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COMMENTARY

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Flexible Budgeting in an Activity-Based Costing Framework

A recent article (Cooper and Kaplan, 1992) introduced the distinction between the activity-based measurement of the costs of resources **used** by activities (for products, services and customers) and the traditional financial measurement of the costs of resources **supplied** to enable activities to be performed. The two concepts are related through the unused capacity of the resources supplied, as shown in the following equation:

Costs of Resources Supplied	=	Costs of Resources Used	+	Cost of Unused Capacity

Periodic financial statements measure the left-hand-side of the above equation. The activity-based costs assigned to products, services, customers, and other cost objects are aggregated into the first term on the right-hand-side of the equation. The difference between these two amounts represents the cost of unused capacity.

Cooper and Kaplan (1992) indicated that some resources, such as energy to operate machines or overtime labor, are supplied only as needed so that no unused capacity can exist for these resources. The costs of supplying such resources are what many people have characterized as "variable costs" since the spending on these resources varies directly with the demands or usage for the resources. The costs of resources contracted for in advance can be considered as "fixed" costs since the spending on these resources will be independent of actual use. The expenses associated with such resources do not vary, within the time period, with variations in the demand for the activities performed by these resources. Cooper and Kaplan (1992) assumed that the resources used for a particular activity were either entirely flexible with demand or entirely committed in advance of demand. They did not explicitly allow for the possibility that some portion of the resources supplied to perform a given activity could be committed, while another, flexible, portion was supplied as needed to meet actual, realized demand for the activity.

The assumption that the costs of resources to perform an activity are either entirely "variable" or "fixed," or **flexible** or **committed**, as they will be referred to in the remainder of this paper, is not an inherent feature of activity-based cost systems. Just as in traditional cost models, some of the resources to perform a given activity can be committed in advance, while other resources may be supplied as needed. In such cases, the activity cost exhibits a mixed behavior, with the total cost of performing the activity representing a combination of committed and flexible supply of resources in response to demand fluctuations. To assign the costs of such activities to cost objects, such as products, services, and customers, within an activity-based framework requires that the cost assignment appropriately incorporate the resource supply/resource use distinction that lies at the heart of ABC systems. When such a distinction is incorporated, the resulting reporting structure en-

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ables activity-based cost assignments to be completely integrated with periodic financial performance measurement.

Companies have been urged to start their redesign of cost systems by developing only Stage 3 cost systems (Kaplan 1990) in which the activity-based systems are implemented separately from companies' operational control systems that provide periodic feedback on financial and operating performance. The concepts in Cooper and Kaplan (1992) and this paper begin identifying the design characteristics for Stage 4 cost systems in which activity-based cost and profitability information on products, customers, and services are integrated with periodic reporting on actual activity demands and resource expenses.

The basic principles for integrating activity-based cost assignments with flexible budgeting and *ex post* analysis of actual expenses can be illustrated with a simple numerical example. Let's take a support activity, such as inspection, and assume that the cost driver for this activity is the number of inspections performed. One can think of the demand for this activity coming from set-ups—inspecting the first few items produced after each changeover to verify that the set-up was done appropriately; from receipts— inspecting raw material or purchased parts from non-certified vendors; or from shipments—preventing external failures by verifying that the product meets customer specifications. Table 1 presents the financial and operating assumptions for this activity for a given period, such as a month, as well as the actual results.

I. SIMPLE ABC APPROACH

In a simple ABC approach, a cost driver rate is derived from budgeted figures on expenses and anticipated activity volumes:[1]

$$\text{Cost per Inspection} = \frac{\text{Budgeted Inspection Expenses}}{\text{Budgeted Activity Volume}} = \frac{\$280{,}000}{4{,}000}$$
$$= \$70/\text{inspection}$$

During the period a $70 charge is assigned to any receipt, batch, or shipment that has an inspection performed; that is, the cost assignment uses a standard cost driver rate applied to actual volumes.[2] Assuming that the operating expense for the inspection activity is considered a committed expense, reconciling the inspection expense charged to products with the inspection expense recognized in the period's financial statement can be accomplished in a straightforward calculation:[3]

