



Are **ABC** and **RCA** Accounting Systems Compatible with **Lean Management**?

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COMPANIES SUCH AS TOYOTA THAT USE A SO-CALLED LEAN PRODUCTION AND COSTING SYSTEM HAVE SHUNNED BOTH ACTIVITY-BASED COSTING AND RESOURCE CONSUMPTION ACCOUNTING.

As many U.S. firms faced severe competition in the 1980s, mostly from Japanese companies, some managers at U.S. manufacturing companies looked to their accounting systems for information to help them confront the competition but found the systems lacking. Accounting systems designed to support financial reporting were providing data about processes that were too aggregated and information about products and services that was distorted and too late to support management's planning and control decisions.¹

At the time, Robin Cooper and Robert S. Kaplan had introduced activity-based costing (ABC). It was seen as a path to regain relevance for cost systems, and U.S. companies began developing ABC systems. Case studies chronicling these adoptions reported astonishing differences in reported product costs. Managers' views of their products were turned upside down. Changes in product pricing, promotion, and mix decisions based on ABC costs led to dramatic improvements in profitability and competitiveness for some U.S. firms. At the same time, many of the companies at the forefront of the

competitive onslaught on U.S. manufacturers were so-called "lean" companies. By using the term "lean," I am not referring to "lean and mean" companies that *slash* costs to achieve short-term financial goals—often without regard to the effect on customer value and other long-term consequences. Rather, I am referring to companies that continuously eliminate *waste* by adopting a particular type of management and production system, such as the Toyota Production System or some variant of it. Waste is any resource or activity that does not provide value the customer is willing to pay for. A lean production system continuously eliminates waste, flexibly providing value that customers are willing to pay for.

Rather than producing to a forecast and seeking to maximize utilization of "fixed costs" like equipment, companies with lean systems strive to achieve one-piece flow through the value stream—the entire series of processes that deliver value to customers—and produce to actual customer demand. These companies did not use activity-based costing in their management accounting systems. Nor did they adopt ABC as it

developed further, and their competitiveness laid bare the irrelevance of U.S. management accounting systems.

Today, ABC systems have evolved and spread beyond manufacturing. These cost management systems emphasize process improvement as well as product and service costs. But global competition in many industries is increasingly severe, and many managers remain dissatisfied with the information from their management accounting systems, including ABC.

But why? After almost a generation of ABC systems, has increased competition rendered the early ABC systems obsolete? The truth is that many companies have not adopted ABC, and many companies that have tried ABC have abandoned it. Paul Sharman cited one study reporting that 80% of responding companies in the United States are still using traditional cost allocation systems.² He also cited a study showing that of the 60% of U.S. companies that have tried ABC, as many as two-thirds have abandoned it.

Sharman suggests *Grenzplankostenrechnung* (GPK) as an alternative to ABC.³ GPK is a German system usually translated in the United States as flexible margin costing. Anton van der Merwe and David E. Keys go one step further to propose resource consumption accounting (RCA), which they characterize as a blend “of the robust German cost management system with activity-based costing,” as an improvement over existing ABC systems.⁴ Articles explaining or advocating GPK or RCA have been appearing with increasing frequency in *Strategic Finance*, *Management Accounting Quarterly*, and other accounting publications.

This article examines the reasons why companies that use lean systems have not adopted ABC systems and the implications of lean-oriented companies developing RCA, an emerging GPK-based system. I believe that companies using lean production techniques are unlikely to adopt RCA systems for many of the same reasons they have not adopted ABC systems. On the other hand, nonlean companies may find RCA attractive. But if managers at nonlean companies are dissatisfied with their competitive position and their management accounting information, they may be better off changing to a lean management system supported by a simple lean accounting system. This may be a

better path to superior results than applying their existing management approach with information from a more powerful, detailed, and expensive ABC or RCA system.

LOST RELEVANCE OF COST ACCOUNTING INFORMATION

Cost accounting information—and, more generally, accounting information—has three basic roles in organizations:

1. Financial reporting,
2. Operational control and improvement, and
3. Decision making and planning.⁵

In *Relevance Lost*, H. Thomas Johnson and Robert S. Kaplan trace the shift among U.S. companies after World War I from cost management to cost accounting, or, in other words, from an emphasis on supporting internal business decisions to providing auditable inventory valuations and income measurements for external financial reporting.⁶ Managerial and product cost systems that largely had been developed by engineers were abandoned. Most U.S. companies began using what Kaplan and Cooper called stage II systems.⁷ In stage II systems, information for decision making and control was drawn from systems designed to serve financial reporting needs.

The reckoning for U.S. manufacturing firms was undoubtedly delayed by the destruction of so much of the world’s manufacturing infrastructure during World War II. The weakness of the dollar during the 1970s further shielded U.S. manufacturers from foreign competition. By the 1980s, however, when the dollar strengthened, key service industries were deregulated, and Japanese manufacturing companies were gaining competitive clout, the irrelevance of management accounting information in the modern production environment could no longer be hidden. The traditional accounting systems in the United States satisfied financial reporting needs but failed to provide the information managers needed for decision making and control. J. Robb Dixon, Alfred J. Nanni, and Thomas E. Vollman highlighted the problems of using traditional stage II systems for operational control:

“For feedback and learning...periodic departmental costs

may not be the appropriate measure of progress. The cost-based signals are not 'real time.' Cost variances are passengers, not drivers. Controlling against such signals may lead managers to manage the symptoms, not treat the disease.”⁸

Dixon, et al., conclude that, for controlling factory operations, traditional financial measures are “typically too irrelevant due to allocations, too vague due to dollarization, too late due to accounting period delay, and too summarized due to the length of the accounting periods.”⁹ In a similar vein, Kaplan and Cooper maintain that traditional systems are ineffective for feedback and learning due to delayed reports, exclusive reliance on financial measures, top-down direction, focus on local task improvement, individual control, and adherence to historical standards.¹⁰

Traditional systems also fail to provide relevant information for decision making.¹¹ First, full absorption costing data are inappropriate due to errors caused by capacity utilization and arbitrary allocation. Second, marginal costing data, when available at all in traditional systems, are inappropriate due to improper cost-driver selection. Finally, most traditional systems fail to trace nonmanufacturing costs to products and customers.

