THE CASE FOR RCA: EXCESS AND IDLE CAPACITY

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Executive Summary

- The mapping method of Resource Consumption Accounting (RCA) significantly enhances the management of the resource side of the activity-based costing model.
- RCA complements the activity-based costing model by incorporating the visible homogeneous measures of capacity, directly expressing the interrelationships between resource elements, reflecting the initial inherent nature of cost, and accounting for excess and idle capacity.

Editor's Note: Business managers have been looking for solutions to complex problems since before George Dantzig developed the simplex algorithm for linear programs over a century ago.

Dr. Eli Goldratt, the genius behind the Theory of Constraints, set his ambitions on maximizing thoroughput while simultaneously containing or even reducing operating expenses and inventory levels.

Drs. Robert S. Kaplan and Robin Cooper set the foundations for measuring and managing activities that consume an organization’s resources (ABC/M) in a number of articles between 1990–1995 and in 1998, thoroughly articulated their resource consumption model, capacity, and performance systems in their book, Cost and Effect (Harvard Business School Press). Numerous other thinkers contributed to the exploration of the interrelationship of resources, capacity, and profitability. Now, Anton van der Merwe and David Keys throw their hats into the resource/capacity ring. In this first of a series of articles, the authors build on their predecessors’ work, and propose a mapping method to analyze and manage the “resource” side of ABC. The authors present their work as complementary to activity-based costing and management as they attempt to more directly express the interrelationships between resource elements.

This article addresses the misapplication of ABC systems. Many practitioners jumped on the ABC bandwagon in its early stages, and have neglected to keep up with the evolutionary thinking that has occurred since. This article series will be especially helpful for managers using ABC systems first implemented 5-to-10 years ago, and that have undergone minimal design changes since. Resource-consumption accounting concepts can assist in updating such models to deliver more valuable decision-making information.

INTRODUCTION

In the mid-1980s, ABC came into prominence, a paradigm shift occurred in the way cost and its behavior were viewed. Processes became the primary drivers of costs. There was talk of the functional organization being replaced by an entirely process-oriented
organization, and attempts were made to incorporate capacity management into ABC. Resources, traditionally viewed as expense elements on the general-ledger view of expense elements, were recast in a new light—the process view.

Fifteen years later, the functional organization is alive and well and the general opinion is that ABC had mixed, if not mediocre, success in the market.¹ The reasons are not fully understood, and efforts are under way to gain more insight.² The problems may lie in the philosophy itself or the ways in which it was applied; other shortfalls can be ascribed to the view that was adopted for ABC in regard to resources. Some companies plunged headlong into a fixed-cost death spiral using ABC information.

THE ABC VIEW OF RESOURCES FALLS SHORT

Exhibit 1 illustrates the mapping of resources and expense accounts to activities (processes are implied) using the ABC model. Dock 1, a docking station at a distribution center, receives palletized shipments from plants and breaks them down for storage. Based on demand in the region, smaller pallets are stacked and loaded for shipment to retail outlets. Breaking down and stacking are accomplished with manual labor. Because electric forklifts are used to unload and load pallets, accounts 272, 274, and 280 are mapped only to the unloading and loading activities.

This mapping method, though intrinsically sound for allocating costs, falls short of being the definitive method in eight significant ways regarding resource costing:

1. A homogeneous measure of capacity is not incorporated.
2. Interrelationships among resource elements (e.g., output quantities, utilization statistics) are only indirectly expressed.
3. The initial inherent nature of cost (i.e., the fixed and proportional characteristics of the costs given the capacity, skill, technology, operating characteristics of the resources deployed) is not reflected.
4. Excess and idle capacity is not properly accounted for.
5. Interrelationships between resource pools (i.e., the grouping of related resource elements into a pool) are only indirectly expressed.
6. The changing nature of cost, as it relates to the cost model, is not reflected.
7. Fully burdened resource costs are not provided.
8. Inferior information is supplied for effective resource management and certain strategic decisions.

Exhibit 1.

The ABC View of Resources and Their Cost Flow

This article addresses the first four of eight shortfalls and proposes RCA not as a replacement for ABC but rather as a complement to it. The solution to the first three shortfalls is provided in the explanation of the RCA view of resources. Resources, in the proposed view, include more than just the expense elements in the general ledger; it also includes machines or groupings of these and people and groupings of people. In addressing the fourth shortfall, criteria for the evaluation of excess capacity solutions are proposed. Two
typical ABC excess capacity solutions are reviewed and evaluated before the resource consumption accounting solution is presented and evaluated. Shortfalls five through eight will be addressed in two subsequent articles.