Inspection Expense Charged to Products:	3,500 @ $70	$245,000	
Volume Variance: (Budgeted – Actual Activity Level) (4,000 – 3,500) = 500	@ $70	35,000	U
Spending Variance: (Actual – Budgeted Expenses)		(30,000)	F
Total Actual Expenses		$250,000	

The "Simple ABC" approach, however, causes the cost driver rate to fluctuate each period with anticipated activity levels. If anticipated activity levels are falling faster than operating expenses can be reduced, the cost

[1]When using an ABC system on an ongoing basis, as exposed to a one-time snapshot of prior period's operations, a **standard** (or **budgeted**) activity cost driver is calculated from budgeted information.

[2]Alternatively, a cost driver rate could be determined *ex post* based on actual expenses and actual activity levels ($250,000/3,500 = $71.43 per inspection). This *ex post* calculation has several undesirable aspects, as discussed in standard textbook treatments of service department cost assignments; see, for example, pp. 249–253 in Kaplan and Atkinson (1989).

[3]The variances are calculated to reconcile the cost of supplying resources during the period with the cost of resources used for the activities actually performed. These variances can serve as a signal or trigger for managerial action. The appropriate interpretation and use of these reconciling variances are managerial judgments.

TABLE 1
Inspection: Operating Expenses and Activity Levels

	Expense	Activity Level (# Inspections)
Budgeted	$280,000	4,000
Actual	$250,000	3,500

driver rate starts to escalate leading to potential death spirals.[4] More fundamentally, no theoretical reason exists for calculating cost driver rates in this manner. The $70 rate is just a rough surrogate, and perhaps a quite inaccurate one, for the costs of resources used in each inspection. The rate includes not only the costs of resources actually used for the inspection, but also some portion of the unused capacity costs of resources supplied to perform this activity.

II. CAPACITY-BASED ABC APPROACH: COMMITTED EXPENSES

The approach advocated in Cooper and Kaplan (1992) overcomes the limitations in the "Simple ABC Approach" by interpreting the budgeted operating expenses of $280,000 as supplying a **capability** or capacity to perform inspections. With this interpretation, an additional piece of information is required to calculate the cost driver rate for the inspection activity, namely, how much capacity is supplied for this commitment of resources.[5] Assume that contracting to supply $280,000 of resources for inspection provides a practical capacity to perform 5,000 inspections in the period. This assumption leads to a cost driver rate calculation of:

$$\text{Cost per Inspection} = \frac{\text{Budgeted Inspection Expenses}}{\text{Capacity Activity Volume}} = \frac{\$280,000}{5,000}$$
$$= \$56/\text{ inspection.}$$

In the Capacity-Based ABC approach (referred to as the "Strategic ABC Approach by Yang and Wu (1993)), the cost driver rate is based on the capacity provided by organizational spending, and is not influenced by actual or anticipated levels of actual resource usage. Since, at the anticipated activity level of 4,000 inspections, not all of the capacity provided will be used productively, a cost of unused capacity is anticipated in the budgeting process:

Budgeted cost of unused capacity
= (Practical – Budgeted Capacity) @ $56
= (5,000 – 4,000) @ $56
= $56,000.

Given the actual expenses and use of the inspection activity, reconciling the inspection expense charged to products with the amount recorded in the period's financial statements is now:

Inspection Expense Charged to Products:			
	3,500 @ $56	$196,000	
Budgeted Unused Capacity Cost:			
	1,000 @ 56	56,000	U
Capacity Utilization Variance:			
	(4,000 – 3,500) @ 56	28,000	U
Spending Variance: (Actual - Budgeted Expenses)			
		(30,000)	F
Total Actual Expenses		$250,000	

This capacity-based calculation enables the $84,000 of unused capacity ($56,000 expected, $28,000 unexpected) to be highlighted for management attention. It signals the opportunity for actions such as reducing the supply of this resource or soliciting additional business that could be accommodated within existing resource supply.

