



# THE INNOVATION OF TIME-DRIVEN

This is the first chapter from the upcoming book, *Time-driven Activity-based Costing: A Simpler and More Powerful Path to Higher Profits*, Harvard Business School Press (April 30, 2007).

## ACTIVITY-BASED COSTING


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**C**onsider the conventional activity-based cost (ABC) system used at Charles Schwab's brokerage operation several years ago. The system attempted to measure product cost and customer profitability each month, certainly desirable goals for stimulating process improvement, product pricing, and customer relationship actions. But the process required 700 employees at more than 100 facilities to submit monthly surveys of their time. The company employed fourteen full-time people just to collect and process the data and prepare management reports, and the monthly reports took more than thirty days to prepare. Hende Enterprises, a far smaller Houston-based manufacturer of awnings, encountered similar implementation problems with its ABC model. The software took three days to calculate costs for the company's 150 activities, 10,000 orders, and 45,000 line items.

These two experiences, unfortunately, were not atypical. Many companies, because of the time-consuming surveying and data-processing costs of ABC systems, either abandoned ABC entirely or ceased updating their system, which left them with out-of-date and highly inaccurate estimates of process, product, and customer costs. Contrast these experiences, however, with the situation at Charles Schwab today. It has imple-

mented a new ABC approach that uses automatic data feeds from its enterprise resource planning (ERP) system to provide managers throughout the system with monthly reports on capacity utilization and customer profitability. The system summarizes, within a few days after each monthly close, the profit impact of over 50 million transactions conducted by its more than 3 million clients in the previous month. Managers have already used this information to lower process costs by several hundred million dollars annually and to align better their product pricing and account management to the company's diverse client segments. Two employees maintain the system's accuracy and capabilities.

The new approach, which we call time-driven activity-based costing (TDABC), gives companies an elegant and practical option for determining the cost and capacity utilization of their processes and the profitability of orders, products, and customers. TDABC enables companies to improve their cost management systems, not abandon them. Managers obtain accurate cost and profitability information to set priorities for process improvements, rationalize their product variety and mix, price customer orders, and manage customer relationships in ways that benefit both parties.



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### Activity-based costing: A brief history

As originally introduced in the 1980s, ABC corrected serious deficiencies in traditional standard-cost systems.<sup>1</sup> These systems typically used only three cost categories: labor, materials, and overhead. While manufacturing companies could generally trace the labor and materials used by their individual products, their cost systems allocated the indirect and support costs—the “overhead”—with measures already being recorded, such as direct labor hours and direct labor dollars.

As the direct labor content of products decreased, through automation and industrial engineering-driven efficiencies, the percentage of total costs represented by the somewhat arbitrary allocations of overhead had continually increased during the twentieth century. In addition, many companies had shifted from mass-production strategies to those that offered customers more variety, features, and options. The customer-focused strategy attempted to attract, retain, and grow business by offering services such as the following:

- Producing and stocking a greater variety of products
- Supporting more order-entry and order-tracking channels
- Producing and delivering in smaller order sizes
- Delivering directly to customers' end-use locations, often in expedited and narrow time windows

- Providing specialized technical applications support

All these new services created value and loyalty among customers, but none came for free. To offer the expanded variety and the new options, features, and services, companies had to add (overhead) resources for engineering, scheduling, receiving, storage, inspection, setup, materials handling, packaging, distributing, order handling, marketing, and selling. Overhead costs increased both relatively and absolutely as companies diversified into more product lines, customers, channels, and regions, and offered specialized features and services.

By the 1980s, the standard cost systems designed during the scientific management movement seventy-five years earlier no longer reflected the current economic reality. Companies were now operating with distorted information about the profitability of their orders, products, and customers. For example, while traditional cost systems might show that all customers were profitable, the economic reality was that a minority of customers earned between 150 and 300 percent of profits, and unprofitable customer relationships lost 50 to 200 percent of profits.