ACTIVITY-BASED COSTING

As an outgrowth of their work with the CAM-I Cost Management System Project and their other work with innovative U.S. companies, Cooper and Kaplan introduced activity-based costing as a more relevant alternative to the cost allocations and product costs provided by traditional cost systems.

ABC begins with the premise that organizations use resources and incur costs to perform activities. To develop an ABC system, an organization needs to:

1. Identify activities performed,
2. Assign the costs of resources used to perform the activity to the activity cost pool either by direct attribution or indirectly using a resource driver, and
3. Assign costs from the activity cost pool to products or other cost objects requiring the activity based on an activity cost driver.

Cooper and Kaplan’s early writing and the early activity-based systems focused on the accuracy of product cost data.¹² Activity-based systems had the greatest

potential benefit for companies where product-cost distortions under traditional cost systems were greatest. Conventional systems led to greater distortions in product costs at companies having a high proportion of shared resources to direct product costs and a high amount of product heterogeneity. Cooper and Kaplan describe firms that would be prime candidates for an ABC system:

“They all produced a large number of distinct products in a single facility. The products formed several distinct product lines and were sold through diverse marketing channels. The range in demand for products within a product line was high, with sales of high-volume products between 100 and 1,000 times greater than sales of low-volume products. As a consequence, products were manufactured and shipped in highly varied lot sizes.”¹³

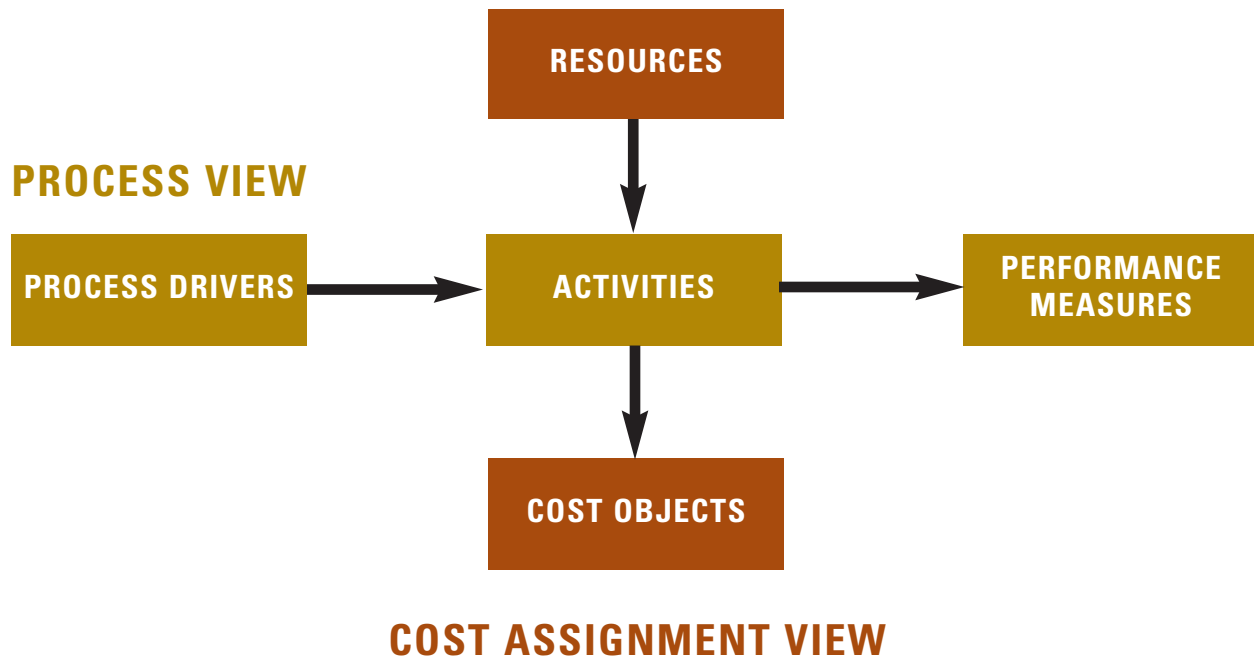
The greater the number and heterogeneity of different products, the greater the complexity of the production-management environment. More support costs are required to handle the added complexity. The absolute amount of overhead to be allocated increases along with the likelihood that a traditional cost system will distort the proportion of overhead allocated. As a rule, traditional systems overcosted low-complexity, high-volume products and undercosted complex, low-volume products.

ABC systems are long-term resource consumption models. All costs of performing an activity are proportionally assigned to cost objects based on the activity cost driver. Unused capacity of “fixed” discrete resources made available to perform an activity can and should be identified, but companies implementing ABC failed to identify unused capacity. Assuming unused capacity is relatively immaterial or is properly accounted for, ABC should provide cost information to support long-term decision making superior to that provided by traditional stage II cost systems.

Managers of the early ABC adopters made decisions based on their more realistic view of their products’ demands for activities. They either dropped some products that were marginal, low-volume, and complex or increased the prices of these products. The companies recognized that they were more competitive on high-volume, low-complexity products than they had real-

Figure 1: The CAM-I Two-Dimensional Activity-Based Costing Model

Activity-based costing provides a process view of activities for performance improvement in addition to a cost assignment view for product costing.