The capacity-based calculation continues to assume that all of the expenses associated with supplying resources to perform the inspection activity are incurred independently of the actual demand for this activity during the period. This situation arises when the physical resources for the activity have already been acquired (such as the inspection equipment) and the people performing inspections have an implicit or explicit contract with the organization to continue to come to work and be paid whether or not work is available for them to perform. Also, no alternative activity exists that could productively use these resources when they are not actually perform-

[4] Cooper and Verma (1991) show how a death spiral can arise in the "simple" use of ABC.

[5] Selection of the quantity to use as the capacity or capability of the resource provided is a complex subject, well beyond the scope of this paper. For some resources, such as machines, capacity is acquired in lumpy amounts. A strong argument can be made for using the activity volume anticipated in the acquisition decision—which could be less than the actual capacity acquired—as the "practical capacity" for these resources. For other resources, bottleneck constraints and seasonal and cyclical peak usage demands need to be considered. The particular denominator volume selected does not affect the calculations proposed in this paper, though it may affect interpretation of the results.

ing inspections, their intended activity.[6] Thus, any deviation between actual and budgeted spending is attributed to timing differences or unexpected spending rather than to variations in activity levels.

III. CAPACITY-BASED ABC WITH COMMITTED AND FLEXIBLE RESOURCES

A more general treatment allows some portion of the activity resources to be committed in advance, so that the associated expenses are volume-independent, and a separate portion of resources supplied as needed to meet actual, realized demands. For example, equipment and space may be dedicated to inspections, but people are supplied as needed to perform inspections. In this case, two different cost driver rates are required to assign resource expenses to cost objects. The committed expenses (space and equipment) are assigned, as in case II, based on the capacity or capabilities provided by these resources, while the expenses of the flexible resources (inspectors) are assigned based on the activity volumes actually realized.[7] This procedure resembles what is now a standard textbook recommendation for assigning service department costs to production centers; that is, assign the "fixed" capacity resources based on anticipated usage or demand for the capacity and assign the "variable" portion of service department costs based on actual usage. In the ABC treatment, however, the cost of committed resources is still assigned based on actual usage.

To illustrate this procedure, assume that the numerical example of the $280,000 of budgeted expenses for inspection, $200,000 represents the expenses of committed resources and $80,000 represents the expenses of flexible resources. Table 2 presents a summary of this situation, including calculation of the two different cost driver rates.

Now the amount charged to products can easily be reconciled with the amount of expenses actually recorded:

Inspection Expense Charged to Products: 3,500 @ $60	$210,000
Budgeted Unused Capacity Cost: (5,000 – 4,000) = 1,000 @ 40	40,000 U
Capacity Utilization Variance: (4,000 – 3,500) = 500 @ 40	20,000 U
Spending Variance: Actual – Budgeted Expenses ($250,000 – 270,000[8])	(20,000) F
Total Actual Expenses	$250,000

In summary, the assignment of expenses to products (or services, or customers) for both committed and flexible resources associated with performing a particular activity can be

[6] If, as assumed in the numerical example, resources are not fungible (transferable) across activities, then unused capacity can be measured at the activity level. If resources are fungible across several activities, then the resources but not the activities have the potential for unused capacity. The judgment of when unused capacity exists at the activity level and when at the resource level is not trivial, and should be examined in future research.

[7] A multi-tiered structure for cost driver rates to distinguish between capacity-supplying resources and flexibly-supplied resources has been proposed previously (Ostrenga 1988; and Christensen and Sharp 1993). These previous approaches, however, focused only on product costing aspects and did not explore the integration of the approach with flexible budgeting and *ex post* analysis of actual expenses.

[8] Flexible Budget for Expenses = $200,000 + $(20 * 3,500) = $270,000.