Activity-based costing seemingly solved the inaccurate allocation of overhead from standard cost systems by tracing these indirect and support costs first to the activities performed by the organization's shared resources, and then assigning the activity

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costs down to orders, products, and customers on the basis of the quantity of each organizational activity consumed. Managers used the more accurate ABC and profitability information to make better decisions about process improvements, order acceptance and rejection, pricing, and customer relationships. The decisions led to near-term and sustainable improvements in product and customer profitability.

### ABC pitfalls

Despite its attractive value proposition, however, ABC was not universally accepted. In an annual survey of the adoption of management tools, ABC ranked below the median, with only a fifty percent adoption rate.<sup>2</sup> For a system that gives companies insights into the cost and profitability of products, processes, services, and customers—insights not otherwise available—the low adoption rate seemed surprising.

Some companies failed to adopt ABC, or abandoned the tool, because of behavioral and organizational resistance that accompanies any new idea, particularly one as seemingly radical as to treat most organizational costs as variable and to acknowledge the possibility of unprofitable customers.<sup>3</sup> But much of the resistance to adopting and sustaining ABC was rational and justified. As our opening example documents, ABC systems were expensive to build, complex to sustain, and difficult to modify. People also questioned the accuracy of cost assignments based on individuals' subjective estimates of the percentages of their time spent on various activities. Apart from the measurement error introduced by employees' best attempts to recall their time allocations, the employees—anticipating how the data would be used—might bias or distort their responses. As a consequence, operations, sales, and marketing managers argued about the accuracy of the model's estimated costs and profitability rather than addressing how to improve the inefficient processes, transform unprofitable products and customers, and cope with the considerable excess capacity that the model had revealed.

Many managers raised an additional concern. Despite the large number of activities in the ABC model, they knew that the model

was not accurate or granular enough to capture the complexity of actual operations. For example, consider an activity *ship order to customer*. Rather than assume a constant cost per order shipped, a company may wish to recognize the cost differences when an order is shipped in a full truck, in a less-than-truckload (LTL) shipment, by overnight express, or by a commercial carrier. In addition, the shipping order may be entered either manually or electronically, and it may require either a standard or an expedited transaction. To allow for the significant variation in resources required by the different shipping arrangements, new activities would have to be added to the model, further expanding its complexity. When employees must be reinterviewed and asked to estimate their time across a broader and more complex set of activities, cost assignments generally become even more subjective and inaccurate.

Further, as ABC system designers expand the activity dictionary to reflect more granularity and detail about activities performed, the demands on the computer model used to store and process the data escalate nonlinearly. For example, a company using 150 activities in its enterprise-wide ABC model, applying the costs to 600,000 cost objects (products, SKUs, and customers), and running the model monthly for two years requires data estimates, calculations, and storage for more than 2 billion items. Such expansion causes many ABC systems to exceed the capacity of generic spreadsheet tools, such as Microsoft Excel, and even many commercial ABC software packages. The systems take days to process one month of data, assuming the solution converges at all.

Because of the difficulties that conventional ABC software solutions had in scaling to enterprise-wide models, companies (and their consultants) frequently built isolated ABC models for individual facilities, departments, and businesses that could not link with each other, or the companies built separate models for product and customer analysis that did not link. Because of the proliferation of models across units, the companies could not take a holistic view of cost and profitability issues. Improvements were incremental and local. The benefits from the siloed ABC models



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could not justify the models' high cost to maintain and run.

These estimating and data-processing difficulties became obvious to most ABC implementers. But a subtle and more serious problem arises from the interview and survey process itself. When people estimate how much time they spent on a list of activities handed to them, invariably they report percentages that add up to 100 percent. Few individuals record a significant percentage of their time as idle or unused. Therefore, almost all ABC systems calculate cost driver rates assuming that resources work at full capacity. But operations at practical capacity are more the exception than the rule. ABC cost driver rates should be calculated at practical capacity, not at actual utilization.<sup>4</sup>

In summary, implementing conventional ABC encountered the following problems:

- The interviewing and surveying process was time-consuming and costly.
- The data for the ABC model were subjective and difficult to validate.
- The data were expensive to store, process, and report.
- Most ABC models were local and did not provide an integrated view of enterprise-wide profitability opportunities.
- The ABC model could not be easily updated to accommodate changing circumstances.
- The model was theoretically incorrect when it ignored the potential for unused capacity.