Source: Norman Raffish and Peter B.B. Turney, editors, *The CAM-I Glossary of Activity-Based Management*, CAM-I, Arlington, Texas, 1991.

ized, and they adjusted their promotion decisions and product strategies accordingly. If batch costs such as setups, orders, or shipments were high, they tried to negotiate with their customers to reduce the frequency of these activities or obtain payment to offset the cost.

Optimizing decisions within the existing cost structure was the source of many of the benefits from early ABC systems, but ABC used in this manner did not address feedback and learning.¹⁴ Soon after, many companies adopted the CAM-I two-dimensional activity-based model, shown in Figure 1. The cost dimension of this model, coupled with the process dimension, focuses on why and how well activities were performed. ABC's emphasis on activities and the process dimension means that it supports a "horizontal" process view. The ABC model also recognizes that costs associated with an activity may span departments or responsibility areas. As such, ABC supports an orientation toward team

rather than individual responsibility for performance. By recognizing interdependencies, ABC systems may also avoid the emphasis on local optimization often characteristic of traditional systems.

ABC systems may support team rather than individual performance and global rather than local optimization, but they do not address other deficiencies of traditional feedback and learning systems, especially the overemphasis on financial measures and delayed reports. Kaplan and Cooper recognize the importance of nonfinancial measures for feedback and learning, particularly quality and time-related measures, but they maintain that financial measures must still play an important role in feedback and learning. ABC provides a means for prioritizing improvement efforts and for assessing the performance efficiency of activities. Kaplan and Cooper also cite cases where financial measures provide powerful motivation for improvement.¹⁵

Finally, activity analysis is required to develop ABC systems. The learning that takes place during the activity analysis may lead to performance improvements. Compared to traditional stage II systems, ABC systems provide better cost data for long-term decision making, and they can provide better information for budgeting based on anticipated demand for activities.

ABC appears to address some of the operational control and improvement deficiencies found in traditional systems. Still, many companies have not adopted ABC systems, and other companies that tried them have abandoned them. Apparently, managers of these companies believe the cost of developing or maintaining ABC systems exceed the benefits. In *Relevance Regained*, Johnson maintains that ABC systems are not appropriate for operational control and improvement because they are often top-down systems controlled by central staff rather than by the personnel who actually do the work.¹⁶ In addition, ABC systems are not customer oriented and are too aggregated to identify internal customers and show how the work of individuals or teams contributes to internal or external customer satisfaction. Johnson concludes that ABC “greatly improves cost-focused management practices of the past, but it is not a tool for managing competitive operations in a global economy.”¹⁷ The continuing dissatisfaction reported with cost systems, however, suggests that most managers are seeking an alternative to the traditional systems whether they or not they have ever used ABC.

Noting that the use of GPK in Germany and German-speaking countries is long-standing, widespread, and increasing and that the managers of companies using GPK are generally happy with their cost information, it has been suggested that U.S. firms consider either GPK or RCA as an alternative to traditional systems.¹⁸

GPK AND RCA SYSTEMS

GPK assigns cost (resource) elements to cost (resource) centers. Cost centers are defined by the following criteria:

1. The center must have an identifiable, measurable output and identifiable, separable costs specific to the output being produced;
2. The outputs must be repetitive and subject to planning;

3. The costs, technology, resource type, and work in the center must be homogeneous;
4. The cost center’s size should be limited, and it should be geographically compact; and
5. A single manager should have responsibility for the cost center, although a single manager may be responsible for more than one cost center.¹⁹

Resources can be included in the pool as primary costs, via direct tracing, or as secondary costs, via driver allocation. In the cost center, the cost elements are divided into fixed and variable components. Variable costs vary proportionately with the cost center output. This level of disaggregation allows the costs to be properly characterized depending on the context. Cost centers can be primary or supporting with respect to the production of goods and services. For example, a maintenance cost center might support a “primary” machining cost center directly involved with the production of goods. The output measure of the “secondary” production-supporting cost center is used to assign costs from the support center, such as maintenance, to the cost centers it supports. Proportional support-center costs are assigned to the consuming cost centers at a standard rate per actual amount of output used. Fixed support-center costs are assigned at a standard rate determined by the practical capacity of the committed resources. The consuming cost centers are charged this standard rate for the capacity that has been budgeted for the consuming center. Excess capacity of fixed resources is not allocated. The fixed/proportional character is maintained for costs transferred from support centers to primary cost centers.

Variable primary-center costs are assigned to products or services based on the primary cost center’s output measure. Fixed primary-center costs are assigned to products or product lines to generate contribution income statements, but fixed primary costs are not assigned to individual units of product or service. The result is an incremental contribution view of cost data designed to support short-term decision making. The fixed/variable designation of costs and individual manager responsibility for cost centers supports the creation of flexible budgets and the use of variance analysis for operational feedback and operational cost control. GPK is not tied to financial reporting rules. Replacement

costs rather than historical costs are frequently used for computing depreciation, and imputed interest on cost center assets may be included as a cost. As with ABC systems, GPK systems assign nonmanufacturing costs such as marketing, selling, and research and development to products where appropriate.

