Resource Consumption Accounting – Where Does It Fit?

David Perkins, Abilene Christian University, USA
O. Scott Stovall, Abilene Christian University, USA

ABSTRACT

With the increasing sophistication of recent costing innovations, such as resource consumption accounting, the selection of a costing system can be a daunting decision as one seeks to choose the appropriate costing methodology for a given (1) decision context, (2) production environment, and/or (3) information system available to a firm. Taking a 'big picture' perspective, this article illustrates the distinguishing features of RCA, ABC, and TOC as compared to the traditional costing approach (as a benchmark) and attempts to offer some basic guidance as to when each system may be appropriate. This comparative presentation of RCA is designed to provide time-pressured management accounting practitioners a frame of reference for considering RCA (or one of the other methodologies) prior to a more in-depth investigation. Managers may also use this comparison to support organizational efforts to train staff with varying levels of management accounting background on the similarities and dissimilarities between the various product costing alternatives. Finally, we believe this presentation can benefit teachers of cost accounting who are interested in exposing their students to the conceptual differences between RCA and the other costing methodologies.

Keywords: Resource Consumption Accounting (RCA); Activity Based Costing (ABC); Theory of Constraints (TOC), Product Costing

INTRODUCTION

The continued, widespread use of the traditional 'peanut butter' approach to cost allocation is somewhat surprising given that it has been criticized for over thirty years now. Studies have shown that up to 80% of companies continue to use (or have switched back to) traditional product costing methodologies, despite the fact that many accountants within these companies express dissatisfaction with relying on the outputs of their cost accounting system for decision-making purposes (Sharman 2003b). However, change comes slowly, especially when the alternative approaches are unfamiliar, somewhat confusing, and offer costing solutions from such divergent perspectives.

For example, proponents of activity-based costing (ABC) base their arguments on the view that all costs, even the cost of capacity, are variable in the long-term. The ABC model captures this variability by assigning costs to products in proportion to each product's expected long-term demand for costly resources. On the other hand, proponents of the Theory of Constraints (TOC) take a very short-term perspective and assume the costs of most resources are fixed and inescapable. Thus, the TOC model usually assigns only variable material costs to products while seeking to optimize throughput (i.e., contribution margin) on the fixed resource capacities that constrain the overall system.

Given that these competing methodologies take such opposing perspectives, they are likewise plagued by contrasting weaknesses. ABC, while offering a sophisticated view of the processes that make up a company's operations, is often rejected, before or after a trial implementation, as too complicated or untimely for short-term decisions. However, while the simplicity and timeliness of TOC make it attractive, the information it provides is deemed inadequate for decisions that look beyond the very short term.

More recently, various authors in the accounting literature have supported a resource-based cost management system patterned after German cost accounting models (see the sidebar to Krumwiede 2005 for a partial list of authors). Referred to as resource consumption accounting (RCA), the approach combines activity-based information with knowledge of resource capacities and relates cost behaviors to input/output relationships at the resource level. Like the other approaches, RCA enjoys an interesting history, is based on sound theory, and has proponents in both practice and academia. RCA's sophistication renders it technology-intensive, requiring ERP systems for adequate implementation. This sophistication adds to RCA's complexity.

Regardless of the improvements any particular costing method may offer in a firm-specific environment, the array of approaches makes the selection of a costing system a daunting decision. In addition, one may legitimately criticize any of the aforementioned costing methods given a particular (1) decision context, (2) production environment, and/or (3) information system available to a firm. For example, Grasso (2005) has argued that ABC and RCA can be counter-productive for firms that adopt an operating philosophy based on lean management techniques. In any event, with the increasing sophistication of the more recent innovations, such as RCA, it is easy to get 'lost in the details' while seeking to understand both the mechanics of the alternative approaches and the appropriateness of each in various situations. For example, in spite of the onslaught of articles addressing RCA, one may remain perplexed regarding the basic costing procedures required for its implementation.