THE BASIC RCA SOLUTION

The proposed RCA solution is best illustrated by means of the strategic or organizational planning process, especially when considering a “green fields” organization or a new business plan. Vision, mission, and purpose objectives are converted into an investment in resources of the desired quantity, quality, technology, and skill. This process similarly applies to an existing enterprise that requires a commitment of resources to achieve the goal. From a cost management perspective, this commitment assumes the following:

● Available capacity has been determined.
● Skill, technology, level of training, and operating characteristics of the resource base have been determined, which in turn are the primary determinants of:
   ● Interrelationships between resource elements (e.g., electricity expense and forklift hours in Dock 1).
   ● The initial inherent nature of cost for the resource base.
   ● Resource pool interdependencies and how the nature of cost will change at the time of consumption.

One overall assumption is made with regard to the plan: no one plans for failure, the plan is as sound as can be, given knowledge and insight at the time. Adjustments to the plan are inevitable, these will be incremental, unless the plan or strategy—or the business—is abandoned. Until abandonment, the strengths, weaknesses, advantages, limitations, and characteristics of the invested resource base must be harnessed to achieve the strategic goals.

HOW RCA ADDRESSES ABC SHORTFALLS

Some activity-based and traditional cost models include the creation of “resource pools.” Likewise, RCA provides a particular framework for viewing resources. Resources and related resource elements are first grouped into generic resource pools, using the following criteria:

● Resources must be of a similar technology—for example, labor in Dock 1 is grouped together and the forklifts are considered a separate resource pool.
● Resource pool output and its relationship to consumers can be quantified and planned.
● Actual data, costs, and quantities for each pool can be collected or imputed.

The resource pools address the first three shortfalls noted in the following paragraphs.

No Homogeneous Capacity Measure Exists. To address this shortfall, an output measure must be assigned to each resource pool, serving as a consistent measure of output to manage capacity. It provides insight into resource utilization, regardless of the mix of activities the resources perform. Although resource output measures are used in ABC and other models, RCA’s insistence on closer attention to the nature and relationship of resources provides insights for a more accurate choice of output measures that better mirror the differences and similarities between types of capacity.

The Interrelationship of Resource Elements Is Not Directly Reflected. In resource consumption accounting, resource elements are grouped into resource pools (compare Exhibit 2 to Exhibit 1). As shown in Exhibit 2, Dock 1 has two resource pools, one for labor and one for the forklifts. The resource pool is the first discrete cost object in the cost model for the initial reclassification and collection of quantitative and monetary (expense) resource elements. Thus, a resource’s output quantity is associated with a dollar amount. In addition, RCA’s construction of more direct pathways between relationship-based resource pools and activities make cost relationships more visible for decision making. It could be argued that such careful construction can be made within an ABC model. This is true; however, organizations can easily make the mistake of matching general-ledger accounts to activities on a one-to-one basis. The RCA-based construction thus can strengthen an ABC model’s linkage methodology.

Exhibit 2.

The RCA View of Resource Costs
The Initial Inherent Nature of Cost Is Not Reflected. Associating expense elements, under the umbrella of the resource output measure is the basis for reflecting the initial inherent nature of cost of the resources. In this step, expenses are categorized into fixed and proportional components (as discussed in Sidebar A, on proportional cost). In Dock 1 (shown in Exhibit 2), depreciation and a portion of equipment maintenance are fixed expenses. Maintenance is considered partially fixed because the forklifts must be maintained to ensure serviceability even if utilization drops significantly. Electricity and the remaining portion of equipment maintenance are considered proportional expenses.

Sidebar A.

**Fixed and Proportional Cost in RCA**

The term “proportional” is used (as opposed to just “variable”) to stress the linear relationship between certain of the associated expense items and the resource output quantity. This linear relationship is graphically depicted in Exhibit A-1.

All of these expense elements are called primary expense elements, because expenses are initially incurred here for the resources. Primary expense elements reflect the initial inherent nature of the resource costs as dictated by the technology, skill, training, and
operating characteristics in which the enterprise is invested.