GPK cost centers are essentially activity centers in that each has a measurable output that must be the result of some activity. As opposed to the activity-centric view in ABC, the resource-centric view in GPK results in much greater granularity in GPK systems. For example, a single activity cost pool in an ABC system for an activity that draws resources from several departments or areas would require multiple cost centers in a GPK system. ABC systems assign resource elements to activity cost pools based on resource drivers. Once this stage-one assignment is made, all resources in the activity cost pool are assumed to take on the behavior of the activity cost driver. For example, all the resources in a setup activity pool would be considered variable with respect to number of setups or setup hours regardless of the committed or flexible nature of the underlying resources. Cooper and Kaplan are not concerned with this “distortion” because they consider ABC a long-term consumption model, but they do maintain that the unused capacity of committed resources should be excluded when determining activity rates. In practice, many ABC implementations fail to account for the unused capacity of committed resources. This failure may be due to the lack of attention given to the nature of the underlying resources. At its heart, GPK is an expenditure model, but it also explicitly considers capacity and usage of committed (fixed) resources. For proportional (variable) costs, expenditure and consumption are assumed to match.

On the other hand, GPK is limited to using volume-based resource drivers. All resource allocations are made based on measures of cost center output. Nonvolume-based cost drivers, such as complexity, are not used. This means that costs with nonvolume-related drivers either cannot be allocated in a GPK system or are characterized as fixed with respect to a volume-based driver. With the increasing importance of fixed costs and indirect costs in the production of goods and services and the advent of ABC in the United States, Péter Horváth

and others in Germany explored the implications of ABC for GPK systems. The result was *Prozesskostenrechnung* (PK), roughly translated as “process costing.” PK applies ABC principles to the analysis of indirect costs and fixed costs within the GPK system.²⁰ The integration of PK and GPK has been named resource consumption accounting (RCA) in English. RCA essentially retains the resource-centric conceptual foundation and generates incremental expenditure and marginal analyses while also having the capability to generate activity-based, long-term consumption model cost data.

The principal operational control and improvement feature of both GPK and RCA systems is flexible budget variance analysis. Direct costs are accumulated for each cost center, and indirect costs are assigned based on planned and actual consumption of outputs of other cost centers. The single output per cost center combined with the committed/proportional cost classification allows the cost center budget to be easily flexed to reflect actual cost center output. In contrast to the dual vertical and horizontal view in ABC, as shown in Figure 1, the resource-centric GPK and RCA systems have vertical, resource (cost) views. With their emphasis on having an individual manager responsible for each cost center, GPK and RCA also focus on local rather than system optimization and individual rather than team responsibility.

For decision making, RCA systems can provide marginal cost data to support short-term decision making and can allocate fixed costs on an activity basis to support long-term decision making. RCA systems also can generate activity-based budgets for planning purposes, but this information comes at considerable cost.

The benefits of GPK's cost center criteria lead to systems with a vast number of cost centers—400 to 2,000 cost centers in a typical system.²¹ The Deutsche Telekom system that Paul Sharman and Kurt Vikas describe has roughly 40,000 cost centers!²² Sharman notes that many companies that have installed Enterprise Resource Planning (ERP) systems may already have paid for a module capable of running a GPK or RCA system.²³ Still, the additional setup costs—identifying cost centers, classifying costs—are substantial. Once the system is established, costs must be properly assigned to hundreds or thousands of cost centers, and

the system must be maintained and updated. Before investing in an expensive information system to support traditional management, companies should consider adopting a lean management system.

THE LEAN MANAGEMENT SYSTEM

According to Taiichi Ohno, “The basis of the Toyota Production System is the absolute elimination of waste.”²⁴ The lean approach to management is to continually find the less wasteful ways to create value from the perspective of the end-use customer.²⁵ From a lean perspective, all business processes contain waste. Reducing the waste in any business process means that the same customer value can be delivered at a lower cost. Then the gains can be shared among all the stakeholders in the organization.

The guiding principles of lean management are:

1. Define value, and identify the value stream for each product (or service);
2. Eliminate all unnecessary steps in every value stream;
3. Make value flow, which requires rethinking the entire work organization;
4. Pull all activity by the customer, or, in other words, produce to customer demand; and
5. Pursue perfection continuously.²⁶

The lean approach is not a search for a perfect end-state with zero waste. It is a never-ending journey toward perfection through continuous improvement—constantly seeking and implementing better and less wasteful ways of performing processes than the ways we knew previously. Ohno identified seven types of waste:

1. **Overproduction:** Producing more than the amount currently needed by the next process or customer. This is the worst form of waste because it contributes to the other six.
2. **Waiting:** Operators or machines waiting for a process to finish, for materials, for parts or repairs, for setup for the next product, or for information.
3. **Transportation:** Unnecessary movement of parts or products.
4. **Processing:** Beyond what is necessary to provide the specified or promised value to customers.
5. **Inventory:** Having more than necessary for a precisely controlled pull system.

6. **Motion:** Unnecessary or “straining” motions for the operator or machine.

7. **Defects:** Defective products or services.²⁷

The “pillars” of the Toyota Production System (TPS) are just in time (JIT) and jidoka. Just in time refers to having resources available and production of goods or services occurring in just the amount needed at the moment. It is ideal to have production flow through the process in a batch size of one, called one-piece flow, and have each unit of product completed just as a customer needs it. Jidoka means that machines and operators automatically stop when they sense abnormal conditions to avoid producing defects. Machines are designed to stop automatically if operating conditions such as temperature, pressure, material characteristics, or speed exceed specified parameters. A signal indicating a problem is sent to the appropriate personnel. Operators are instructed to stop production if they see abnormal conditions or problems, even if the stoppage leaves an entire assembly line idle. By contrast, traditional companies give only certain managers the authority to stop production, and there is often great pressure to keep production moving and worry about possible defects when the products get to inspection. As Fujio Cho observes, “Just in time and jidoka do more than simply eliminate waste and improve quality. They bring the manufacturing process into crisp focus, exposing problems as they arise.”²⁸ Because the lean management process exposes problems, you do not need to wait for an accounting cost report to discover that you have problems.