In an effort to address this confusion, this article highlights the distinguishing features of RCA, ABC, and TOC as compared to the traditional costing approach (as a benchmark) and attempts to offer some basic guidance as to when each system may be appropriate. The descriptions provided are intentionally kept simple to emphasize the key theoretical differences between the methodologies. This comparative presentation of RCA is designed to accomplish several tasks - first, to provide time-pressured management accounting practitioners a frame of reference for considering RCA (or one of the other methodologies) prior to committing substantial time and financial resources for a more in-depth investigation. Second, for those firms that choose to adopt RCA, this presentation will provide some degree of clarity regarding the similarities and dissimilarities between the various product costing alternatives, thus supporting organizational efforts to train staff with varying levels of management accounting background. Finally, we hope this presentation can be of benefit to academics interested in exposing their students to the conceptual differences between RCA and alternative costing approaches.

To facilitate the discussion and illustrate the output from these alternative costing systems, consider the following information for a hypothetical production company.

EXAMPLE

Sample Company has three support departments, Human Resources, Materials Handling, and Setups, and two production departments, Machining and Finishing. Relevant information regarding operations and costs for each department are provided in Table 1 and Table 2, respectively.

Table 1: Departmental Information

Department	Human Resources	Materials Handling	Setups	Machining	Finishing
Number of Personnel	4	3	2	2	12
Salary/Person	$24,000	$24,000	$24,000	$24,000	$24,000
Training %	10%	5%	10%	5%	5%
Planned Maintenance				10%	5%
Square Footage %	5%	10%	5%	50%	30%
Theoretical or Practical Capacity [A]:	30	40,000	1,800	30,000	24,000
Costs Proportional to…?	Head Count	# of Parts	Setup Hours	Machine Hours	Labor Hours

[A] Proponents of ABC generally employ practical capacity as a denominator volume while proponents of RCA employ theoretical capacity as the denominator volume for fixed costs. For simplicity, we equate theoretical and practical capacities in this analysis.

Table 2: Departmental Costs						
Department	Human Resources	Materials Handling	Setup	Machining	Finishing	Totals
Supplies	$30,000	$30,000	$30,000	$30,000	$30,000	$150,000
Labor	$96,000	$72,000	48,000	$48,000	$288,000	$552,000
Equipment Costs	$5,000	$15,000	10,000	$800,000	$20,000	$850,000
Building Costs	$5,000	$10,000	5,000	$50,000	$30,000	$100,000
Totals	$136,000	$127,000	$93,000	$928,000	$368,000	$1,652,000

The company manufactures 2 products, Y and Z. Table 3 provides production related information for each product.

Table 3: Product Information		
Product	Y	Z
Budgeted Demand (units)	3,000	4,000
Sales Price	$500	$220
Materials	$60	$35
# of Parts	6	4
Lot size	15	20
Hours per setup	3	2
Machining Hours	2	4
Finishing Hours	5	1

Traditional Costing System – A Benchmark

The traditional approach to costing assigns material and labor directly to products and uses a two-stage approach for allocating overhead. First, the accounting information system accumulates the indirect costs of production into an overhead cost pool. Then, the system spreads these overhead costs like 'peanut-butter' over the units produced via an overhead application rate based on some plant-wide measure (e.g., budgeted direct labor dollars). Incremental improvements to the traditional approach may be implemented through the use of departmental rates and/or alternative bases of production (e.g., machine hours, # of component parts, etc.) to apply overhead in a manner that more accurately represents cause-effect relationships between the demand for and supply of costly resources.

Traditional Solution - Product Costs. Table 4 provides a budget for Sample Company using the traditional approach. Sample Co. assigns materials and labor directly to each unit of production and allocates all other production costs to products using an overhead rate based on budgeted direct labor hours. Sample Co. classifies labor as direct only within the finishing department. The company treats labor within the machining department as indirect since workers can run multiple machines at one time and it is difficult to assign the labor to particular units.

Traditional Costing – Context. The traditional approach to product costing originated at a time when production was labor-intensive and indirect overhead costs were relatively insignificant. In such an environment, labor-based cost assignments probably did an adequate job of representing the relative costs of producing one product versus another. In addition, the traditional approach is deemed sufficient when a company manufactures a homogenous product mix through similar production processes. In other words, the traditional approach to costing is adequate when products consume manufacturing resources on a relatively equal basis, thus mitigating the possibility for product and/or processing differences to create cost distortions.