TABLE 2
Operating Expenses and Activity Levels: Budget and Actual

	Expense	Activity Level (# Inspections)	Driver Rate
Budgeted Committed (Supplying Capacity)	$200,000	5,000 (capacity)	$40
Budgeted Flexible (Varying with Volume)	80,000	4,000 (budgeted)	20
Budgeted Total	$280,000		$60
Actual (Realized)	$250,000	3,500 (actual)	

easily handled by using two different cost driver rates. One rate assigns the cost of resources that are committed (supplied) in advance of knowing actual demand and the other rate assigns the cost of resources that are supplied in proportion to actual activity demands.[9] This two-tier structure enables product costing to be integrated with expense analysis. Actual spending or expenses can be estimated based on forecasted activity levels. The $250,000 of expenses actually reported during a period can be reconciled with the $210,000 of expenses assigned to products, through expected and unexpected costs of unused capacity and spending variations.

In addition, the analysis reveals which costs assigned to products (or customers or services) represent committed versus flexible resources. Managers can easily see which expenses are expected to vary in the short run and use this information in making short-run incremental pricing and product- and customer-mix decisions.

POSTSCRIPT

Measuring product costs based on a measure of practical capacity is certainly not a new idea. Donaldson Brown, in the 1920s, devised a pricing formula for General Motors that used a standard volume assumption of 80 percent of theoretical capacity (Brown 1924a, 1924b; and General Motors 1960). And even earlier, Gantt (1915) one of the leading figures in the scientific management movement, criticized the apparently already prevailing practice of assigning actual expenses based on actual production volumes and advocated capacity-based costing:

> The only expense logically chargeable to a product is that needed for its production when the factory is running at its full or normal capacity.
>
> Inasmuch as the determination of this fact is primarily an engineering or manufacturing problem, and not primarily an accounting problem, it becomes evident that cost methods must be based on engineering knowledge, and the cost accountant of the future must himself be an engineer or manufacturer, or be guided by one.

Gantt's recommendations to adopt capacity costing, and about the educational and experiential background for cost accountants, were not widely followed by many companies in subsequent decades.[10] General Motors, however, for some 50 years did continue to use two different volume assumptions in its management systems. Donaldson Brown's standard volume of 80 percent of theoretical capacity was used for planning and pricing purposes, whereas budgeted volume (called "index volume" in the company) was used for budgeting and control of short-term operating expenses. In the mid-1970s, the apparent confusion from having two different volume assumptions (both standard and index volumes) in the company's management systems caused senior management to eliminate the standard (practical capacity) volume and to use index volume for product costing and pricing purposes. This decision, which led the company to raise prices to cover their higher reported product costs, occurred just as Japanese and European competition combined with a surge in oil prices to cause sales of U.S. domestic automobile companies to plummet. The death spirals induced by assigning committed plant operating expense to a diminished volume base likely led to more than a few plant closings in the General Motors system.

Cooper and Kaplan (1992) applied the Gantt and Donaldson Brown recommendations by advocating that activity-based cost driver rates be calculated using the practical capacity supplied by the resources committed

[9] Alternatively, as Robin Cooper pointed out to me, we can skip this mixed situation entirely by defining two separate activity pools: one for resources committed in advance to perform the activity, and one for resources provided as needed to perform the activity. The cost of the activity driver for the committed resource activity cost pool would be based on the practical capacity supplied, and the cost of the activity driver for the cost pool containing the flexible resource costs would be based on the actual amount of work performed.

[10] Textbooks, however, such as Shillinglaw (1983, 183–185) certainly made this point in connection with assigning service department costs to production departments.

to that activity. The current paper extends that analysis by showing how activity-based analysis can be integrated into a flexible budgeting process and an *ex post* financial analysis of operating expenses. The recommended process allows Donaldson Brown's "standard volume" assumption to be used to assign the costs of using committed resources to products, services and customers. Also, such costing can be integrated with the analysis of expenses of flexible resources whose supply varies with actual activity volumes.

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