 3	System 4	System 5	System 6
Scenario 1	280,714	280,714	280,714	280,714	280,714	280,714
Scenario 2	344,560	273,909	380,814	272,200	382,635	344,091
Scenario 3	285,444	284,682	286,563	285,444	285,444	285,917
Scenario 4	287,540	280,714	291,111	280,714	291,111	287,540

appear to contradict the relevance of design choices to the outcome. However, the first scenario represents an exceptional situation where product line 1 consumes identical percentages of all overhead resources or activities (43% in this case). Clearly, product costs remain neutral to the process of allocation of activity costs whenever this property holds.

However, when usage of various activi-

ties are not identical, significant cost distortions can arise. In scenario 2 of Table 5, where product 1 is more "machine-intensive" and less "space-intensive" than product 2, traditional as well as alternative ABC systems (systems 4 through 6) result in sizable cost distortions.

ABC systems 4 and 5 provide a sharp contrast to system 6. Intuitively, these two systems characterize the least logical ways of pool-

ing activities and allocating their costs to products. Here, non-homogeneous building and equipment related expenses are pooled together. Besides, no care is taken to ensure that all pooled activities are driven by the same driver. Yet for scenario 3, cost allocations by systems 4 and 5 are identical to those under ABC system 1. The main reason for this result is all three systems allocate 44% of the first and third activity costs and 43% of the second and fourth activity costs to product 1. One may conclude, therefore, that as long as activities used in identical proportions are pooled together to reduce the number of cost pools, ABC cost estimates will remain unchanged.

Before we continue further, let us summarize the above observations in the form of following design guidelines to ensure minimum cost distortions: (1.) In setting up cost pools, combine activities and resources that belong to the same activity group and hierarchical category and, to the extent possible, are driven by the same cost driver. This should prevent the system from pooling activities with substantially different cost structures; and (2.) Where step 1 fails to produce a sufficiently small number of cost pools, combine unrelated activities or resources that are used in identical proportions by all products. Deviations from the above procedure reduces the accuracy of the ABC results. However, it should be emphasized that in many real world situations, there may be a trade-off between accuracy and simplicity. Considerable experience and judgment is required to compromise the above procedure and maintain system accuracy at the same time.

Need for frequent updating of the ABC system

A basic problem with the assumption of proportionality of activity costs to cost drivers is the need for frequent updating of the ABC system as production volume and technology change. The reason for this problem is straightforward. Activity costs are, in general, not proportional to cost drivers. Proportionality is an artifact of ABC systems that treat the existing

product-mix, and thus, the activity rates as given. The example of plant depreciation vividly proves this point. Similar problems may arise for batch-level and product-sustaining activities. In a stable business with non-seasonal products, this may cause little problem. However, where product volume or production processes change frequently, the parameters of the ABC system should be updated frequently. Absent a solid updating mechanism in the ABC system, its performance may turn out to be less reliable than that of the traditional systems. The following example demonstrates this point.

Numerical Illustration 2

Assume that company A's products are seasonal. Further, they are close substitutes so that their demand levels move in opposite directions. Potential product demand and resource consumption are shown in Table 6. Notice that, as production volume changes, activity costs decrease or increase more rapidly than under a proportional cost structure. Besides, usage ratios are no longer identical for the two products. This example is useful for examining the impact of nonlinear activity costs and changing volumes on the performance of alternative cost systems.

Note from Table 6 that when production volumes of both products are 10,000 units, space and machine usages are identical to scenario 1 of Table 3. The volume of 10,000 units is the starting point in Table 6. Activity usages and costs at this point constitute the *base parameters* for the ABC system. Parameters of the ABC or any other costing system should be regularly updated to reflect the most recent activity consumption levels and rates. Otherwise, the system may continue to use the original parameters for cost estimation at different volume levels. In Table 9, such a cost system is referred to as a *rigid* cost system.

