IDENTIFYING AND MEASURING THE COST OF ERROR AND WASTE

Gary Cokins

When managerial accountants and information system builders better understand the nuances for designing their cost measurement system, they are more successful. One of the challenges for a cost measurement design team is to right-size the system. This means to balance simultaneously its level of detail, relevance, and accuracy with the level of administrative effort made to collect data and report the transformed information.

Any managerial accounting textbook will proclaim that there are multiple purposes for managerial accounting ranging from tight-fisted budget control to predictive planning. An increasingly popular purpose has been to calculate the costs "caused" by an organization's ultimate external consumer. In the public sector, this might be a service recipient such as a license bureau registrant or a family residence provided with weekly trash pickup. This information reveals who (or what) are the high-versus-low demanders. In commercial business, the final cost object[1] is the end-customer, and managerial accounting has been shifting its emphasis to the measurement of customer profitability rather than the measurement product costs. This is because products are becoming much like commodities; as a result, understanding customer behavior is now more important. The goal is less to make product and then locate customers to buy, but rather more to uniquely serve each customer for retention. The emergence of one-to-one customer relationship management (CRM) systems forces this need for visibility. By calculating customer costs-to-serve, inclusive of their individual product-related and channel-related costs, do businesses finally discover from whom they make or lose money.

Ultimately, after a service provider discovers where their end-users rank in terms of profit margins and their unique consumption of the provider's resources, then

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EXECUTIVE SUMMARY

- *One of the most important managerial activities for optimizing a cost measurement system design that addresses waste is the sizing of the model to a proper level of detail and disaggregation that satisfies accuracy requirements.*
- *Unlike the ABC/M system designed to address the comprehensive organizational cost measurement perspectives, organizations can permit and encourage ABC/M perspectives and systems at the local level to enhance operational performance and waste management decision making.*
- *When organizations permit local processes to devise a customized set of attributes, the local system can calculate the unique waste-related costs of work activities and their consuming outputs.*

begins the task of improving the situation. There are two broad categories of actions:

- Strategic—raise prices, terminate unprofitable customers, alter behavior with menu-based service-level options induced by step-pricing
- Operational—streamlining processes, removing low-value added work, improving asset utilization

Much has been written about strategic cost management that arguably can be described in terms of senior manager exercises. This article addresses what to do in the trenches of the organization *to identify and measure the cost of error and waste*. As improvement initiatives evolve, such as lean operations and Six Sigma, a parallel monetary view is needed to mirror the cycle-time and quality-based metrics prevalent in such programs.

RIGHT-SIZING THE COST MEASUREMENT SYSTEM

To truly sustain a cost measurement system, an organization must secure organizational buy-in from managers and employees who will use the data. These people ideally should achieve a mastery of (or at least reasonable proficiency in) understanding the properties applied in assigning expenses (i.e., general ledger accumulations of spending) into their calculated costs—the uses of the spending. In short, costing is modeling how the demands on work and their source resources are uniquely consumed and reflected. Costs measure effects.

Since the 1980s, activity-based cost management (ABC/M) has become a popular methodology for cost management. A major misconception about ABC/M is that it

In short, costing is modeling how the demands on work and their source resources are uniquely consumed and reflected.

is monstrous in size requiring a mudslide of data and an army of workers to collect and report the data. In reality, basic ABC/M is nothing more than a refined absorption accounting system that causally traces expenses into calculated costs. Many accountants violate the cause-and-effect rule by using convenient broadly averaged and volume-based allocation factors. Hence, their results are flawed and misleading. However, adding more cost assignment factors does not mean the cost model must be huge. Given the zero-sum error and error-offsetting properties of absorption accounting, the accuracy of what is being costed is strongly governed by the cost assignment structure, rather than the amount or quality of the input data. This is counter-intuitive to some accountants, and the accounting profession will evolve in overturning its own misconception that precision and detail is synonymous with accuracy. They are not.

Achieving success with ABC/M initially begins with overcoming the ABC/M leveling problem—right-sizing the model to a proper level of detail and disaggregation to satisfy the accuracy requirements. Once the appropriate levels are stabilized at a Goldilocks-level—not too detailed, not too summarized—then the connection of the ABC/M data to business problems, their analysis, and ultimate solutions can follow. In the end, the payback from ABC/M can be accelerated.