Lean production is an empowering management system. Once problems are exposed, lean management relies on all workers to solve the problems. Workers are challenged to continually search for better ways to conduct activities. As Teruyuki Minoura observed, “An environment where people have to think brings with it wisdom, and this wisdom brings with it kaizen [continuous improvement]. The T [in Toyota Production System] actually stands for ‘thinking’ as well as for ‘Toyota.’”²⁹ A manager cited by Kaplan and Cooper illustrates the difference between lean management and traditional management:

“The machines build the parts. They have been designed to

run automatically. An employee's job is to think, to problem solve, to ensure quality....In traditional factories, the financial system viewed people as a variable cost. If you had a production problem, you sent people home to reduce your variable costs. Here we do not send people home. Our production people are viewed as problem solvers, not variable costs."³⁰

Although lean is commonly associated with manufacturing, the lean management system applies to all organizational activities: support activities as well as the production of goods and services. As Ohno says, "The original concepts behind the Toyota Production System were aimed at the entirety—not at a part—of a company's organization...a total management system—across industry boundaries whether they handle goods or manage information—across companies...as large as Toyota or as small as the local dry cleaner."³¹ Lean is a total business management system, and the challenge to eliminate waste and continuously improve performance applies to accounting processes as well as the factory floor. Lean is a management system, not an accounting system. The term "lean accounting" carries two dimensions: (1) accounting for lean—what information should be provided to best support the lean management system—and (2) lean accounting—the most efficient way to deliver the desired information.

LEAN ACCOUNTING FOR CONTINUOUS IMPROVEMENT

One of the main deficiencies of traditional accounting systems for operational control and improvement is the excessive emphasis on financial measures. Accounting in lean systems emphasizes nonfinancial measures for supporting continuous improvement. Financial results are more difficult to understand, confound performance change with price change, and, in the words of Dixon, et al., are "passengers, not drivers."³² In other words, costs are an effect, not a cause. Operational measures are more likely to lead to the root cause of problems. Operational data also are reported more easily in real time than cost data. Even though ERP systems have the capability to report cost information in real time or daily, actual cost data delivered in such small increments are very likely to be distorted. The authors of the leading textbook on GPK also acknowledge the

importance of nonfinancial measures and the decreasing importance of cost data for operational control:

*"Cost planning takes precedence over cost control. The effort involved in planning and monitoring costs is increasingly being seen as excessive....An alternative increasingly being called for is to control costs through direct activity/process information (quantities, times, quality) for cost management at local, decentralized levels instead of relying on delayed and distorted cost data....[An] important component of process-cost management is the continuous improvement of processes, and this is...mainly achieved by direct monitoring of critical process parameters."*³³

Jean E. Cunningham and Orest J. Fiume maintain that performance measures chosen to support continuous improvement should:

- ◆ Support the company's strategy;
- ◆ Be relatively few in number;
- ◆ Be mostly nonfinancial;
- ◆ Be structured to motivate the right behavior;
- ◆ Be simple and easy to understand;
- ◆ Measure the process, not people;
- ◆ Measure actual results versus goals; and
- ◆ Be timely, e.g., weekly, daily, or hourly.³⁴

As an example of the lean approach, the performance measures used at the corporate level and at the factory floor level of The Wiremold Company are shown in Tables 1 and 2, respectively. The company is organized into production cells capable of producing a family of products from start to finish. The performance measures are largely nonfinancial, especially at the production-cell level.

Cunningham and Fiume also recommend that the performance measures be displayed visually, using graphs and charts and showing trend lines in actual performance. Frequently, charts and graphs for the key measures are posted on display boards in the production cells. Cost information is not entirely irrelevant, but it is not the information used to drive continuous improvement efforts. Costs must be checked to ensure that the process improvements shown in the operational metrics are translated into the expected cost savings. Typically, reviewing the trends in actual costs for each production cell or value stream on a monthly basis will

Table 1: Wiremold's Company-Level Performance Measures

OBJECTIVE	GOAL	MEASURE
1. Constantly strengthening operations	◆ 100% on-time customer service	◆ First shipment fill rate
	◆ 50% reduction in defects per year	◆ Number of defects
	◆ 20% productivity gain annually	◆ Sales per full-time employee
	◆ 20X inventory turns	◆ COGS/FIFO inventory value
	◆ 20% profit sharing	◆ Actual profit-sharing dollars/actual straight-time wages
	◆ Visual control and the five Cs of workplace organization practices—categorize, clear, clean, consistent, and continuous coaching—plus discipline	◆ One to five rating on a Likert scale
2. Double in size every three to five years.	◆ Pursue selective acquisitions	◆ N/A
	◆ Use quality function deployment—a method for translating customer desires into product features—to introduce new products every month	◆ New product development cycle time; number of new products

Source: Bob Emiliani, with David Stec, Lawrence Grasso, and James Stodder, *Better Thinking, Better Results: Using the Power of Lean as a Total Business Solution*, The Center for Lean Business Management, LLC, Kensington, Conn., 2003, p. 216.