Table 7 shows cost estimates and percentage distortions in total overhead costs allocated to product 1 for different output levels. For output level 4, notice that there is no difference

TABLE 6
Nonproportional Consumption of Activities by Products

PRODUCT 1	Potential Demand and Output Levels						
	1	2	3	4	5	6	7
Production Volumes, units	8,500	9,000	9,500	10,000	10,500	11,000	11,500
Depreciation, Plant 1, Sq. ft.	73,000	79,500	84,500	90,000	95,000	100,500	107,000
Depreciation, Plant 2, Sq. ft.	121,000	132,000	140,000	150,000	158,000	167,500	178,000
Maint. Plant 1, Mhrs.	3,050	3,300	3,520	3,750	4,000	4,200	4,600
Maint. Plant 2, Mhrs.	2,400	2,650	2,800	3,000	3,200	3,350	3,600

PRODUCT 2	1	2	3	4	5	6	7
	1	2	3	4	5	6	7
Production Volumes, units	11,500	11,000	10,500	10,000	9,500	9,000	8,500
Depreciation, Plant 1, Sq. ft.	137,000	130,500	125,500	120,000	115,000	109,500	103,000
Depreciation, Plant 2, Sq. ft.	229,000	218,000	210,000	200,000	192,000	182,500	172,000
Maint. Plant 1, Mhrs.	6,050	5,650	5,300	5,000	4,675	4,375	4,000
Maint. Plant 2, Mhrs.	4,840	4,520	4,240	4,000	3,740	3,500	3,200

TABLE 7
Overhead Allocations to Product 1 under Alternative Cost Systems
(Percentage distortions measured against flexible ABC estimates)

	8,500	9,000	9,500	10,000	10,500	11,000	11,500
Flexible ABC	\$221,280	\$243,706	\$261,511	\$280,714	\$299,918	\$318,133	\$343,345
<u>Rigid Cost Systems:</u>							
System 1 (ABC)	226,612 (2.41)	247,446 (1.53)	262,689 (0.45)	280,714	298,219 (-0.57)	313,776 (-1.37)	338,139 (-1.52)
System 2	226,911 (2.54)	247,379 (1.51)	262,589 (0.41)	280,714	295,920 (-1.33)	313,464 (-1.47)	333,348 (-2.91)
System 3	226,651 (2.43)	247,444 (1.53)	262,832 (0.51)	280,714	299,427 (-0.16)	313,984 (-1.30)	341,016 (-0.68)
System 4 (ABC)	227,010 (2.59)	247,454 (1.54)	262,709 (0.46)	280,714	295,969 (-1.32)	313,464 (-1.47)	333,398 (-2.90)
System 5 (ABC)	226,274 (2.26)	247,539 (1.57)	262,681 (0.45)	280,714	299,427 (-0.16)	313,890 (-1.33)	340,263 (-0.90)
System 6 (ABC)	226,740 (2.47)	247,422 (1.53)	262,747 (0.47)	280,714	298,223 (-0.57)	313,806 (-1.36)	338,382 (-1.45)

between the estimates of the flexible ABC with that of the alternative cost systems. This scenario is a replication of scenario 1 in Table 3 where all resources are used in identical proportions by the two products.

The first row of Table 7 is the benchmark system where the updated (i.e., correct) activity drivers and rates for alternative volumes are used in cost estimation. This system is referred to as flexible ABC. The remaining rows show cost estimates under alternative rigid cost

systems and percentage distortions resulting from them. For instance, when volume is 11,500 units, the rigid ABC system understates overhead applied to product 1 by 1.52 percent, etc. Two observations can be made from Table 7: (1.) As production volume moves away from its base level cost distortions increase in all of the rigid systems; and (2.) The ABC system with four activity pools does not always outperform the other cost systems. As unit activity costs become less accurate, traditional and alternative ABC systems have the advantage of offsetting incorrect activity costs against one another.