USING THE ATTRIBUTES OF ACTIVITY-BASED COSTING

One role for calculating costs is to help suppliers and service-providers identify which of their organization's work activities are:

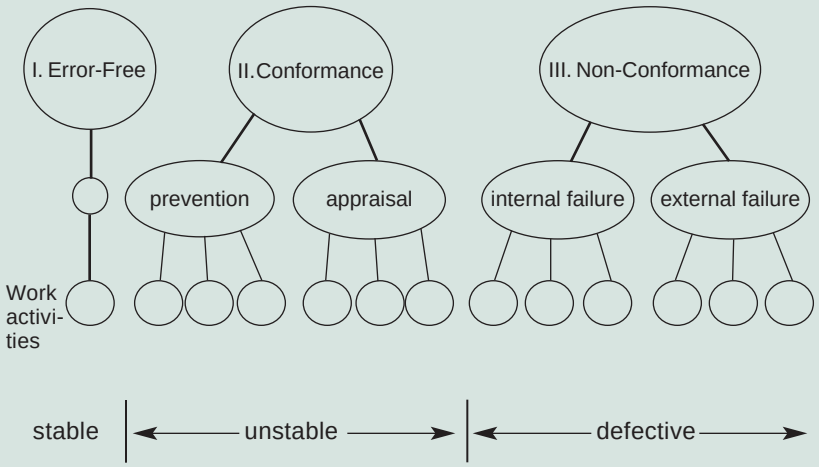
- Not required at all and can be eliminated (e.g., a duplication of effort)
- Ineffectively accomplished and can be reduced or redesigned (e.g., due to outdated policies or procedures)
- Required to sustain the organization (i.e., the work is not directly caused by making product or delivering services through channels to customers), and therefore it may not be possible to reduce or eliminate the work activity (e.g., provide plant security, compliance with government regulations, etc.)
- Discretionary and can potentially be eliminated (e.g., the annual employees' picnic)

Activity-based cost management (ABC/M) systems provide for distinguishing these work activities either by including them in a cost assignment structure (i.e., sustaining cost objects) or by tagging their costs as an overlay (i.e., attributes).

Organizations have very little insight about how their individual costs—whether in products, customers, or business processes—vary among themselves aside from the amount of the cost. Traditional cost accounting methods do not provide any way for individual costs to be tagged or highlighted with a separate dimension of cost other than the amount that was spent. An example of a range of a tag that can be scored for activities

EXHIBIT 1

ABC/M's "Attributes" Can Score and Tag Costs: A Cost of Quality (COQ) Classification Scheme



is as "very important" versus "required" versus "postponable." These are popular ways of measuring how much value-added costs exist and where they are located. What this introduces is visibility to the colors of money.

In short, traditional accounting simply provides racked-and-stacked numbers; aside from the cost amount or emphasis in the appearance of the numbers, one cannot differentiate one cost from another. This is true whether one is examining resource expenditures or their calculated costs of activities, processes, and final cost objects (i.e., workflow outputs, products, or customers). Attributes solve this money-level-only limitation of traditional costing. One can think of attributes as offering many other dimensions to segment costs that are different from absorption costing's single dimension, which only reflects variation and diversity consumption of cost objects like outputs, products, service lines, and customers. Attributes can be used as a grading method to evaluate the individual activities that contribute to a process output's goods or services. ABC/M attributes allow managers to differentiate activities from one another even if they are equal in amount.

AN ANALYST'S DREAM

Some practitioners of ABC/M believe it is the use of "attributes" that really brings power to ABC/M analysis. This implies that the attributes information may be more important than the traced and assigned cost data that are so fundamental to what ABC/M is doing: calculating the unique costs of work activities and their consuming outputs. In contrast to ABC/M's objective reporting of the facts, attributes take the ABC/M data an additional step by making the data very suggestive in terms of what actions to take. I like to refer to attributes as the "air conditioning" for ABC/M.

With attributes one is no longer just tracing or adding up costs as an accounting exercise. To serve an alternative purpose, one is differentiating among the costs that reside within outputs, such as standard service lines and/or customers, or within business processes. The differentiating is based on something other than the amount of costs.