### **Time-driven ABC:**

#### **An elegant, more accurate approach**

Fortunately, a solution to all these problems with conventional ABC now exists. We have recently devised, tested, and implemented a new approach, which we call time-driven activity-based costing. TDABC is a rare example of a free lunch; it is simpler, cheaper, and far more powerful than the conventional ABC approach.

TDABC simplifies the costing process by eliminating the need to interview and survey employees for allocating resource costs to activities before driving them down to cost objects (orders, products, and customers). The new model assigns resource costs directly to the cost objects using an ele-

gant framework requiring only two sets of estimates, neither of which is difficult to obtain. First, it calculates the cost of supplying resource capacity. For example, consider a department or process for handling customer orders. In this first step, the TDABC model calculates the cost of all the resources—personnel, supervision, occupancy, technology, and supplies—supplied to this department or process. It divides this total cost by the capacity—the time available from the employees actually performing the work—of the department to obtain the capacity cost rate.

Second, TDABC uses the capacity cost rate to drive departmental resource costs to cost objects by estimating the demand for resource capacity (typically time, from which the name of the new approach was chosen) that each cost object requires. Staying with our example of the customer order department, the model requires only an estimate of the time required to process a particular customer order. But TDABC does not require that all customer orders be the same. It allows the time estimate to vary on the basis of the specific demands by particular orders, such as manual or automated orders, expedited orders, international orders, orders for fragile or hazardous goods, or orders from a new customer without an existing credit record. The TDABC model simulates the actual processes used to perform work throughout an enterprise. It can therefore capture far more variation and complexity than a conventional ABC model, without creating an exploding demand for data estimates, storage, or processing capabilities. Using TDABC, a company can embrace complexity rather than being forced to use simplified, inaccurate ABC models of its complex businesses.

We illustrate the fundamental differences between the conventional and TDABC approach with a simple numerical example. Let's consider the analysis of a customer service department whose total operating expenses are \$567,000 per quarter. This amount includes the customer service personnel, their supervisors, and the cost of the department's information technology, telecommunications, and occupancy. Let's also assume that the \$567,000 is committed for the quarter and won't vary

### EXHIBIT 1 Average Cost Driver Rates for Conventional ABC

Activity	Time Spent (%)	Assigned Cost	Cost Driver Quantity	Cost Driver Rate
Process customer orders	70	\$396,900	49,000	\$8.10 per order
Handle customer inquiries	10	\$56,700	1,400	\$40.50 per inquiry
Perform credit check	<u>20</u>	<u>\$113,400</u>	2,500	\$45.36 per credit check
Total	100	\$567,000		

with the quantity of work performed by the customer service department.

#### Conventional ABC

Conventional ABC starts with a project team interviewing supervisors and departmental personnel to learn about the various activities they perform. To keep the example simple, let's assume that the ABC team determines that the department performs the following three activities:

- Process customer orders
- Handle customer inquiries and complaints
- Perform customer credit checks

In the next step, the team interviews and surveys the employees, asking them to estimate the percentage of their time spent (or that they expect to spend) on these three activities. This part of the analysis is generally time-consuming and difficult for people to respond to. A typical employee question is, "Do you mean what I did yesterday?" The reply is, "No, I would rather that you think about an average three- or six-month period and estimate the proportion of time you are processing customer orders, dealing directly with customer questions or complaints, and checking and maintaining customer credit reports during this extended period." The ABC team cannot really validate employees' subjective time distributions unless it is prepared to spend weeks observing the actual mix of time spent among the three activities.