Conversely, a traditional costing system can provide inadequate and dysfunctional information for decision makers when the conditions discussed above are not present. Traditional cost allocations do not adequately reflect the costs of products that consume indirect manufacturing resources disproportionately. In such an environment,

some products are inevitably under-costed while others are over-costed, leading to potentially dysfunctional product mix decisions. Also, using cost allocations that do not segregate fixed costs may hinder attempts to make decisions at the margin, inhibiting a company's ability to adapt to short-term, rapidly changing business conditions (e.g., a one-time special order or a temporary production shut-down due to a labor strike or material shortage).

Table 4: Budget – Traditional Costing

Product	Y (3,000 units)		Z (4,000 units)		Totals
	Per Unit	Total	Per Unit	Total	
Sales Price	$500.00	$1,500,000	$220.00	$880,000	$2,380,000
Materials	60.00	180,000	35.00	140,000	320,000
Labor [A]	75.79	227,368	15.16	60,632	288,000
Overhead [B]	358.95	1,076,842	71.79	$287,158	1,364,000
Total Product Costs	494.74	1,484,210	121.95	487,790	1,972,000
Gross Margin	$5.26	$15,790	$98.05	$392,210	$408,000

[A] Labor rate within the finishing department:

Budgeted finishing labor (see Table 2): $288,000 = $15.158 per hour

Budgeted finishing labor hours: 19,000 hrs*

*Budgeted finishing labor hours:
Product Y: 3,000 units x 5 hrs/unit = 15,000 hours
Product Z: 4,000 units x 1 hr/unit = 4,000 hours
Total 19,000 hours

[B] Overhead application rate:

Budgeted Overhead Costs** $1,364,000 = $71.789 per hour

Budgeted Direct Labor Hours 19,000 hrs

**Budgeted Overhead Costs:

Budgeted conversion costs (see Table 2):	$1,652,000
Less: Finishing Direct Labor	<288,000>
Budgeted Overhead Costs	$1,364,000

Theory of Constraints (TOC)

The TOC philosophy emphasizes performance measurement and improvement from a system-wide perspective. Based on the interdependence of system resources, TOC seeks to optimize the performance of the system by focusing on the system's constraints. The number one objective of the TOC philosophy is the maximization of throughput (i.e., contribution margin) at the constraints. Due to its focus on throughput, TOC views all cost allocations as irrelevant and assigns only variable costs (i.e., the cost of materials) to products for decision-making purposes. With its short term perspective, TOC treats all other production costs as fixed (and assumes the fixed costs are inescapable in the short run). Incremental improvements to the TOC model may include the identification of other costs that behave in a purely variable fashion and assigning these costs, along with the cost of materials, to products.

TOC Solution - Product Costs. Table 5 provides budgeted information for Sample Company based on the TOC approach. As described above, under the TOC system, Sample Co. assigns only the costs of materials to products and classifies all other costs as fixed period expenses.

TOC – Context. Originally developed as a scheduling technique, the TOC approach provides relevant information for those frequent, short-term decisions related to the best use of fixed resource capacity (e.g., order acceptance, product mix scheduling, etc.). As such, TOC facilitates the maximization of short-term profits given a constrained resource environment.

The benefits of TOC tend to fade, however, when decision-makers must make plans beyond the short-term. For example, one must consider a product's expected full cost when making strategic pricing decisions for the normal course of business or whether to add or delete a product to/from the firm's current product offering. A firm would run a high risk of failure if it did not consider a product's impact on both variable and fixed costs in long-term decisions. In addition, TOC has the potential to inhibit a firm's ability to manage production costs by failing to illuminate how resources are consumed during normal operations.