Monetary information alone about what an output, product, or service costs does not necessarily convey to anybody what to do or how to improve. Just knowing the amount of costs may not be sufficient to analyze the results and make judgments. Various types of costs may be of interest as well. The monetary costs have not been differentiated from each other except in their relative magnitudes. Types and attributes are synonymous. The activity monetary costs can be further differentiated into user-defined categories to facilitate managerial analysis. Without additional differentiation, the activities will all look the same except for their description and dollar amount.

ABC/M attributes are frequently scored and graded against the work activities. The number of different attributes is unlimited, but many organizations settle on their favorite half dozen or so. Examples include the level of importance and level of organizational performance. The Six Sigma and quality management community uses attributes to calculate the cost-of-quality (COQ). Exhibit 1 illustrates the three popular COQ categories for grading work activities. Categories themselves can be broken down into subcategories for more refined reporting.

Category I in the exhibit means a good and stable process. Category II has quality-related costs because the process is not sufficiently stable to trust it, so inspecting and testing are required. Category III has quality-related costs because something is already defective or not con-

formed to specifications defined for or by the service-recipient. With rigor like this, quality teams can pursue stronger improvement programs and shift their time and emphasis away from documentation and reporting to taking corrective actions.

Multiple activities can be simultaneously tagged with these grades and, of course, the money amount trails along, first at the work activity level and then into the cost objects or into the process component activities. Attributes can also be directly tagged on resources as well as final cost objects, but tagging activities is the most popular.

When attributes are tagged to activities, each cost object will consume multiple grades of a select attribute and, as a result, will reflect different blends. An analogy would be the different gallonage (cost amount) of different colored paint (an attribute's different score) being poured (activity driver) into an empty paint can (cost object). As each empty can is filled, the color of the paint will be different, even if the cans are filled to comparable levels (same amount of cost). Hence, you can see the colors of money.

POPULAR ATTRIBUTES

Advanced, mature users are masters at employing ABC/M attributes. A popular attribute involves scoring activities along their "high- versus low-value-adding" scale. The idea is to eliminate low-value-adding activities and optimize high-value-adding activities, thus enabling employees to focus on the worth of their organization's work. Employees can see how work really serves customers and which activities may be considered wasteful. Focus and visibility are enhanced because people can more easily see where costs are greater and also which costs can be managed in the near term. Scoring costs with attributes invokes action beyond just watching and analyzing costs.

Advanced, mature users are masters at employing ABC/M attributes.

In the early days of ABC/M, the scoring choices for value-adding were limited to either value-added (VA) or non-value-added (NVA). This either/or choice created problems. First, it was considered a personal insult to employees to tell them that part or all of what they do is non-value-adding. Employees are not real happy to hear that. Even more restrictive is the ambiguity of scoring value that can lead to unsolvable debates. For example, take the activity "expedite order" to prevent a late shipment to an important customer; is this VA or NVA work? A solid argument can support either case. It is better to simply discard the VA versus NVA dichotomy with a different set of words that scale along a continuum and better describe levels of importance (e.g., critical, necessary, regulatory, or postponable.)

Regardless of what type of scale used to score or grade value, the objective is to determine the relation of work or its output to meeting customer and shareholder requirements. The goal is to optimize those activities that add value and minimize or eliminate those that do not. Following are some tips, but by no means hard rules, for classifying value attributes. High-value-adding activities are those that:

- Are required to meet customer requirements
- Modify or enhance purchased material of a product
- If more of them are accomplished, the customer might pay more for the product or service
- Are critical steps that cannot be eliminated in a business process
- Are performed to resolve or eliminate quality problems
- Are performed due to a request or expectation of a satisfied customer
- In general, if time permitted, you would do more of

Low-value-adding activities are those that:

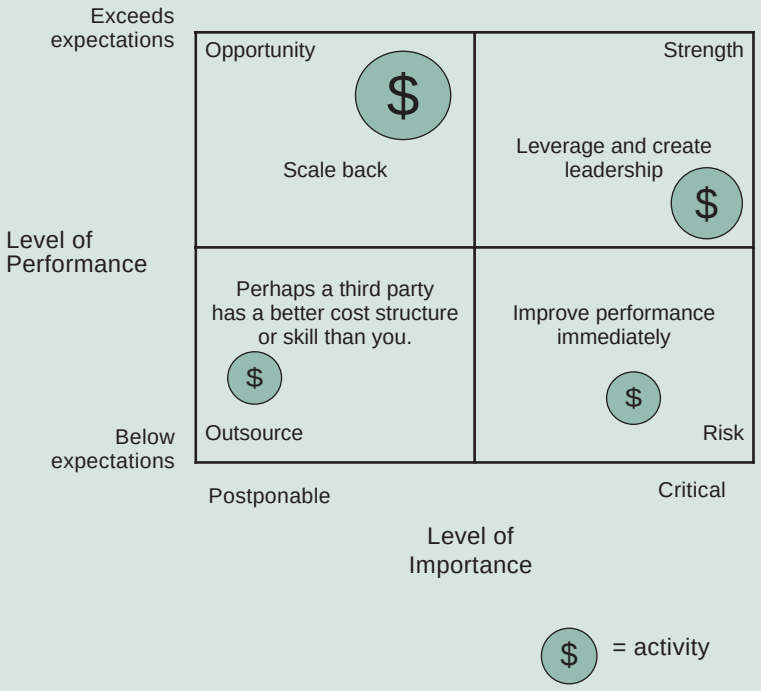
- Can be eliminated without affecting the form, fit, or function of the product
- Begin with the prefix "re" (such as rework or returned goods)
- Result in waste and add no value to the product or service
- Are performed due to inefficiencies or errors in the process stream
- Are duplicated in another department or add unnecessary steps to the business process
- Are performed to monitor quality problems
- Are performed due to a request of an unhappy or dissatisfied customer
- Produce an unnecessary or unwanted output
- If given the option, you would prefer to do less of.

Another popular attribute scores how well each activity is performed, such as "exceeds customer expectation," "meets," or is "below." This reveals the level of

EXHIBIT 2

ABC/M's "Attributes" Can Be Suggestive of Action

Scoring and tagging activities can assist employees to determine what directional actions to take with that work.



performance. Multiple activities can be simultaneously tagged with these grades from two or more different attributes. As an option, activities can be summarized into the processes to which the activities belong. Using two different attributes along the process view, organizations can see, for example, that they are spending a lot of money doing things that they are good at but that they have judged to be unimportant. Attributes are very suggestive. In this example, it is obvious that the organization should scale back and spend less on that kind of work. Exhibit 2 illustrates the four quadrants that result from combining the two attributes for performance (vertical axis) and importance (horizontal axis). The activity costs for such unimportant activities would be in the upper-left quadrant.

Although most attributes are subjectively scored or graded by managers and employees, when the attributes' targeted activities or cost objects are grouped together, any subjectivity begins to become directionally reliable (assuming there was no bias in the scoring of every single attribute). As a result, the attributed costs introduce emotionally compelling business issues, such as the example above.

ABC/M attribute development should follow some disciplined guidelines:

- Keep the definitions concise.
- Allow employees to develop the classifications, and more importantly, classify (or distribute) their own activities with the attributes.
- Be clear that attributes are tagged to activities, not to the people who perform the work.
- Constantly ask, "Can the high value adding activities be done more quickly or at a lower cost?"
- Determine if low-value-adding activities can be eliminated or at least minimized.

Some analytical people are uncomfortable with any form of subjective grading and prefer rigorous rule-based methods to determine which attribute score is applicable. In this area, they can lighten up and just go with the flow. The scorings may come from some snap judgments of employees and other process participants, but the resulting view of the costs is just a starting point for asking more questions. The data collection effort should not be an obstacle.

Because in activity-based cost management the activity costs will "pile up" into their final cost objects, and the attribute costs can just tag along, one can get another view of attributes now located in the outputs. As low-value-added costs are removed, a trend of relatively lower product or service line costs would reflect the improvements.

Another way of thinking about this is that when attributes are tagged to activities, each cost object will consume multiple grades of a select attribute. As a result, the cost objects will reflect different blends relative to each other. An analogy would be the different gallonage (cost amount) of different colored paint (an attribute's different score) being poured (activity driver) into an empty paint can (cost object). As each empty can is filled, the color of the paint

will be different, even if the cans are filled to comparable levels (same amount of cost).

Attributes can reveal a different mix of value or performance. For example, there can be a major difference between two products with roughly the same unit cost. Revisiting the colors of paint analogy, one color of paint may cost $50.00 per gallon, with $15.00 of that total coming from a dozen activities scored as "below expectations" performance. Another color may also cost $50.00 per gallon, but with only $5.00 of that total coming from "below expectation" activities. Armed with this information, the product manager of the first color now has a hint that his or her product cost can be lowered. In this way, the attributes are being used as in benchmarking to compare and contrast—and then to focus.

