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Management Applications of Activity-Based Cost Accounting



Larissa S. Kyj and Robert E. Pritchard

Abstract

To obtain better information to manage indirect costs, General Electric finance and production managers developed a basic activity-based cost accounting system (ABC) during the 1960s. Harvard Business School Professors Robin Cooper and Robert Kaplan further refined ABC in the late 1980s. They attempted to develop a cost accounting system that would overcome the difficulties inherent in traditional cost accounting systems—particularly the tendency to undercost low-volume products and overcost high-volume products.

While ABC has been applied primarily to manufacturing operations, with the increasing importance of cost containment in the service sector, many large service companies are also using ABC. Building on these service sector applications, this paper provides a transition from theory to practice. The paper includes a brief historical framework of ABC, explains how ABC is used in manufacturing settings, and then demonstrates how ABC can be adapted as a management tool in the service sector, using the construction industry as an example.

General Electric finance and production managers developed an activity-based cost accounting system (ABC) during the 1960s. They described work that causes costs to be incurred as “activities,” thereby giving rise to the term activity-based cost accounting.

As a part of the work that led to the development of ABC, General Electric’s team discovered that many indirect costs

associated with the manufacturing process resulted from decisions made in other departments. Yet the existing cost accounting system resulted in charging indirect costs to the department that incurred them rather than to the department that caused them.

For example, an engineering design change is a typical situation in which one department causes costs to be incurred in other departments. Such a design change, even a relatively minor one, might trigger changes in a number of other departments. It may trigger changes in blueprints, bills of materials, material ordering specifications and purchasing, quality control, manufacturing processes, packaging, shipping and handling, as well as customer instructions and applications procedures. The costs of these changes are generally classified as indirect costs.

General Electric found that costs resulting from the engineering changes were allocated to the various departments involved (rather than to the engineering department) and that, in many cases, the engineering department was not even aware of the costs it had triggered. Consequently, GE endeavored to trace costs to the activities that caused the costs.

GE did not, however, follow through completely. It did not use the concept of the "activity cost driver" to estimate product costs. Nor did it use ABC to connect costs to those activities that resulted in additional value for its customers. To identify those activities, it is necessary to have a better understanding of both traditional and activity-based cost accounting systems.

Traditional versus Activity-Based Cost Accounting Systems

Activity-based cost accounting, as it is known today, was developed largely by Harvard Business School Professors Robin Cooper and Robert Kaplan in the late 1980s to overcome some of the difficulties inherent in traditional cost accounting systems. In particular, traditional cost accounting systems tend to undercost low-volume products and overcost high-volume products because they use volume-based input or output measures as their "cost drivers."

The undercosting and overcosting result from the allocation of overhead costs based on the number of units produced (or other volume-related measures) that characterize traditional systems. Under a traditional volume-based cost accounting system, if two products are produced, perhaps 900 units of product A and 100 units of product B, a supervisor's salary and benefits would likely be allocated 90 percent to A and 10 percent to B. Experience might indicate that, in reality, each production run (regardless of size) requires three hours of the supervisor's time. Consequently, if the supervisor's "overhead" cost is allocated using the volume of output produced as the cost driver, the result will be to undercost the low-volume product and overcost the high-volume product.

In contrast to traditional volume-based cost accounting systems, ABC is an *activities/operations-based* costing system. It follows a two-stage procedure to assign overhead costs to products. The first stage identifies "significant activities/operations" and assigns overhead costs to each operation, depending on the proportions of the organizational resources it uses. Examples of overhead costs associated with these operations in a manufacturing process include maintenance, depreciation, computer support, electricity, set-up, engineers' salaries, engineering support, plant management, plant maintenance, property taxes, and security.

The overhead costs assigned to each activity/operation are allocated to the appropriate "activity cost pool." An activity cost pool is a grouping of individual overhead cost items that increase or decrease due to the activity level of the cost drivers. Examples of cost pools include engineering, machinery, set-up, facilities, receiving and inspection, materials handling, quality assurance, and packaging and shipping.

In stage two, the overhead costs are allocated from each activity cost pool to each product line in proportion to the amount of the cost driver consumed by the product line. The more activity cost pools there are in an activity-based costing system, the greater the accuracy of the cost assignment.

Initially, ABC was applied primarily to manufacturing set-

tings using *operations-based cost drivers* as a supplement to volume-based cost drivers. In their seminal article, Miller and Vollman (1985)¹ defined operations-based cost drivers in terms of four types of transactions that occur in the factory:

1. *Logistical transactions.* These involve ordering, executing, and confirming the movement of materials from one location to another. These transactions are processed, transcribed, and analyzed by people on the shop floor as well as by people in receiving, expediting, shipping, data entry, and accounting departments.

2. *Balancing transactions.* These ensure that the supplies of materials, labor, and manufacturing capacity are equal to the demand for resources. Personnel in purchasing, production and materials planning, production scheduling and control, labor requirements planning, and managers involved in market forecasting take part in these transactions.