Let's assume that interviews and surveys reveal that the time mix among the three activities is seventy percent, ten percent, and twenty percent, respectively. The ABC team assigns the total cost of the department (\$567,000) to the three activ-

ities using these time percentages. The team also collects data about the actual (or estimated) quantities of work for the quarter in these three activities, as shown below:

- 49,000 customer orders
- 1,400 customer inquiries
- 2,500 credit checks

The project team makes an additional assumption to keep the analysis simple: all orders take about the same quantity of resources (time) to process, all customer inquiries take about the same amount of time, and each customer credit check also takes about the same level of effort. The ABC system now calculates the following average cost driver rates as shown in Exhibit 1.

The ABC project team uses these cost driver rates to assign the customer service departmental expenses to individual customers on the basis of the number of orders handled, complaints processed, and credit checks performed for each customer.

#### Time-driven ABC

TDABC skips the activity-definition stage and therefore the need to allocate the department's costs to the multiple activities the department performs. The time-driven approach avoids the costly, time-consuming, and subjective activity-surveying task of conventional ABC. It uses time equations that directly and automatically assign resource costs to the activities performed and transactions processed. Only two parameters need to be estimated: the capacity cost rate for the department and the capacity usage by each transaction processed in the department. Both parameters can be estimated easily and objectively. The capacity cost rate is defined below:

$$\text{Capacity cost rate} = \frac{\text{Cost of capacity supplied}}{\text{Practical capacity of resources supplied}}$$

The cost of capacity supplied is, of course, the \$567,000 per month. To estimate the practical capacity, the TDABC team identifies the quantity of resources (typically, personnel or equipment) that actually perform work. Assume that the department employs twenty-eight frontline people (this doesn't count supervisors or support staff). Each frontline employee works an average of twenty days per month (sixty days per quarter) and is paid for 7.5 hours of work each day. Each employee shows up at work, therefore, for about 450 hours, or 27,000 minutes per quarter.

Not all the time paid for is available for productive work. Employees in the customer service department spend about seventy-five minutes per day in breaks, training, and education. Thus, the practical capacity for each employee is about 22,500 minutes per quarter (375 minutes per day multiplied by 60 days per quarter). With

twenty-eight frontline employees, the department has a practical capacity of 630,000 minutes. The cost rate (per minute) of supplying capacity, the first estimate for a TDABC model, can now be calculated:

$$\text{Capacity cost rate} = \frac{\$567,000}{630,000 \text{ minutes}} = \$0.90 \text{ per minute}$$

Estimating the practical capacity for an employee or a piece of equipment should be straightforward. Calculate how many days per month, on average, employees and machines work, and how many hours or minutes per day employees or equipment are available to do actual work, after subtracting time for scheduled breaks, training, meetings, maintenance, and other sources of downtime. This amount need not be calculated precisely; an error of a few percentage points will rarely be fatal, and major errors will be detected through unexpected shortages or excesses of capacity.

The second estimate required for the TDABC model is the capacity required—in this and most cases, time—to perform each transaction. Conventional ABC uses a transaction driver whenever an activity—such as *setup machine*, *issue purchase order*, or *process customer request*—takes about the same amount of time. TDABC, instead of using such transaction drivers, simply has the project team estimate the time required to perform each of these transactional activities. The time estimates can be obtained either by direct observation or by interviews. As with the estimate of practical capacity, precision is not critical; rough accuracy is sufficient. And unlike the percentages that employees subjectively estimate for a conventional ABC model, the capacity-consumption estimates in a time-driven model can be readily observed and validated.