Attributes make ABC/M data come alive to some people. And when the attributed ABC/M data are exported into OLAP software and executive information system (EIS) tools, they can have a very stimulating impact on users.

LOCAL VERSUS ENTERPRISE-WIDE ABC/M

A common misconception is that the scope of an ABC/M system must be enterprise-wide; that is, the expenses included in the system must account for *all* the employees in the organization and 100 percent of a time period's expenditures. (Or alternatively, the expenses must include *all* the people in a substantial portion of the organization, such as a factory or service-delivery arm.) People with this misconception have usually been exposed only to ABC/M models or systems that are used for calculating the total costs of a product or service line used to determine their total profitability.

Attributes make ABC/M data come alive to some people.

In practice, the vast majority of ABC/M is applied to subsets of the organization for process improvement rather than revenue enhancement and profit margin increases. An example of a subset is an order-processing center or equipment maintenance function. These ABC/M models and systems are designed to reveal the cost structure to the participants in the main department and related areas. In ABC/M's cost assignment view, the cost structure is seen from the orientation of how the diversity and variation of the function's outputs cause various work to happen, and how much. The costs of the work activities that belong to the processes are also revealed in the ABC/M model as they relate in time and sequence. However, it is ABC/M's powerful revealing of the costs of various types of outputs that stimulates discussion and discovery. For example, an order-processing center that learns that the cost per each adjusted order is roughly eight times more costly than for each error-free or adjustment-free entered order would get people's attention. This result happens even if the order entry process has been meticulously diagrammed, flowcharted, and documented.

Commercial ABC/M software now enables consolidating some, and usually all, of the local, children ABC/M models into the enterprise-wide, parent ABC/M model. The local ABC/M model data are used for tactical purposes, often to improve productivity. In contrast, the consolidated enterprise-wide ABC/M model is often used for strategic purposes because it helps focus on where to look for problems and opportunities. Also, enterprise-wide models are popular for calculating profit margin data at all levels, including channel-related and customer- and service-recipient-related profit contribution layers.

EXAMPLE OF A "LOCAL" ABC/M MODEL

Exhibit 3 illustrates a template timesheet input form for a local ABC/M model of a typical purchasing function. In this example, the interest for this portion of the organization is to understand how different types of suppliers create and cause varying levels of costs—both the obvious, such as from the purchasing department, and the "hidden" tangential costs from other departments. For purchasing departments, an increasingly popular exercise is to continuously evaluate and grade their suppliers. This use of a local ABC/M model provides excellent metrics to assist in supplier ratings.

Exhibit 3 includes *all* the expenses of any department or group of people that may have any involvement in or be affected by the purchasing process. The magnitude of the cost impact on each department may be large or small. For the departments and functions outside the formal purchasing department, the specific work is described using the "verb-adjective-noun" grammar of ABC/M. All of those employees' nonpurchasing process-related work, regardless of what they do

EXHIBIT 3

An ABC/M Timesheet for a "Local" ABC/M Model

Work Activity Time Sheet		Annual salary and benefits costs =				$ 50,000
Dept	Activity	Number of Employees	%	TCO $	other $	
Purchasing		10				
	process blanket purchase orders		10%	$ 50,000		
	process unique purchase orders		30%	$ 150,000		
	negotiate deals		10%	$ 50,000		
	process returns to suppliers		20%	$ 100,000		
	troubleshoot product problems		5%	$ 25,000		
	resolve problems & disputes with suppliers		25%	$ 125,000		
Inspection		10				
	resolve inbound problems		20%	$ 100,000		
	Do other Core work		80%		$ 400,000	
Receiving		10				
	process supplier paper work		20%	$ 100,000		
	Do other Core work		80%		$ 400,000	
Production planning	reschedule operations—supplier-caused	5	10%	$ 25,000		
	Do other Core work		90%		$ 225,000	
Operations	idle or wasted time—supplier-related	100	5%	$ 250,000		
	Do other Core work		95%		$ 4,750,000	
Sales	Explain late shipments—supplier-related	20	5%	$ 50,000		
			95%		$ 950,000	
	Do other Core work					
		155		$ 1,025,000	$ 6,725,000	
			total=	$ 1,025,000		

NOTE: $525,000, which is over 100% of the Purchasing Departments expenses, are usually "hidden" supplier-related costs.

and why, is simply lumped together as a single activity (e.g., "do all the other work").