Table 2: Wiremold's Performance Measures at the Production-Cell Level

PERFORMANCE DIMENSION	PERFORMANCE MEASURES
Customer satisfaction and responsiveness	◆ Delivery performance <ul style="list-style-type: none"> • Promised date meets customer request date • On-time deliveries by promised date
	◆ Schedule performance (performance to takt time, the rate needed to satisfy customer demand)
Operational flexibility and responsiveness	◆ Setup time
	◆ Lead time
	◆ Cycle time
	◆ Number of defects
	◆ Inventory, number of pieces
	◆ Inventory turnover: COGS/FIFO inventory value
	◆ Units produced per hour
Productivity	◆ Units produced per hour
Workplace organization	◆ One to five rating on a Likert scale for use of visual controls and the five Cs of workplace organization practices—categorize, clear, clean, consistent, and continuous coaching—plus discipline
Worker involvement	◆ Number of suggestions
	◆ Percentage of associates making suggestions

Source: Bob Emiliani, with David Stec, Lawrence Grasso, and James Stodder, *Better Thinking, Better Results: Using the Power of Lean as a Total Business Solution*, The Center for Lean Business Management, LLC, Kensington, Conn., 2003, p. 217.

be sufficient. Investigation of the causes of financial performance will only be required if expected savings do not materialize and managers do not know the reasons for the absence of cost improvement. This condition is uncommon in a lean environment.

Kaplan and Cooper suggest that ABC data can be used for prioritizing improvement efforts, cost justifying improvement efforts, and tracking the benefits of improvement efforts.³⁵ Companies with lean systems do extensive activity analysis in conjunction with their continuous improvement efforts. Some companies adopting lean practices may maintain stand-alone ABC models to help encourage and evaluate improvement efforts. Dan Swenson describes an ABC model that Carrier Corporation, a lean-oriented company, uses.³⁶ But use of ABC is not common at companies with lean practices, nor would they develop ABC systems to report actual historical data. In a lean environment, there is no need to develop and maintain an ABC system in order to act on the results of the activity analysis. Financial measures of performance, whether ABC or otherwise, are not the drivers of continuous improvement efforts at companies that use lean methods.

Tom Johnson and Anders Bröms describe the process of continuous improvement at a Toyota assembly plant in Kentucky:

“At TMM-K [Toyota Manufacturing Motors—Kentucky] everyone recognizes when disruption occurs, and everyone knows how to set it right. At TMM-K, as in a natural living system, the information is implicit in the work, because the work itself is the information....TMM-K does not have the standard cost systems, the MRP scheduling systems, [and] the shop floor computer systems that almost every manufacturing organization in the world, especially in the U.S. and Europe, considers to be indispensable. These systems are not necessary [at Toyota] because every employee’s mastery of TPS [the Toyota Production System] insures that results are immanent in the work.”³⁷

If the employees understand the processes and understand and follow lean management principles, operational data will be sufficient to guide continuous improvement efforts. To further emphasize this point,

consider a description of the response of design engineers to an overly simple ABC system:

“The [company’s] objective was to load most expenses on those drivers, such as number of part numbers, and thus pressure engineers to design products using already existing components and to avoid adding new components. However, when product engineers developed new designs that had very low reported costs according to the simplistic ABC system, more experienced engineers could see that the new designs would actually be quite expensive.”³⁸

Contrary to what was being reported by the product cost system, the engineers knew that the new designs would be expensive because they understood the design and production process. Employees who understand their production processes would recognize what issues will have a large impact on costs without resorting to a detailed activity-based system. In general, improvement efforts should be prioritized based on the potential to eliminate waste from the end-use customer’s perspective. An internal cost measure does not provide a customer perspective.³⁹

Lean-oriented companies also have little use for the flexible budget variance analyses to evaluate performance, a feature of RCA systems. Trends in actual results are used in place of budget-based comparisons. Variance analysis has several drawbacks. Variances are harder for many line employees to interpret. Monthly variances will not be timely, and more frequent variance computations may not be meaningful. Variances encourage meeting the target and local optimization rather than continuous improvement and system or value-stream optimization. As Robert D’Amore observes, “A variance is not the cause, it is the result.”⁴⁰ Operating personnel almost always know the cause of large variances that occur in their area. Variance reports are for explaining variances that occur among operating personnel and first-line managers to higher levels of management, and they are not a tool for employees to use in continuous improvement efforts. Instead of variance analysis, stretch goals are used to motivate employee performance, and non-financial measures are used for operational control.

Table 3: Kaizen Costing Versus Standard Costing

KAIZEN COSTING	STANDARD COSTING
◆ Cost reduction focus	◆ Cost maintenance focus: actual = standard
◆ Achieve target reductions	◆ Meet current standard
◆ New targets monthly	◆ Sets standards annually
◆ Kaizen activities such as an event to reduce machine setup time or an event to modify a process to eliminate a source of defects	◆ Variance analysis
◆ Investigations when target reductions are not achieved	◆ Investigations when standards are not achieved

KAIZEN COSTING

Some companies using lean methods use kaizen costing. On the surface, a kaizen costing system may appear to differ little from a standard cost system. As Kaplan and Cooper note, however, there are significant differences. They summarize some key features of kaizen costing:

- ◆ The focus is to inform and motivate process cost reduction;
- ◆ Cost reduction is a team, not an individual, responsibility;
- ◆ Frequent, even batch by batch, actual costs of production are calculated, shared, and analyzed by frontline employees;
- ◆ The cost information used by the teams is customized to their production environment;
- ◆ “Standard costs” are continually adjusted to reflect past adjustments in actual costs and targeted improvements in future costs; and
- ◆ Work teams are responsible for generating ideas and have authority to make small-scale investments.⁴¹

Kaizen costing and conventional variance analysis are contrasted in Table 3. A key difference is that kaizen costing is designed to motivate cost improvement whereas traditional variance analysis is typically used to uncover problems and to encourage managers to meet standards. As Yasuhiro Monden explains:

“In kaizen costing...improvement activities lead to cost reductions in various cost items for the factory, and the amount of such cost reductions...can be measured, but there is little effort to understand how specific improvement activities lead to specific cost reductions. In this respect, the accounting division does little more than encourage kaizen costing activities.”⁴²