Returning to the numerical example, suppose that the TDABC team obtains estimates of the following aver-

#### EXHIBIT 2 TDABC Cost Driver Rate Calculation

Activity	TDABC Cost Driver	
	Unit Time (minutes)	Rate (at \$0.90/minute)
Process customer order	8	\$7.20
Handle customer inquiry	44	\$39.60
Perform credit check	50	\$45.00

#### EXHIBIT 3 Calculating the Cost of Performing Activities with TDABC

Activity	Unit Time	Quantity	Total Minutes	Total Cost
Process customer order	8	49,000	392,000	\$352,800
Handle customer inquiry	44	1,400	61,600	55,440
Perform credit check	50	2,500	<u>125,000</u>	<u>112,500</u>
Used capacity			578,600	\$520,740
Unused capacity (8.2%)			<u>51,400</u>	<u>46,260</u>
Total			630,000	\$567,000

**EXHIBIT 4** End of Period TDABC Report

Activity	Quantity	Unit Time	Total Time	Unit Cost	Total Cost Assigned
Process customer orders	51,000	8	408,000	\$7.20	\$367,200
Handle customer inquiries	1,150	44	50,600	39.60	45,540
Perform credit checks	2,700	50	<u>135,000</u>	45.00	<u>121,500</u>
Used capacity			593,600		\$534,240
Unused capacity (5.8%)			<u>36,400</u>		<u>32,760</u>
Total			630,000		\$567,000

age unit times for the three customer-related activities:

- Process customer orders: 8 minutes
- Handle customer inquiries : 44 minutes
- Perform credit check: 50 minutes

The team now simply calculates the cost driver rate for the three types of activities performed in the customer service department by cross-multiplying the capacity cost rate with each activity's estimated unit time as shown in Exhibit 2.

Alternatively, we can replace the three customer service activities in the conventional ABC model with a single time equation for the department:

$$\begin{aligned} \text{Customer service time (minutes)} = & \\ & 8 \times (\text{number of orders processed}) + \\ & 44 \times (\text{number of customer inquiries}) + \\ & 50 \times (\text{number of customer credit checks}) \end{aligned}$$

The TDABC cost driver rates are somewhat lower than those estimated by the conventional ABC model. The reason for this discrepancy becomes obvious when we recalculate the cost of performing the three activities during the recent quarter shown in Exhibit 3.

The analysis reveals that only about ninety-two percent of the practical capacity (578,600 divided by 630,000) of the resources supplied during the period was used for productive work; hence only ninety-two percent of the total expenses of \$567,000 is assigned to customers during this period.

The conventional ABC system overestimates the costs of performing activities because its distribution-of-effort survey, while quite accurate (the estimated percentage mix of 70,10, and 20 is quite close to the actual mix of 67.7, 10.6, and 21.6 percent of the productive work across the three activities), incorporates both the costs of resource capacity used and the costs of unused resources. By specifying the unit times to perform each instance of the activity, the organization gets a more valid signal about the cost and underlying efficiency of each activity as well as the quantity (51,400 hours) and cost (\$46,260) of the unused capacity in the resources supplied to perform the activity.

While the TDABC model is initially estimated on historical data, its main power is to help predict the future. Suppose, in the next period, the quantity of activities is expected to be 51,000 customer orders, 1,150 customer inquiries, and 2,700 credit checks. During the period, the company can operate the TDABC model as a standard cost model—though, of course, with many more cost drivers than a traditional standard cost model—and assign costs to orders and customers on the basis of the standard rates, calculated at practical capacity: \$7.20 per order, \$39.60 per customer inquiry, and \$45.00 per credit check. This calculation can be performed in real time to assign customer administration costs to individual customers, as their transactions occur. The standard cost rates can also be



**THE ACCURACY OF A TDABC MODEL ARISES FROM ITS ABILITY TO CAPTURE THE RESOURCE DEMANDS FROM DIVERSE OPERATIONS BY SIMPLY ADDING MORE TERMS TO THE DEPARTMENTAL TIME EQUATION.**

used in discussions with customers about acceptance and pricing of new business.

Assuming that the actual quantities at the end of the period correspond to those expected, as specified above, the company obtains a simple and informative report shortly after the end of the period, shown in Exhibit 4. The report reveals the time required to perform the three activities, as well as their resource costs. It also highlights the difference between capacity supplied (both quantity and cost) and capacity used. Managers can review the \$32,760 cost of the unused capacity and contemplate actions to determine whether and how to reduce the costs of supplying unused resources in subsequent periods.