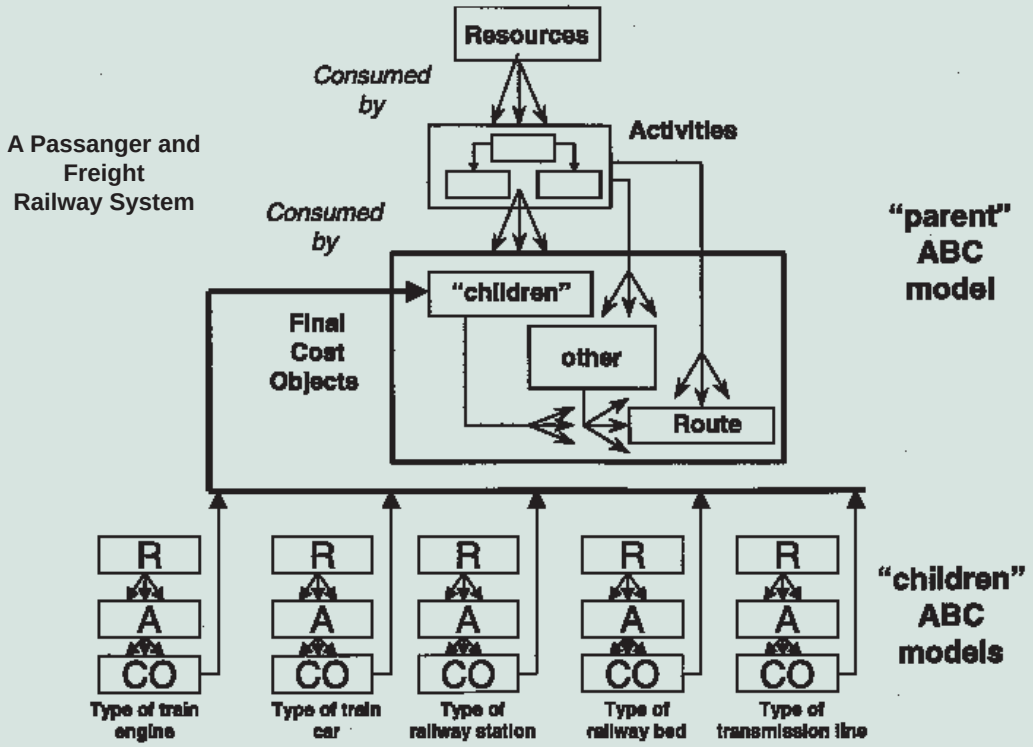
In some cases, the head count of one of these tangential groups of workers may be many orders of magnitude greater than the number of employees in the purchasing department. However, for example, a 5 percent activity cost recorded from several large groups of people can reveal a significant amount of traditionally hidden or usually nonquantified costs relative to just the purchasing department. In Exhibit 3, the full-time equivalent (FTE) head count that is related to the purchasing process is 20.5. This includes all ten purchasing department employees and portions of the other 100-plus employees that add up to 10.5.

The cost math on the timesheet input form consequently computes a total cost for all the employees, then carves out only those activity costs that are related to the purchasing process. In the community of professional purchasing managers, this total cost has been referred to as the total cost of ownership (TCO). The first part is the direct purchase price of the product or service line printed on the supplier's invoice. This form is like a block of marble for a sculptor. After the non-TCO costs are excluded, like the finished sculpture, the costs that remain are pure TCO.

PARENT AND CHILDREN ABC/M MODEL CONSOLIDATION

Activity-based costing models can be designed to accomplish both strategic and operational purposes. This is done by constructing

EXHIBIT 4
ABC/M Multi-Models



several ABC/M models *inside* the enterprise-wide ABC/M system. We describe the *children ABC/M models* as the components that roll-up and consolidate into the *parent ABC/M model*. Exhibit 4 illustrates the concept.

Exhibit 4 demonstrates the value of having multiple local models. Imagine the goal is to privatize a national railroad system that is substantially losing money such that it operates at break-even. One approach would be to build the enterprise-wide ABC/M model with each daily route number as the final cost object. By matching each route's traced costs against the passenger and freight revenues, the profitability of each route is known. Some strategic decisions can then be made to adjust prices, alter route schedules, close train stations, and so on.