Testing activity costs for nonlinearities

Clearly, it is important to fully understand the underlying production and cost processes before implementing an ABC system. The assumption of constancy of average costs must be verified for the relevant range of output. To do that, the designer of the ABC system should carefully examine the total cost plot of an activity against the corresponding cost driver. For activities exhibiting a fixed cost component, the fixed component should be removed from the corresponding cost pool and included in product or facility-sustaining category for further examination. Alternatively, a different driver that does exhibit a proportional relationship with the activity cost must be used. The next step is to ensure that the plot is *linear* within the relevant range. While visual examination of the plot is helpful, it is preferable to perform a regression and to plot its residuals. Presence of any patterns in the residual plot is typically the sign of nonlinearities. A fairly random residual plot around the horizontal axis provides more assurance. Further, to ensure that fixed costs are trivial, the estimated intercept of this regression must be close to zero (i.e., not significantly different from zero).

Ideally, these procedures must be performed for all activities before any aggregation takes place. In practice, the designer may find considerable information about various activities and their costs to facilitate his or her task. Activities that vary proportionately with respect to a

cost driver can safely be pooled in a single cost pool. Further, activities that take place in the same production process or work center and those sharing the same hierarchical classification can also be combined together before performing any regression tests. For non-homogeneous and any remaining activities with unknown cost structures, the designer should perform proportionality tests before pooling them. If nonlinear activities are pooled with linear activities, the result will be a nonlinear activity. It is, therefore, quite important not to introduce any measurement errors in activity costs in this manner.

Building safeguards into ABC Systems

To mitigate adverse consequences of above problems, the ABC designer should take the following necessary precautions: (1.) Examine the company's technological and market environment. Instability in either area normally implies that the ABC system should contain more controls and updating mechanisms; (2.) Examine the underlying accounting assumptions to determine whether a true cause-and-effect relationship between cost drivers and activities exist; (3.) Examine activity or resource costs for nonlinearities. Use plots and regressions for added reliability of the tests. Where nonlinearities are pervasive, it may be preferable to have fewer cost pools (larger portfolios) to take advantage of offsetting errors. Otherwise, extreme caution must be exercised in identifying the true (nonlinear) cost structure of such activities on an individual basis. This will enable the designer to determine the correct average cost for each activity at different production volumes. Further, the consumption data and rates for all nonlinear activities must be updated frequently; (4.) Classify activities according to the hierarchical approach. Move up from the unit-level to the batch-level and to product-sustaining activities and filter out any fixed costs to the higher level. Facility-sustaining category should include all such costs and the cost of any unused capacity. Further, it should be treated as a period cost; and (5.) In pooling resources, choose activities that belong to the same process and hierarchical category.

Alternatively, or as an additional safeguard, ensure that the pooled resources are used in identical proportions by all products using that resource.

Conclusion

System designers engaged in activity-based costing projects should take careful note of the underlying assumptions of ABC systems and of potential consequences of violating them. Constancy of average activity costs is one of the more important ABC assumptions. It rules out fixed costs and requires linear cost functions. Ignoring this assumption and the sensitivity of product costs to the aggregation and allocation process may introduce distortions into an ABC system that are no less significant than those created by the traditional systems.

Suggestions For Future Research

Future research on the implementation of activity-based costing should pay more attention to the following areas: (1.) Studying firm or industry-specific cost structures. Where cost structures are essentially non-proportional the recommendations of this article should be taken into account; (2.) Developing better procedures for identifying causal activity drivers and of pooling them together to minimize cost distortions in non-linear cost environments; (3.) Extending the basic ABC model to situations where cost structures are non-linear. The goal of this effort should be the development of a generalized ABC system that does not rely on specific assumptions about cost structures.

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Endnotes

1. Cooper and Kaplan [1992] and Kaplan [1994] suggest that the cost of any unused capacity must be expense rather than be allocated to product on an ad hoc basis.

Such arbitrary allocations render the costs of activities and products highly volatile as production volume varies from one period to the next.

2. See Eiler, R. G. and C. Ball [1994], Sharma [1994] and Eiler, R.G. and J. P. Campi [1990].

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