Rather than reduce currently unused capacity, managers may choose to reserve that capacity for future growth. As managers consider new product introductions, expansion into new markets, or just increases in product and customer demand, they can forecast how much of the increased business can be handled by existing capacity. Managers can also forecast where capacity shortages are likely to arise if forecasted increases in demand will exceed currently available capacity.

### Time equations

Time-driven ABC easily incorporates variation in the time demands made by different types of transactions. It does not require the simplifying assumption, made so far, that all orders or transactions are the same and require the same amount of time to be processed. We can allow the unit time estimates in a TDABC model to vary on the basis of order and activity characteristics.

Companies can usually predict the drivers that cause individual transactions to be simpler or more complex to process. For example, consider the department of a chemicals distribution company that packages customer orders for shipment. A standard item in a compliant package may require only 0.5 minutes. If the item requires a special package, then an additional 6.5 minutes is required. And if the item is to be shipped by air, an additional 0.2 minutes is required to place it in a plastic bag. Rather than define a separate activity for every possible combination of shipping characteris-

tics, or estimate transaction times for every possible shipping combination, the time-driven approach estimates the department's resource demand by a simple equation:

$$\text{Packaging time} = 0.5 + 6.5 \text{ {if special handling required}} + 0.2 \text{ {if shipping by air}}$$

While seemingly complicated and demanding of data, in fact time equations are generally quite simple to implement since many companies' ERP systems already store data on order, packaging, distribution, and other characteristics. These order- and transaction-specific data enable the particular time demands for any given order to be quickly calculated with a simple algorithm that tests for the existence of each characteristic affecting resource consumption. With the TDABC approach, the model expands linearly with variation.

The accuracy of a TDABC model arises from its ability to capture the resource demands from diverse operations by simply adding more terms to the departmental time equation. Returning to the packaging department, let's say that the chemicals company wants to offer a new differentiating feature by giving its customers access to hazardous materials. To capture the cost of this feature, packaging personnel do not need to be reinterviewed to learn what percentage of their time will be required for packaging orders for hazardous chemicals. The TDABC model manager simply adds one more term for this possible variation in the packaging activity. The new equation becomes:

$$\text{Packaging time} = 0.5 + 6.5 \text{ {if special handling required}} + 0.2 \text{ {if shipping by air}} + 30 \text{ minutes {if hazardous material}}$$

In contrast, conventional ABC requires a geometric expansion to capture the increase in complexity. The packaging department's work would be decomposed into four distinct activities:

- Packaging standard product
- Packaging product with special handling requirements
- Packaging product for air shipment
- Packaging hazardous material

Each period (e.g., month), personnel in the packaging department would be surveyed for estimates of what percentage of their time is spent with each activity. This survey is

time-consuming and subjective. The TDABC model allows all these activities to be combined into one process, with one equation. A typical TDABC model requires fewer equations than the number of activities used in a conventional ABC system, while permitting much more variety and complexity in orders, products, and customers. Complexity in the process, caused by a particular product or order, may add terms, but the department is still modeled as one process with one time equation. This feature adds accuracy to the model at little additional cost and effort. And once a time equation is built for each process, through interviews and time studies the model dynamically reflects the actual activity in each period.

The time equations in a TDABC model also provide managers with a capability for simulating the future. The equations capture the principal factors that create demands for process capacity, including changes in process efficiencies, product volume and mix, customer order patterns, and channel mix. Managers can use their TDABC model to perform dynamic what-if analysis of various scenarios. The model can easily be incorporated into a new budgeting process that analytically calculates the required supply and spending on resource capacity that is needed to deliver on future periods' sales and production plans.