Exhibit 2 serves as a completed example of resource pools under resource consumption accounting. Dock 1 has two resource pools, each with its own output measure and associated primary expense elements, categorized into fixed and proportional components. These components are divided by the output quantity to obtain fixed cost rate and proportional cost rate for an output unit, to be used for charging consumers of the resources.  

The RCA View of Resources

The first obvious difference between RCA and ABC is RCA’s association of resource elements into a resource pool, which serves as the cost object for these elements for planning, collection of actual data (values and quantities), and variance calculation. Second, the output measure also serves as the resource cost driver and should not be confused with a resource driver in ABC, which has the sole purpose of allocating expense elements to processes. Though quantities are often used (e.g., full-time equivalents), these “quantities” seldom result in more than allocation ratios or percentages. In resource consumption accounting, however, the output measure or resource cost driver has the following distinguishing characteristics:

- The output quantity and associated expenses (fixed and proportional) are primary planning/budgeting outputs.  
- Consumers of resources are charged for the actual resource output quantities consumed multiplied by fixed and proportional cost rates (actual or planned/standard rates can be used).  
- The actual output quantity is used to impute authorized resource pool expenses—for example, by answering the question Given an actual resource output level of X, what should expenses in the resource pool be?  
- Authorized expenses and the actual resource output level, when compared to actual costs and quantities, serve as the basis for variance calculation in the resource pool.

A third notable difference is the pooling of interrelated resource elements, resulting in more homogeneous cost pools with enhanced levels of information. Finally, the recognition of the linear relationship between resource output and its expenses is another important distinction from the ABC view.

The Implications of RCA for ABC Information

Processes (or other consumers) consume resource output units, each with a fixed cost component and a proportional cost component. Increased process output will require more resource output and thus more resource proportional costs (stepped fixed cost is ignored because it was assumed the original plan was not flawed). A cost curve for a process will therefore look like that in Exhibit 3, reflecting the cost characteristics of the resources consumed.

Exhibit 3.

Resource Units and Costs Consumed by a Process
Proponents of ABC would argue that this view is flawed: costs associated with the process disappear when the process is eliminated—that is, all costs for a process are variable. The graph also illustrates that by reducing the process quantity to zero, a zero process cost will result. Even if the process is not performed, costs will still exist in terms of available resources. For example, in Dock 1, employees arrive at work, but no deliveries or shipping requests are received, so no activities are performed. Yet costs are still incurred—resource costs. If an hour later, the first truck arrives, activities resume and resource output units are consumed. This is an example of a short-term or operations perspective; the longer-term view will be addressed in the final article in this series. (For a thorough, complementary view of process and capacity under the ABC paradigm, see Kaplan and Cooper, *Cost and Effect*, Chapter 7, Harvard Business School Press, 1997).

**ACCOUNTING FOR EXCESS AND IDLE CAPACITY**

Once fixed cost is recognized as a fait accompli, properly accounting for excess or idle capacity becomes paramount. The following three criteria are therefore proposed:

1. The method should supply information that highlights the problem (e.g., idle resources).
2. The method should supply information that gives unambiguous insight into the causes and effects of the excess and idle capacity—the downstream effects of the problem should be transparent. Excess and idle capacity costs should be allocated where they are visible and actionable.
3. The method should supply information that is readily accessible and of sufficient quality and granularity to support the decision-making process. Where is the excess capacity? What is the magnitude in dollars and as a percentage of total capacity? Is it temporary? Can resources be retrained or realigned? Is there an option to divest? If yes, what fixed cost will remain? Can excess capacity be marketed? If yes, then for pricing purposes, what is the proportional cost of producing one additional unit of resource output?

Information that satisfies these preceding criteria will enable management to understand the reasons for excess capacity and idle capacity and to take corrective action.

**Two ABC Approaches**

Improperly accounting for excess and idle capacity results in product cross-subsidization and fluctuating product margins between periods. A product can be profitable one month and unprofitable the next. This phenomenon is also prevalent with the ABC method of accounting for excess and idle capacity, where the lack of a resource output measure leads to the handling of such capacity in one of two ways:
1. Accommodating excess and idle capacity on a single or dedicated activity.
2. Incorporating excess and idle capacity on every activity.