Table 5: Budget – Theory of Constraints Costing

Product	Y (3,000 units)		Z (4,000 units)		Totals
	Per Unit	Total	Per Unit	Total	
Sales Price	$500.00	$1,500,000	$220.00	$880,000	$2,380,000
Materials	60.00	180,000	35.00	140,000	320,000
Throughput	440.00	1,320,000	185.00	740,000	2,060,000
Operating Expenses (see Table 2)					1,652,000
Net Margin					$408,000

Activity Based Costing (ABC)

Contrary to the TOC model, the ABC approach seeks to identify the full cost of products. ABC takes the economist's view that all costs are variable in the long-run. This view is most appropriate in the budgeting phase before discretionary spending patterns become committed 'fixed' costs (Kaplan and Cooper, 1997). Thus, ABC systems seek to identify long-run cause/effect relationships between resource-consuming activities and costs, and may be viewed as "long-term resource consumption models" (Grasso, 2005, 14). An ABC system assigns costs based on each product's demand for cost driving activities. Compared to the traditional approach, ABC requires additional sophistication in assigning costs to products. Typically, ABC requires (1) detailed activity analysis, (2) the accumulation of costs into multiple, homogenous cost-pools, (3) the identification of measurable cost drivers that link activities to specific cost objects, and (4) the determination of multiple cost driver rates to assign activity costs to products. To determine cost driver rates, ABC relies on a hierarchy of cost driver categories based on whether activities are driven at the unit-, batch-, product-, or facility-level. However, once costs are assigned to products, costs tend to be reported at the unit-level and thus risk losing the more meaningful hierarchical status.

Critics of the ABC approach point to its complexity as a hindrance to its successful implementation and/or long-term sustainability. In response, more recent innovations involving a time-based approach to ABC implementation address the criticisms of the model's over-complexity and may improve the rate of successful ABC adoptions (Kaplan and Anderson, 2004). Proponents of the time-based approach argue that only two estimates are required: (1) the unit cost of capacity supplied and (2) the unit time required for specific activities. The time-based ABC model bases the unit cost of capacity on an estimate of practical capacity as a denominator volume. This represents an incremental improvement to the typical ABC model by allowing for the determination of the cost of excess capacity for specific activities. Proponents of ABC such as Cooper and Kaplan (1992) have long encouraged the measurement of excess resource capacity, but Grasso (2005) notes that companies implementing ABC have generally failed to do so. However, ABC's failure to distinguish between fixed and variable cost behaviors can overstate the costs of unused capacity due to the inclusion of variable costs in the excess capacity cost allocation.

Product Costs – ABC Solution. The Sample Co. has four activity cost pools: materials handling, setups, machining, and finishing. As summarized in Table 6, these cost pools consist of direct costs and a pro rata share of the support costs from human resources. These activity cost totals are assigned to the products using a cost driver rate based on practical capacity and the number of cost drivers in each product. Following the time-based approach to ABC, Table 7 summarizes Sample Company's budget using the activity based cost assignments and isolates the budgeted cost of excess capacity for each activity as the difference between practical capacity and the amount of capacity required to meet budgeted demand.

Table 6: Activity Cost Pools					
Department	Materials Handling	Setups	Machining	Finishing	Totals
Direct Costs [see Table 2]	$127,000	$93,000	$928,000	$368,000	$1,516,000
Support Costs:					
Human Resources *	21,474	14,316	14,316	85,894	136,000
Totals	$148,474	$107,316	$942,316	$453,894	$1,652,000
Cost Driver Capacity [See Table 1]	40,000 parts	1,800 setup hrs	30,000 machine hours	24,000 finish hours	
$ per cost driver	$3.7119 / part	$59.62/SH	$31.411 / MH	$18.912 / FH	

* The assignment of Human Resource costs to the cost pools is based on the head counts provided in Table 1, as follows (using the direct method):

$$\frac{\text{Total Human Resource Costs (see Table 2)}}{\text{Total \# of personnel represented in each cost pool}} = \frac{\$136,000}{19 \text{ persons}} = \$7,157.89 \text{ per person}$$