### Model updating

Managers can easily update a TDABC model to reflect changes in their operating conditions. As already noted, they don't have to reinterview personnel when more activities are added to a department. They simply estimate the unit times required for each new activity identified. Managers can incorporate the effect of complex versus simple orders by estimating the incremental unit time required when a complex transaction must be handled. For example, one food service company modified the algorithm for customer service time to reflect the additional time required to process special orders and those that required credit memos. The algorithm subtracted time if the order came via an electronic data interchange (EDI) connection. In this way, TDABC models evolve seamlessly as man-

agers learn more about additional variety and complexity in their processes, orders, suppliers, and customers.

Managers can also easily update cost driver rates. Two factors cause a cost driver rate to change. First, changes in the prices of resources supplied affect the capacity cost rate. For example, if employees receive an eight percent compensation increase, the cost rate increases from \$0.90 per supplied minute to \$0.97 per minute. If new machines are substituted or added to a process, the analyst modifies the capacity cost rate to reflect the change in operating expense associated with introducing the new equipment.

The second factor affecting the cost driver rate is a shift in the efficiency of the activity. Quality (six sigma) programs, other continuous improvement efforts, reengineering, or the introduction of new technology can reduce the time or resources needed for the same activity. When permanent, sustainable improvements in a process have been made, the TDABC analyst modifies the unit time estimates (and therefore the demands on resources) to reflect the process improvement. For example, if a computerized database is made available to the customer administration department, the people may be able to perform a standard credit check in twelve minutes rather than fifty minutes. The improvement is simple to accommodate; just change the unit time estimate to twelve minutes, and the new activity cost driver rate automatically becomes \$10.80 per credit check (down from \$45.00). The new rate may be somewhat higher than \$10.80 after the unit cost rate has been increased (above \$0.90 per minute) to reflect the department's cost for the newly acquired database and computer system.

In summary, TDABC models are updated on the basis of events rather than by the calendar (once a quarter, or annually). Any time that analysts learn about a significant shift in the costs of resources supplied, or changes in the resources required for the activity, they update the capacity cost rate. When they learn of a significant and permanent shift in the efficiency with which an activity is performed, they reduce the unit time estimate to reflect the lower time required. Best-practice TDABC companies assign an operational owner to each process time



**A TYPICAL TDABC MODEL REQUIRES FEWER EQUATIONS THAN THE NUMBER OF ACTIVITIES USED IN A CONVENTIONAL ABC SYSTEM, WHILE PERMITTING MUCH MORE VARIETY AND COMPLEXITY IN ORDERS, PRODUCTS, AND CUSTOMERS.**

equation, thereby ensuring that each equation remains accurate as business processes evolve and become more efficient.

### **Time-driven ABC: “Old wine (duration drivers) in new bottles?”**

Some have attempted to minimize the TDABC innovation by claiming that conventional ABC always had the capability to use time as a cost driver. They cite the role of duration drivers in conventional ABC—an idea introduced by Robin Cooper in a seminal article.<sup>5</sup> Cooper observed that early ABC systems used a large number of transactional cost drivers to count the number of times an activity was performed. Examples of transaction drivers include number of production runs, number of setups, number of shipments, number of purchase orders, and number of customer orders. When the resources required to perform each activity vary, such as when some setups are more difficult or complex than others, or when some customer orders require more time and effort to process than others do, Cooper observed that ABC systems introduce *duration drivers* to estimate the time required to perform an activity. Examples of duration drivers are setup hours, materials handling time, and, of course, direct labor hours and machine hours. Duration drivers are generally more accurate than transaction drivers, but they are also more expensive to measure. Therefore, most ABC designers strive to use transaction drivers whenever these drivers reasonably approximate resource demands by each occurrence of an activity.<sup>6</sup>