However, the more substantial cost improvements may come from the operational cost management actions of removing waste and unneeded idle capacity and streamlining business processes in the individual functions of the railroad, such as track maintenance and railway station management. With a single large ABC/M model, all the employees are "in the model." This is because each route uniquely consumes the output of work from each function—the rail track, the train engine, the train cars, the railway station, etc. However, when so much is included, people's eyes begin to glaze over while they analyze the ABC/M data. Most will not care that much about what the other functional teams are doing.

By dividing the parent strategic model into its components, each functional team can focus on their own area of work and related outputs. By using their own local ABC/M model they can see how the unique diversity and variation of their outputs cause different costs. As an example, maintaining a mile of railway track and bed in snowy mountains will be more costly than on a flat prairie. The cost per each mile for each type is made visible including the unit cost per output of work comprising each mile. This data alone does not automatically produce change, but it begins the discovery process of asking pointed questions that could never be asked before—and answered with reliable fact-based data. For example, why does a sleeping car require five times greater cost than a passenger car? By seeing what work activities are included, an organization can better question long-held assumptions.

EXHIBIT 5

An Example of "Unitized Costs"

Type of Roadbed Costs						
Roadbed Types						
Number of lanes	**Road surface**	**Location**	**Total cost**	**Number of miles**	**Work activity**	**Unit cost per mile**
four	asphalt	interstate	$ 270,137,078.40	125,342		**$2,155.20**
					cut grass	$120.00
					electronic signs	$334.25
					fill pot-holes	$150.00
					plow roads	$975.60
					paint stripes	$450.50
					replace signs	$124.85
two	bituminous	rural	**$29,783,384.10**	**43,578**		**$683.45**
					cut grass	$220.00
					electronic signs	$0.00
					fill pot-holes	$65.00
					plow roads	$250.00
					paint stripes	$112.20
					replace signs	$36.25
four	asphalt	county	**$95,567,207.84**	**65,672**		**$1,455.22**
					cut grass	etc.
					electronic signs	etc.
					fill pot-holes	etc.
					plow roads	etc.
					paint stripes	etc.
					replace signs	etc.

Exhibit 5 illustrates how the unit costs of the output of work can be made visible for a government's highway maintenance department. The benchmarking of relative data can be more powerful than process flow charts in stimulating discussion about what to change.

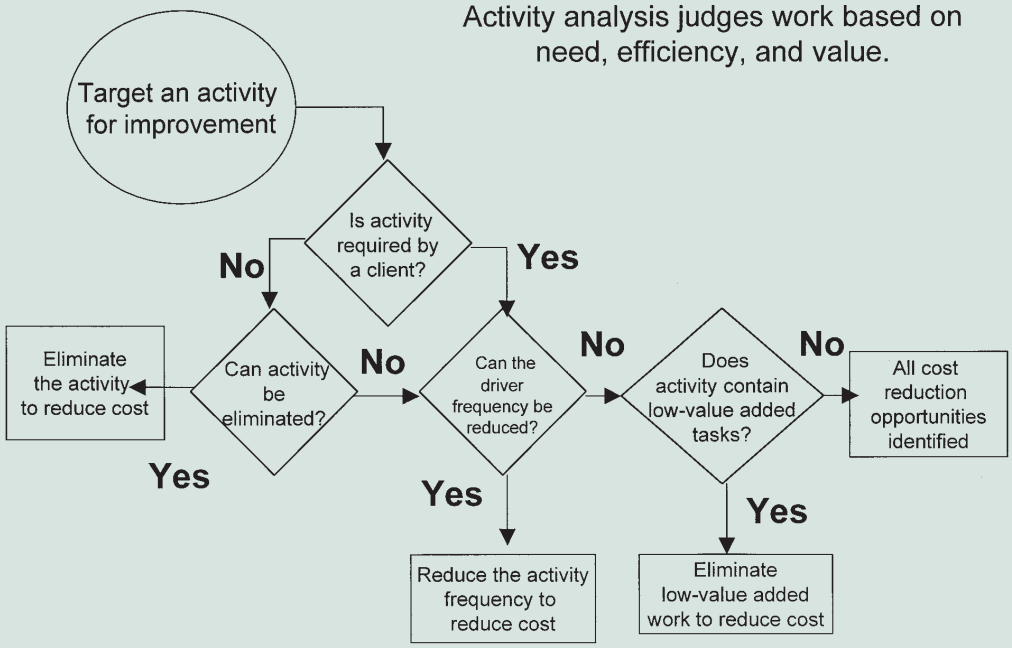
In short, this approach places intra-ABC/M models within an enterprise ABC/M model. A large parent ABC/M model is simply subdivided into its component children ABC/M models. Commercial ABC/M software accommodates consolidations of children into parent ABC/M models. The costs and information are unaffected regardless of which ABC/M models you work with.