Table 7: Budget – Activity Based Costing					
Product	Y (3,000 units)		Z (4,000 units)		Totals
	Per Unit	Total	Per Unit	Total	
Sales Price	$500.00	$1,500,000	$220.00	$880,000	$2,380,000
Materials	60.00	180,000	35.00	140,000	320,000
Materials Handling [A]	22.27	66,810	14.85	59,400	126,210
Setups [B]	11.93	35,790	5.96	23,840	59,630
Machining [C]	62.82	188,460	125.64	502,560	691,020
Finishing [D]	94.56	283,680	18.91	75,640	359,320
Total Product Costs	251.58	754,740	200.36	801,440	1,556,180
Gross Margin	$248.42	$745,260	$19.64	$78,560	823,820
Budgeted Excess (adjusted for rounding) [E]:					
Materials Handling (6,000 parts x $3.7119 / part)					22,264
Setups (800 setup hours x $59.62 / hour)					47,686
Machining (8,000 machine hours x $31.411 / hour)					251,296
Finishing (5,000 finishing hours x $18.912 / hour)					94,574
Total Cost of Excess					415,820
Net Margin					$408,000

Explanation of cost assignments:

Cost Pool	# of Cost Drivers / Unit (see Table 3)	Cost / Driver (see Table 6)	Assigned Cost per Unit Product Y	Assigned Cost per Unit Product Z
[A] Mat. Hand.	6 parts / Y; 4 parts / Z	$3.7119 / part	$22.27	$ 14.85
[C] Machining	2 MH / Y; 4 MH / Z	$31.411 / MH	$62.82	$125.64
[D] Finishing	5 FH / Y; 1 FH / Z	$18.912 / FH	$94.56	$ 18.91

[B] Setup costs per hour (see Table 6) are assigned to each batch as follows:

Product	Setup hours per batch	x	Cost per setup hour	=	Setup Costs per Batch	÷	Lot Size	=	Setup Costs per Unit
Y	3		$59.62		$178.86		15 units		$11.93
Z	2		$59.62		$119.24		20 units		$ 5.96

[E] Excess resource capacity is the difference between practical capacity (see Table 1) and budgeted capacity. The budgeted capacity for each cost pool is determined using inputs from Table 3 as follows:

Product	Y	Z	Total
Budgeted Volume (units)	3,000	4,000	
Budgeted # of Parts (6 /Y; 4 / Z)	18,000	16,000	34,000 parts
Budgeted Setup Hours:			
Lot size (see Table 3)	15	20	
# of production runs (budgeted volume/lot size)	200	200	
Setup Hours per run (Table 3)	x 3	x 2	
Total Setup Hours	600	400	1,000 setup hours
Budgeted Machine Hours (2 / Y; 4 / Z)	6,000	16,000	22,000 machine hours
Budgeted Finishing Hours (5 / Y; 1 / Z)	15,000	4,000	19,000 finishing hours

ABC – Context. An ABC system can yield the greatest benefit when the risk of cost distortion is high, such as when a firm offers a heterogeneous mix of products and/or services in a relatively complex environment. However, in a simple production environment which provides a relatively homogeneous product, the ABC approach may be overly complex and attempt a level of costing precision that fails the cost/benefit test. In addition, activity based information is most appropriate for long-term planning decisions in which most costs are variable or discretionary. For example, the decision to begin or discontinue the production of a given product must consider that product's demand, over the long term, for costly resources. Similarly, an acceptable cost for a potential product may be targeted by considering its demand for costly resources during the design phase for both the product and the process through which production will occur. However, the long-run variability of costs assumed by the ABC approach can make the output from an ABC-system irrelevant and misleading for short-term decisions in which many costs are fixed and, perhaps, inescapable.

Resource Consumption Accounting (RCA)

RCA combines the activity analysis of ABC with detailed knowledge of resource capacities and cause/effect relationships that allow for the monitoring of cost behaviors at the resource level. Costs that originate in a resource cost center are considered primary costs; secondary costs are those that are assigned to the resource cost center from another resource. Total resource costs are then classified as either fixed or proportional, depending on the correlation between the input quantities to and output quantities from the resource. Thus, 'proportional costs' at the resource level should not be confused with 'variable costs' which generally refers to those costs that vary with total production volume. The classification of resource consumption as fixed or proportional may require a significant amount of judgment, but once a cost is classified as fixed, it remains fixed for monitoring purposes. However, resource costs that behave proportionally to the output of a supplying resource may be reclassified if consumed in a fixed manner. For example, while labor may typically be viewed as a proportional cost, labor that is consumed in a fixed quantity for training should be classified as fixed (Webber and Clinton, 2004).