RCA systems could be used to generate kaizen cost standards, but this would require more frequent modification of standards than the annual changes typical of RCA systems. Instead of using RCA or ABC, companies that use lean methods and are interested in more detailed cost information regarding their improvement efforts can develop value-stream cost models. The value stream incorporates all of the tasks required to serve the customer and create value.⁴³ A value-stream model is simpler than an ABC model and is tied more closely to the company’s process improvement efforts. Costs can be calculated using data developed for the present and future value-stream maps. These costs can be used to evaluate the benefits of proposed process improvements and to help prioritize further improvement efforts.⁴⁴

LEAN ACCOUNTING FOR DECISION MAKING

As noted above, increased complexity generally creates increased costs. That is as true for the production of accounting information as it is for any other product or service. Lean-oriented companies opt for the simplest possible system that will provide the needed information and that will provide measures that support their strategies. Ronald Clements and Charlene Spoede report the guidelines that the Trane company used in developing their SOUP (system of utter practicality) accounting system. Consistent with the philosophy espoused by Cunningham and Fiume, Trane’s guidelines are:

- ◆ The cost system is a subset of the business philosophy. It must fit and complement the business philosophy.
- ◆ The cost accounting system should be simple.

- ◆ The cost accounting system should be low cost.
- ◆ The system should eliminate artificial, unnecessary reporting steps.
- ◆ The system should not reward production for building inventory.
- ◆ Accounting exactness does not equal accurate product cost.
- ◆ Costing should be for the unit but not each individual part.
- ◆ Detailed labor reporting should be eliminated. Instead, labor and overhead are combined into conversion cost.
- ◆ Conversion cost should be applied to products based on total product cycle time.
- ◆ The cost system must meet external reporting requirements.⁴⁵

The last item in the list of Trane's guidelines does not mean that lean-oriented companies hold their management accounting systems hostage to financial reporting requirements. For example, Wiremold values inventory at direct material cost for internal purposes. A simple adjustment at the end of the period is sufficient to bring the aggregate inventory value in line with generally accepted accounting principles. Inventory values for individual products are unaffected by the adjustment.

To minimize movement, waiting, and transportation and make it easier to reduce inventory and eliminate defects, lean production is organized into production cells or flow lines. Each production cell or flow line is organized to produce a homogeneous product family. Rather than specializing in one activity, workers tend to be cross-trained to perform many activities within a production cell or flow line. Direct labor performs activities that are often performed by specialists from support departments in traditional batch production settings, such as inspections and routine maintenance. In addition, many support specialists, such as product or process engineers, may be assigned directly to a production cell rather than to a support department. Aside from building occupancy costs, there are very few manufacturing costs that cannot be assigned directly to the production cell.

Traditional batch production in a complex factory consists of hundreds of islands of specialization shared

by thousands of diverse products. The diversity and complexity of the allocations and the amount of costs to be allocated are great. The lean production environment consists of a cluster of mini-factories, each producing a family of more homogeneous products. Most manufacturing costs can be directly assigned to the production cells. Thus, most costs are shared only within homogeneous product families. Production cells are not created to simplify cost allocation, but they minimize both the extent of allocation required and product heterogeneity—the source of the cost distortions that activity-based systems were developed to address. The potential for benefits from ABC systems are much smaller in lean production settings. Within the production cells, product homogeneity means that cost distortions are likely to be small. If individual product costs are needed, a simple cost allocation can be used to assign cell conversion costs to products with reasonable accuracy.

In addition, accuracy of individual product costs may not be important for many companies. For example, at Wiremold, product prices are determined by the market in most cases. Therefore, product costs are not important for pricing. Even on products subject to bid, Wiremold found that an attribute-based model of estimated customer value was superior to product cost information for developing bids. Product profitability was more relevant at the product family level than at the individual product level. According to Fiume, former vice president of finance at Wiremold, the company determined it was strategically important to be a full-line supplier. The profitability of an individual product in a product family was not a concern as long as the profitability of the overall product family was acceptable. "Our focus was eliminating waste," he said. "If we can eliminate waste and save costs, what difference does it make if the savings is on the most profitable product or the least profitable product [in the product family]?"⁴⁶

Lean-oriented companies also avoid ABC systems because some of the messages an ABC system sends to managers and employees are contrary to the lean strategy. Fiume describes the concerns he had when evaluating ABC:

"As we started getting into lean and I was listening to some

of the behaviors that ABC was driving in companies that adopted [ABC], I realized that it was driving behaviors that were just the opposite of lean. If the cost driver was setup time, it didn't drive behavior that said, 'Let's reduce the setup time.' It drove behavior that said, 'Let's reduce the number of setups.' In other words, produce bigger batches of material."⁴⁷

Many of the management decisions based on information from the early ABC systems took the new, more accurate information about the existing cost structure and tried to optimize outcomes given the existing cost structure. Products that were revealed to be highly profitable could be repriced and promoted. Products whose prices did not cover their excessive demands for activity costs could be eliminated or repriced. Some customers might be persuaded to pay for the cost of small shipments, to change orders, or to order in larger quantities. Because of the extent of the product cost distortions in the traditional cost systems, these actions could yield impressive gains in income. To a manager in a lean environment, however, much of other companies' cost structure comes from wasteful practices. The existing cost structure should never be accepted as a given or as an unchanging constraint. Continuous improvement comes from changing the way work is performed, thus changing the cost structure.

Because RCA systems emphasize a marginal costing approach, RCA product-cost allocations should not lead to reported income amounts that would encourage overproduction—as could happen with some ABC systems. The issue is whether RCA costing provides significant benefits for short-term decision making and budgeting for planning purposes to justify the substantial cost of developing and maintaining an RCA system.