APPLICATIONS OF LOCAL ABC/M

The vast majority of ABC/M data are applied locally. Examples such as that for the purchasing process are limitless. Whenever you have people and equipment doing work where the outputs have diversity, a local ABC/M model can be constructed. The objective of local ABC/M models is not to calculate the profit margins of products, service lines, and customers; it is to compute the diverse costs of outputs to better understand how they create the organization's cost structure.

An interesting application is when a marketing, recruiting, or promotion department has employees who are trying to generate new or continuing inbound orders. They may be trying multiple avenues, such as newspapers, radio, television, tradeshows, websites, billboards, and so forth. The costs for advertising placements are different and so might be the results in terms of success (including any additional differences in the type of sale, recruit, or sale). This is an ideal case for an ABC/M calculation to determine the costs-ver-

EXHIBIT 6
Activity Analysis



sus-benefits of all the channel combinations to rank order, which is more or less the best return on spending.

In addition to analyzing the impact of diverse cost objects, there are also the traditional activity analysis and cost driver analysis. Exhibit 6 reveals the link between an activity driver and its work activity. Simply, it describes how each work activity can be judged based on its need by the product or customer, its efficiency, and its value content.

Some managers believe that the only way to truly cut costs is to remove the work activity altogether. Their reasoning is that cutting back on costs is rarely effective. They believe there is little point in trying to do cheaply what should not be done at all—that is, a job not worth doing is not worth doing well.

Regardless of how one attacks achieving improvements, the main message here is that work is central to ABC/M. What do we do? How much do we do it? Who do we do it for? How important is it? Are we very good at doing it?

Some refer to the application of local models as activity-based management (ABM), an earlier-generation term for ABC/M, because the uses of the ABC/M data are more operational than strategic. It's possible to view local ABC/M models using the analogy of a musical symphony orchestra conductor in rehearsal—first working the violins, then the trumpets, then all the string instruments, and then all the brass instruments—and then in a live concert with an entire orchestra. The combined orchestra represents a consolidated parent ABC/M model, with local models rolled up into a parent model, then performing as a repeatable and reliable system.[2]

When ABC/M is applied at all organizational levels—local departments, processes, enterprise-wide, or across the supply chain—it provokes intelligent actions and supports better decisions. ■

Notes

1. A "cost object" is an accounting term (shortened from "cost objective") that describes some thing of which you want to know the calculated cost.
2. Gary Cokins, *Activity Based Cost Management: An Executive Guide* (New York: John Wiley & Sons, 2001), p. 97.

olid waste management is a universal issue affecting every single person in the world. Individuals and governments make decisions about con-sumption and waste management that affect the daily health, productivity, and cleanliness of communities. Poorly managed waste is contaminating the worldâ€™s oceans, clogging drains and causing flooding, transmitting diseases via breeding of vectors, increasing respiratory problems through airborne particles from burning of waste, harming animals that consume waste unknowingly, and affecting economic development such as through dimin-ished tourism. Why Measure? Measurement is critical to every component of a waste reduction programâ€”including waste prevention (preventing waste before it is generated, also known as source reduction), recycling collection, and buying or manufacturing products with recycled content.Â The trial and error of setting a baseline is an opportunity to explore which data collection approach works best. Once you decide on a mea-surement approach, however, you should stick with it. Make sure youâ€™re satisfied with the data collection method and be certain your data sources are likely to remain available.Â Reusing containers can lead to significant cost savings and waste reduction. Corrugated containers generally can be used up to 12 times, while plastic containers might be reusable 250 times. The balancing act: patient care time versus cost. Judith Lloyd Storfjell, Osei Omoike, Susan M. Ohlson. The Journal of nursing administration. 2008. View 1 excerpt. Cites background. Related Papers.