A distinguishing feature of RCA is that the denominator volume used for cost assignment depends on the manner in which resources are consumed. The utilization of fixed costs is determined based on the theoretical capacity of a resource while proportional costs are assigned based on budgeted resource output. The allocation of overhead costs may be implemented vertically through cost centers or horizontally through activities and processes similar to ABC. This vertical/horizontal distinction between RCA and ABC may be lost in practice, however, since "some companies use the cost center module of SAP for implementing ABC" (Friedl, Küpper, & Pedell, 2005, p. 61). Regardless, fixed costs should be strictly separated from proportional costs and the cost of excess capacity should not be assigned to products. Incremental improvements to the RCA approach may include the use of replacement costs rather than the historical costs of resources.

Table 8: Resource Cost Centers			
	Fixed [A]	Proportional [B]	Total
Human Resources			
Supplies		$30,000	$30,000
Wages and Salaries [D]	$96,000		96,000
Equipment Costs	5,000		5,000
Building Costs	5,000		5,000
Total Direct Costs [C]	$106,000	$30,000	$136,000
Cost / Head	$3,533.33	$1,578.95	$5,112.28
Materials Handling			
Supplies		$30,000	$30,000
Wages and Salaries [E]	3,600	$68,400	72,000
Equipment Costs	15,000		15,000
Building Costs	10,000		10,000
Total Direct Costs [C]	28,600	98,400	127,000
Support: Human Resources [F]	15,337		15,337
Totals	$43,937	$98,400	$142,337
Cost per Part	$1.0984	$2.8941	$3.9925
Setups			
Supplies		$30,000	$30,000
Wages and Salaries [D]	$48,000		48,000
Equipment Costs	10,000		10,000
Building Costs	5,000		5,000
Total Direct Costs [C]	63,000	30,000	93,000
Support: Human Resources [F]	10,225		10,225
Totals	$73,225	$30,000	$103,225
Cost per Setup Hour	$40.6803	$30.0000	$70.6803
Machining			
Supplies		$30,000	$30,000
Wages and Salaries [D]	$48,000		48,000
Equipment Costs	800,000		800,000
Building Costs	50,000		50,000
Total Direct Costs [C]	898,000	30,000	928,000
Support: Human Resources [F]	$10,225		10,225
Totals	$908,225	$30,000	$938,225
Cost per Machine Hour	$30.2742	$1.3636	$31.6378
Finishing			
Supplies		$30,000	$30,000
Wages and Salaries [E]	$28,800	259,200	288,000
Equipment Costs	20,000		20,000
Building Costs	30,000		30,000
Total Direct Costs [C]	78,800	289,200	368,000
Support: Human Resources [F]	61,347		61,347
Totals	$140,147	$289,200	$429,347
Cost per Finishing Hour	$5.8395	$15.2211	$21.0606

[A] Fixed costs per unit of resource output are based on the theoretical capacities given in Table 1.
[B] Proportional costs per unit of resource output are based on the budgeted capacities given in note [E] of Table 7 (and Table 1 for Human Resources).
[C] See Table 2 for direct costs of each resource.
[D] Management considers all human resource, setup and machining labor to be a fixed cost of providing these resources to sustain operations.
[E] The % of labor time used for training and maintenance (see Table 1) is treated as a fixed cost in materials handling and finishing.
[F] The supporting cost of Human Resources assigned to each productive resource is based on the total HR cost / head of $5,112.28 x the number of persons budgeted for each productive resource (see Table 1). The entire amount of supporting Human Resource cost is classified as fixed within the productive resources since these costs are not deemed proportional to the output from these resources.