Based on their fixed and proportional cost classifications, RCA systems provide incremental cost data for short-term decision making. The assumption is that usage and expenditure of any cost classified as proportional will be proportional to output volume. If this is a reasonable assumption and the classifications are accurate, RCA systems essentially have data readily at hand for almost any conceivable short-term incremental cost analysis. Except for completely flexible costs, however, the ability to adjust expenditure to actual volume depends on the time frame and discrete quantities in

which the resource must be acquired. As a result, the RCA data may not represent the actual expenditures for a given decision context. The standards used within the RCA system may not reflect existing conditions.

In addition, RCA presumes that many short-term decisions are made based on optimization to existing cost standards incorporated in the RCA system. Strategic concerns and long-term implications often outweigh the marginal costs of short-term decisions. Companies using lean production techniques focus more on improving long-term relationships in the value stream. For example, companies that are lean oriented have established long-term relationships with a small number of suppliers rather than trying to optimize individual resource acquisition transactions. Rather than developing and maintaining an RCA system, it is probably far more cost effective for a lean company to rely on simple cell-cost allocations or sampling to obtain individual product cost data. Cell-cost allocations also make it possible to conduct special studies for the rare decisions where more detailed or precise data are needed.

The design stage of the product life cycle offers the greatest potential for cost improvement. Lean-method companies use target costing as part of their improvement efforts during the design stage. Companies need to be able to estimate future process and material costs to estimate future product costs. It is unlikely that developing and maintaining an ABC or RCA system would significantly improve a company's ability to develop target costs. Regarding GPK and RCA systems, Wolfgang Kilger, Jochen Pampel, and Kurt Vikas conclude:

"If cost accounting is to better support cost control efforts in the early stages of product development, cost estimates are needed that do not use the costing basis of Marginal Costing such as BOMs [bills of material] and routings..."⁴⁸

BUDGET INFORMATION FOR LEAN COMPANIES

Excess resources (i.e., unused capacity) are waste. Companies with lean methods use a demand-pull system rather than a budget forecast system. They try to avoid waste by working, for example, to level customer

demand by encouraging customers to order what they need for short periods rather than six months' worth of material at a time. This way orders do not create spikes in production. Lean-method companies also develop capabilities to respond quickly to the changes in actual demand. Developing better rapid-response capabilities is much more important to lean companies than developing more accurate budgets. Lean-oriented companies typically use budgets only for high-level planning.⁴⁹ The budget will determine what discretionary resources are available for strategic projects, which in many lean-method companies would be decided using the *hoshin kanri* (policy deployment) process.⁵⁰ The budget can be used to communicate sales and productivity goals, but the budget is an attention directing tool, not a production scheduling or performance evaluation tool.

Even if a lean-oriented company were to adopt RCA to develop activity-based budget data, its ability to develop greater budget accuracy at the individual resource level would be limited by the nature of the lean method. The focus of lean companies is on the elimination of waste through continuous improvement. It is not on maintaining a pre-established status quo or even reaching a rigid pre-ordained goal, resource by resource and activity by activity. The continuous improvement process is likely to be uneven and unpredictable. A lean-method company is more likely to focus its efforts on creating more flexibility and more capacity by eliminating waste than to expend effort on establishing and maintaining a cost system to provide better budget cost estimates at a forecast level of activity. In sum, managers at most companies employing lean techniques will view the prospects for increased budget accuracy under RCA as having limited value and the detailed variance analysis reports as a complete waste.

LEAN USE OF RCA OR ABC

RCA provides detailed accounting information to support conventional management practices. It provides marginal cost data while adding the capability of providing activity-based information for budgeting and long-term decision making. Its emphasis is on individual accountability, however, and its view is resource centric. It does not encourage teamwork and system-wide optimization of dependent activities in a process. Instead,

RCA focuses on local optimization and relies on a transfer pricing mechanism to control dependencies between activities.

Companies using lean methods are organized by value stream, creating production cells and flow lines dedicated to related product families. As a result, they do not experience the cost distortion of traditional accounting systems. Moreover, lean-oriented companies derive little benefit from the product costing dimension of ABC systems. An ABC system can be of some benefit to lean-oriented companies in prioritizing improvement efforts, but most lean-method companies find existing process knowledge or analysis of value-stream costs sufficient for prioritization. The flexible budget variance analyses used for cost control in RCA systems does not support lean business practice.

In businesses using lean techniques, RCA systems can provide marginal cost information that could be valuable for short-term decision making, activity-based budget information that could be valuable for resource planning, and, possibly, kaizen cost information that could be used to promote continuous improvement. It is likely, however, that the cost of developing and maintaining an RCA system far exceeds the benefits for lean businesses. It would be hard to imagine a lean-oriented company adopting RCA. From an accounting perspective, it would also be hard to characterize a company using an RCA system as lean.

Lean business management is the state-of-the-art management system. It is becoming increasingly popular and soon may be essential for survival in some industries. According to a report from the U.S. Environmental Protection Agency, some lean experts estimate that 30% to 40% of all U.S. manufacturers claim to have begun implementing lean methods, with about 5% aggressively implementing lean as a total management system.⁵¹ In a 2004 *Industry Week* study, 55% of U.S. manufacturers singled out some version of lean manufacturing as the driving force behind operational improvement.⁵² Lean is also spreading into service industries. Managers of nonlean companies that are seeking to improve their competitive position and are dissatisfied with their existing accounting system should consider adopting a lean management system and a simple lean accounting system rather than invest-

ing in a complex and costly RCA system to support their conventional management practices. ■

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