**ABC Approach 1: Accommodate Excess and Idle Capacity on a Single Activity.** Exhibit 4 presents an ABC model in which the production cost center has two activities—Run Machine and Perform Set-Up—with the drivers Machine Hours and Number of Set-Ups, respectively. The rates for each driver is as indicated. Three products—K, O, and Z—are produced and consume activity driver quantities as shown. Of particular interest in Exhibit 4, and in each of the subsequent illustrations, are the profitability numbers for each product. It is assumed that there is no excess capacity for the cost model initially.

**Exhibit 4.**

**Baseline ABC Cost Model—No Excess Capacity**

In Exhibit 5, the cost model is updated to reflect product improvements in Product K (i.e., a reduction in set-ups from 50 to 30). Electricity expense is considered variable and is reduced (i.e., by $3,750). This product improvement results in excess capacity and revised profitability figures for the ABC model as shown. The results indicate that in a typical ABC model, improvements in one product cause the profitability of other products to change. Improving product K resulted in profitability changes in all three products and in product Z becoming unprofitable. It is important to note that in Exhibit 5, all of the excess capacity cost is allocated through the set-up activity, as evidenced by the change in the driver rate for the set-up activity.

**Exhibit 5.**

**Accounting for Excess and Idle Capacity: ABC Approach 1**
Evaluation Criteria. To determine whether it properly accounts for idle and excess capacity, Approach 1 should be measured against the following criteria.

Point to Idle Resources. Assigning all excess capacity to one activity will result in a hodgepodge of resources that fails to identify where the excess or idle resources are.

Provide Insight into Causes and Effects. Causes will be difficult to pinpoint because the profitability of a number of products changes, as shown in Exhibit 5. The effect is the spread of excess capacity costs across products. Insight required for the decision-making process is therefore lost.

Provide Information to Support the Decision-Making Process. Detailed decision support information will go unfulfilled since no detailed information on the resource pool is available. Quantities are not provided and the value of excess capacity has been lost in the indiscriminate spread among products.

**ABC Approach 2: Incorporate Excess Capacity into Every Activity/Process.** Another ABC approach is to update the model by reallocating the resources or expense accounts. This spreads the excess or idle capacity costs to all activities. In the example, this means allocating some of the excess capacity costs to Run Machine. Exhibit 6 illustrates this model and the effects of ABC Approach 2 when improving product K. Now, both product O and product Z become unprofitable. The results are neither more transparent nor less irrational than with the first approach.

Exhibit 6.

**Accounting for Excess/Idle Capacity: ABC Approach 2**
Measuring ABC Approach 2 Against the Evaluation Criteria. To determine whether it properly accounts for idle and excess capacity, Approach 2 should be measured against the following criteria.

Point to Idle Resources. The following two problems hinder the identification of idle resources:

- A resource can perform multiple activities (i.e., a 1:n relationship exists). Excess capacity on one activity therefore does not necessarily indicate real excess capacity, because the resources might have been consumed by the other activities with higher output levels. In addition, an activity with excess capacity that requires input from multiple cost centers (i.e., an n:1 relationship exists) will not clearly indicate the idle resources.

- Activities do not have homogeneous drivers. Activities would have to be aggregated under Approach 2 to reflect the utilization of resources. A problem arises when activity drivers have diverse units of measure (e.g., number of pickings, packings, and shippings), because these cannot be aggregated at will. Unless a way can be found to add activities or portions of activities that relate to a specific resource in a homogeneous unit of measure, the first criterion will go unfulfilled.

Provide Insight into Causes and Effects. The causes will be difficult to pinpoint because the profitability of all products has changed. The true effects of excess capacity are misstated if the costs are allocated to products.

Provide Information to Support the Decision-Making Process. Supplying adequate decision support information is largely unsupported, with respect to detailed resource information. Both ABC approaches fare poorly against the evaluation criteria, failing to fully satisfy even one. This indicates that activities are unsuitable to account for excess capacity—an observation that is confirmed by conceptual conflicts stemming from the accommodation of excess capacity on activities within ABC, as highlighted in Sidebar B. This analysis of two ABC solutions for excess capacity treatment helps illustrate the supportive and complementary role that resource consumption accounting can play with ABC.

Sidebar B.  