RCA requires a relatively high level of sophistication and results in a cost assignment process employing multiple cost driver rates – perhaps even thousands. For example, DaimlerChrysler AG uses a sophisticated system in which a typical plant may have 2,000 to 2,500 cost centers (Krumwiede, 2005). While the information generated by RCA can represent a rich source of information, the high degree of complexity inherent in the approach may lead to a slow rate of adoption - a fate similar to that of ABC.

RCA Solution – Product Costs. Table 8 provides the budgeted proportional and fixed costs for each of Sample Company's resource cost centers. Table 9 summarizes the budgeted profit for Sample Company based on the RCA model. The reporting format provided in Table 9 maintains the proportional/fixed cost distinctions for marginal costing purposes and also illustrates a possible extension to include the allocation of fixed costs to product lines. (This extension should only be employed when causality can be determined). Notice that the fixed cost classification in Table 8 includes plans to use otherwise proportional resources in a fixed manner (e.g., for training or planned maintenance as given in Table 1). The difference between the theoretical and budgeted capacity for each resource is represented as the cost of excess capacity and is not assigned to products.

Table 9: Budget – Resource Consumption Accounting

	Product Y (3,000 units)			Product Z (4,000 units)			Totals
	Per Unit	Total		Per Unit	Total		
Sales	$500.00	$1,500,000		$220.00	$880,000		$2,380,000
Proportionate Costs[A]:							
Materials	60.00	180,000		35.00	140,000		320,000
Materials Handling	17.36	52,094		11.58	46,306		98,400
Setups	6.00	18,000		3.00	12,000		30,000
Machining	2.73	8,182		5.45	21,818		30,000
Finishing	76.11	228,316		15.22	60,884		289,200
Total Prop. Costs	162.20	486,592		70.25	281,008		767,600
Contribution Margin		1,013,408			598,992		1,612,400
Fixed Costs [B]:							
Materials Handling		19,771			17,574		37,345
Setups		24,408			16,272		40,680
Machining		181,645			484,387		666,032
Finishing		87,592			23,358		110,950
Total Fixed Costs		313,416			541,591		855,007
Gross Margin		699,992			57,401		757,393
Budgeted Excess (adjusted for rounding) [C]							
Human Resources ($3,533.33 / person x 11 people)							38,867
Materials Handling ($1.0984 / part x 6,000 parts)							6,590
Setups ($40.6803 / setup hour x 800 hours)							32,544
Machining ($30.2742 / machine hour x 8,000 hours)							242,194
Finishing ($5.8395 / finishing hour x 5,000 hours)							29,198
Total Cost of Excess							349,393
Net Margin							408,000

[A] Proportional costs are assigned to each product based on the proportional cost per resource output (see Table 8) times the budgeted amount of resource output for each product (see Table 3). For example, the proportional materials handling cost for each unit of product Y is $2.8941 x 6 parts = $17.36.

[B] For full-costing purposes, fixed costs may be assigned to each product based on the fixed cost per resource output (see Table 8) times the budgeted amount of resource output for each product (see Table 7, note [E]). However, fixed costs should only be assigned to products when causality is determined. In many cases, it may not be appropriate to allocate fixed costs below the level of product-groups.

[C] The budgeted cost of excess capacity is based on the fixed cost per unit of resource output (see Table 8) times the difference between the theoretical (see Table 1) and budgeted capacities (see note [E] in Table 7) for each resource. RCA identifies excess capacity at the resource level, therefore secondary resources (e.g., human resources) may be included. The cost of excess capacity is never assigned to products.

RCA – Context. The RCA model attempts to represent cost behaviors by making a relevant distinction between fixed and proportional costs. Therefore, this approach seems most appropriate for those decisions that rely on this cost behavior information for planning and control. One important planning and control concept that educators and practitioners have recognized for years is flexible budgeting. Traditional examples of flexible budgeting have been based upon some plant-wide, or at best department-wide, denominator volume and defined spending patterns (i.e., fixed vs. variable) based on production volume. What is incrementally beneficial about RCA's capacity to address the issue is that it allows a firm to apply flexible budgeting as a planning and control tool at the resource level, thus enabling management to isolate variances in spending and quantities throughout the organization.