Conventional ABC systems, however, use duration drivers in a fundamentally different way than the role of “time” in TDABC. Conventional systems apply duration drivers in the second stage of a cost assignment process, after resource costs have already been mapped to different activities using the expensive and time-consuming interview or survey approach. For example, in our numerical example of the customer service department, instead of assuming that all customer inquiries take the same amount of time, an analyst building a conventional ABC model could estimate the *duration* of each inquiry. But the analyst still has to first interview and sur-

vey all customer service personnel to get their subjective estimates about the percentage of time they spend to handle customer orders, process customer inquiries, and perform credit checks. The duration driver adds accuracy to the conventional ABC model at some additional measurement cost. The important distinction is that the higher cost for using duration drivers in conventional ABC is over and beyond the high cost still required to map resource costs to activities before using the duration driver. Duration drivers add more accuracy, but in a conventional ABC model, they do not eliminate the high cost of first driving costs to activities. The TDABC innovation, in contrast, uses time to drive costs directly from resources to cost objects, skipping entirely the tedious and error-prone stage of first assigning resource costs to activities.

### **Summary**

Since the mid-1980s, activity-based costing has enabled managers to see that not all revenue is good revenue, and not all customers are profitable customers. Unfortunately, the difficulties of implementing and maintaining a conventional ABC system have prevented this innovation from being an effective, timely, and up-to-date management tool. The time-driven ABC approach overcomes these difficulties and has the following advantages:

1. Easier and faster to build an accurate model
2. Integrates well with data now available from ERP and customer relationship management systems (this makes the system more dynamic and less people-intensive)
3. Drives costs to transactions and orders using specific characteristics of particular orders, processes, suppliers, and customers
4. Can be run monthly to capture the economics of the most recent operations
5. Provides visibility to process efficiencies and capacity utilization

**DURATION DRIVERS ADD MORE ACCURACY, BUT IN A CONVENTIONAL ABC MODEL, THEY DO NOT ELIMINATE THE HIGH COST OF FIRST DRIVING COSTS TO ACTIVITIES.**

6. Forecasts resource demands, allowing companies to budget for resource capacity on the basis of predicted order quantities and complexity
7. Is easily scalable to enterprise-wide models via enterprise-scalable applications software and database technologies
8. Enables fast and inexpensive model maintenance
9. Supplies granular information to assist users with identifying the root cause of problems
10. Can be used in any industry or company with complexity in customers, products, channels, segments, and processes and large amounts of people and capital expenditures

These characteristics allow ABC to move from a complex, expensive financial system to a tool that provides accurate and actionable data to managers, quickly, frequently, and inexpensively. ■

#### NOTES

- <sup>1</sup> R. S. Kaplan and R. Cooper, "Measure Costs Right; Make the Right Decisions," *Harvard Business Review* (September–October 1988): 96–103; and R. S. Kaplan and R. Cooper, "Profit Priorities from Activity-Based Costing," *Harvard Business Review* (May–June 1991): 130–135.
- <sup>2</sup> Darrell Rigby, *Management Tools 2003* (Boston: Bain & Company, 2003).
- <sup>3</sup> Sources of organizational resistance to ABC and some suggested solutions to this problem are described in C. Argyris and R. S. Kaplan, "Implementing New Knowledge: The Case of Activity-Based Costing," *Accounting Horizons* (September 1994): 83–105.
- <sup>4</sup> Cooper and Kaplan, "Profit Priorities from Activity-Based Costing," and R. Cooper and R. S. Kaplan, "Measuring the Cost of Resource Capacity," in R. S. Kaplan and R. Cooper, *Cost and Effect: Using Integrated Cost Systems to Drive Profitability and Performance* (Boston: Harvard Business School Press, 1998), 111–136.
- <sup>5</sup> R. Cooper, "The Two-Stage Procedure in Cost Accounting: Part Two," *Journal of Cost Management* (fall 1997): 39–45.
- <sup>6</sup> If different amounts of resources are used each time an activity is performed, then even time estimates (duration drivers) may not be adequate. In this case, an intensity driver that directly charges resource cost for each incident of the activity may be required. See Kaplan and Cooper, *Cost and Effect*, 95–99, for a discussion on the nature of, and trade-offs between, transaction, duration, and intensity cost drivers.