Conceptual Conflicts with Excess and Idle Capacity in ABC  
Attempts to incorporate excess capacity in ABC depart from its execution focus. According to
In the preceding examples, only one change, that of a product improvement, was introduced, but many other changes can have the same effect on the cost model. Examples of such decisions and events that have a direct bearing on capacity utilization are:

- Fluctuations in product mix and volumes.
- Product make-or-buy decisions.
- Resource outsourcing decisions.
- Dropping or adding products and product lines.
- Dropping or adding target markets.
- Dropping or adding customers.
- Selecting from among options for a manufacturing site, a distribution channel, or a storage location.
- Process improvements as well as process eliminations.

The primary consequence of improperly accounting for inactivity is the indiscriminate allocation of excess and idle capacity costs to products, services, and customers. Moreover, profitable products cross-subsidize unprofitable products, resulting in potentially erroneous decisions (e.g., in pricing and dropping of products and services). There is clearly a need to properly account for excess capacity and provide adequate decision support information.

**The RCA Approach**

Accounting for Excess and Idle Capacity on the Resource Pool. Exhibit 7 illustrates two homogeneous resource pools, one for labor and one for machines, each with its own output measure. Capacity for each resource pool is expressed in hours: 4,800 labor hours and 640 machine hours. Using the associated costs, a rate for each resource output measure is calculated: $50 per labor hour and $468.75 per machine hour. (In practice, a fixed cost rate and a proportional cost rate for each pool would always be calculated.) Activities are charged for the actual resource output consumed. Products consume activity quantities according to the post-product-improvement scenario mentioned, profitability is calculated, and the excess capacity variance is separated out in the profitability.
Using resource consumption accounting, the product improvement scenario results in changed profitability for only Product K (as compared with Exhibit 4).

Exhibit 7.

**Accounting for Excess and Idle Capacity: The RCA Approach**

Measuring the RCA Approach Against the Evaluation Criteria. Resource consumption accounting fully satisfies all three criteria to properly account for excess capacity.

Point to Idle Resources. The variance, delineated in the profitability report, highlights the idle resources.

Provide Insight into Causes and Effects. The cause for the variance is clear. The effect on overall profitability is apparent and unambiguous; profit of only Product K has increased.

Provide Information to Support the Decision-Making Process. The magnitude of the excess capacity, in dollars and by quantity, is provided (i.e., 300 labor hours and 40 machine hours to the value of $30,000).

**CONCLUSION**

Resource consumption accounting, when used in tandem with ABC, resolves the first four shortfalls. Resource elements are associated in a resource pool with an output measure that serves as the measure of capacity. The initial inherent nature of cost is reflected by primary expense elements. Fixed and proportional unit cost rates are used to charge consumers of resources. In accounting for excess capacity, the approach is superior in focusing attention on idle resources, accurately accounting for excess capacity, and providing detailed decision support information. A disadvantage of this approach is increased complexity. C.S. Lewis said “Reality is more complex than fiction”—this will be borne out as management accounting systems strive to more accurately reflect the real world with its capacities, activities, inactivities, and related costs.

This article addressed four shortfalls of ABC as it related to resources and resource elements. The second article will look at a further
three shortfalls of the view that was adopted for ABC in regard to resources. These shortfalls are in the area of resource pool interactions and relate to: interrelationships between resources, the changing nature of cost at the time of consumption, and fully burdened resource costs.


2 “ABM Design Framework Development Team,” under the auspices of CAM-I. Historical backdrop: “This group was assembled in June of 1999 in light of the significant number of ABC Project failures and an awareness that one of the principle causes is the lack of clear definition and scope at the onset.” CAM-I, Cost Management Systems Program, 1st Quarter 2000 meeting agenda.


4 W. Kilger, Flexible Plankostenrechnung, p. 305.

5 W. Kilger, Flexible Plankostenrechnung, p. 341.

6 W. Kilger, Flexible Plankostenrechnung, p. 494ff.

7 W. Kilger, Flexible Plankostenrechnung, p. 570ff.

8 W. Kilger, Flexible Plankostenrechnung, p. 518.

9 W. Kilger, Flexible Plankostenrechnung, p. 494.

10 W. Kilger, Flexible Plankostenrechnung, p. 528.

11 W. Kilger, Flexible Plankostenrechnung, p. 590, 805ff. Authorized expense (also called target expense) refers to the calculation based on actual driver quantity and utilizing unit standards to derive what the budget should be given the actual output level. Thus authorized expense reflects a revised value that has eliminated the volume variance.

12 W. Kilger, Flexible Plankostenrechnung, p. 595.

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