Perhaps the most unique contribution that RCA makes to variance analysis is the ability to analyze changes in capacity utilization (i.e., volume variances) at the resource level. The original budget discloses the difference between theoretical and budgeted capacity for each resource as the expected cost of excess resource capacity; therefore, changes in the demand for resource output are represented as increases or decreases in the cost of excess capacity. The cost of excess capacity reported in the RCA approach supports management's efforts to manage the demand for and supply of resources. Management can monitor the reported amounts of excess capacity at the resource level to identify those resources that represent potential bottlenecks to the system due to capacity shortfalls or represent opportunities for cost savings by eliminating resource capacity that exceeds foreseeable requirements.

Of course, the relevance of a flexible budget analysis depends on how appropriately cost behaviors are specified in the budget. The complexity of the cost relationships represented by the RCA model may limit its adoption to organizations having the prerequisite technological sophistication and managerial expertise. These prerequisites may, in fact, exist in many organizations that have already implemented ERP technology (Sharman, 2003a). When these requirements do not exist, the costs of implementing the RCA approach may be prohibitive.

CONCLUSION

The above discussion demonstrates the basic mechanics of RCA as compared to TOC, ABC, and the traditional costing model. Arguments favoring one approach over the others are generally built around the decision time frame, the complexity of the product mix and/or the complexity of the production environment. Relevance is, of course, of utmost importance to an informed decision maker.

Regarding the time frame for decisions, TOC can provide relevant information for short-term decisions, such as developing a production schedule, but may be less useful for more long-term planning/decision contexts. Conversely, ABC potentially provides useful information for long-term decisions, such as a change in a firm's product offerings, but may be misleading when the decision maker faces a short-term planning/event horizon. Finally, if the required technological and managerial expertise is present, RCA seems most appropriate for budgetary control and to support decisions when a meaningful distinction can be made between fixed and proportional cost behaviors.

As a practical matter, maintaining multiple costing systems may not be feasible or desirable; however, understanding the conceptual benefits of different approaches may encourage management to make adaptations to an existing system to accommodate various decision contexts. When the appropriate technological environment and managerial expertise are available, the RCA would seem to accommodate all time horizons noted above. RCA's division of proportional and fixed costs can provide support for short-range marginal decisions and RCA's insights to resource capacities can support long-term decisions that impact and/or rely on capacity requirements.

In a simple production environment, the information provided by one of the more sophisticated approaches may not be justified from a cost/benefit perspective. As environmental complexity increases, however, the information that RCA or ABC provides concerning the "causes" of costs in production processes (i.e. the activities that drive costs) may enhance a firm's ability to manage the demand for those cost-driving activities. In addition, the effort required by RCA to classify costs in terms of behavior (fixed vs. proportional) potentially allows management to isolate the costs of idle capacity and apply flexible budgeting techniques at various levels within the organization or production process. On the other hand, the in-depth analysis and complexity associated with RCA may hinder its desirability and wide-spread adoption.

Before a firm adopts any cost accounting system, management should understand what alternative systems are available, the strengths and weaknesses of each system, and the decision context that is most appropriate for each. These comparisons are facilitated by understanding the basic concepts and mechanics of each method. In other words, before a firm can choose between competing costing systems, producers and consumers of accounting information within the firm must understand how each system works and how the alternatives are both similar and different from one another. It is our hope that the examples and discussion presented in this article have contributed to that understanding.

AUTHOR INFORMATION

David Perkins, PhD, CMA, is a professor of accounting at Abilene Christian University. He has published articles in *Management Accounting Quarterly*, *Journal of Business Ethics*, *International Journal of Information and Operations Management Education*, and the *Journal of Accounting Case Research*. E-mail: david.perkins@coba.acu.edu

O. Scott Stovall, PhD, is an associate professor of accounting at Abilene Christian University. He has published articles in *Management Accounting Quarterly*, *Journal of Business Ethics*, *Corporate Governance: An International Review*, *Journal of Accounting Case Research*, and the *Journal of Applied Business Research*. E-mail: stovallo@acu.edu

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NOTES