3. *Quality transactions.* These comprise quality control, including inspection and rework; quality improvement, including worker training, engineering and supplier certification; field support, including warranty repairs; identification and communication of specifications; and record-keeping.

4. *Change transactions.* These update manufacturing information systems to accommodate changes in engineering designs, schedules, routings, standards, materials specifications, and bills of material. They involve the work of manufacturing, industrial and quality engineers, and accountants.

Miller and Vollman provided a very useful framework for identifying operations-based cost drivers within the manufacturing setting and thereby provided the impetus for many manufacturing firms to utilize ABC.

Cooper and Kaplan (1991) and Kaplan (1993) conducted field studies in a variety of manufacturing settings: bakeries (Maplehurst Bakeries, Canada), electronics equipment systems (Tektronix Inc.), computing and electronic measurement equipment (Hewlett-Packard), and heating wire manu-

facturing (Kanthal—a Swedish firm with a plant in Connecticut). They found that when ABC was introduced in these companies, they were able to control their costs and become more profitable.

Service industries were also intrigued by ABC and soon found that the concept of cost drivers was not limited to manufacturing processes. Recently, service companies have started to employ ABC to assist in tracing overhead costs. Banker and Johnson (1993) conducted an empirical investigation of the operations-based cost drivers in the U.S. airline industry and detailed its success in accounting for overhead costs to reflect the real costs of operating their flight routes.

Activity-Based Management Systems

The underlying concepts of ABC (and particularly the idea of cost drivers) can be applied as a *management tool* that focuses on examining processes with the goal of reducing waste in all activities. The result is *activity-based management* (ABM). Using contractors as an example, these ABM processes range from preparing estimates through customer billing and collections.

Drawing from activity-based cost accounting systems, activity-based management is concerned with the following:

1. Identifying all of the business activities (work) that consume time, materials, and other resources, and therefore drive costs.
2. Segregating activities into two categories: (a) those activities that clearly add to customer value and therefore can be translated into billings, and (b) those activities that do not add to customer value and are not billable.
3. Minimizing the non-value-adding activities. While focusing on waste (unnecessary cost) minimization, activity-based management also focuses on the need to maintain high quality work and flexibility in a business. When implemented, activity-based management will indicate those jobs that are likely to be most profitable (and least profitable) as

well as the mix of work that will be most profitable for a company.

Using Activity-Based Management

Activity-based management can help managers pinpoint waste and reduce costs. Managerial accountant H. Thomas Johnson recommends the following four steps to eliminate waste and become more profitable:

1. Chart the company's flow of activities. Managers need to maintain a diary for at least two weeks and record on an hourly basis what is happening in the business. (Initially, some managers may resist using a formal journal, but the benefits are so significant that they outweigh the extra work involved.) Questions such as the following need to be addressed: What are the managers doing? What are the employees doing? For contractors, this process needs to be carried out at each job site and in the office, as well as at customer sites when estimates are being prepared, etc.

2. Keep close account of the activities that add customer value. For example, while necessary, setting up for a job *does not* add customer value. Shingling a roof *does* add value. Customers pay for shingles on the roof, not for setting up, even though this takes time and costs money. It is necessary to clearly identify activities when time and/or materials are being wasted.

3. Review the diary each evening with particular attention to identifying those activities that *do not* add customer value—that do not result in any payment. Causes of delays and unevenness in work throughout the day need to be identified. Questions such as the following need to be addressed: What held things up? Are there more delays on some types of jobs than on others? What was the total time to complete a repair that usually requires a person to be on the roof for half an hour? Was it instead half a day? It is also important to keep track of customer complaints and follow-up service since these overhead costs can be very high.

4. Track the things that cause delays and *do not* add customer value. These items need to be recorded each day. Then a dollar cost can be attached to each and trends noted.

There are many activities that do not add customer value but can be very costly and erode profits. Consider the following examples from contracting:

1. A contractor answers a prospective customer's call, goes to the customer's place of business, secures the appropriate information, and prepares and delivers an estimate for the job. However, the contract is subsequently awarded to a competitor. The costs incurred in preparing the estimate diminish profits since customers don't pay for estimates.

2. A contractor has several contracts going at the same time and spends time running from one job site to another. Sometimes he completes part of one job, then packs up and moves to another site, unloads, sets up, does some work there, and moves again, as annoyed customers call, asking why their work has not been completed. A lot of time is spent packing up, moving, and setting up. This is expensive but does not add any value to the job.

3. A contractor is running behind and must pay overtime to get the job completed. Overtime was not anticipated when the job was bid. Now it rapidly erodes profit.

Following Johnson's four-step process should yield the following results:

1. A list of activities that cause delays, waste time and other valuable resources, and erode profits. These are the costly activities that need to be eliminated.

2. A clear identification of *profitable and unprofitable activities* and a more precise basis for allocating overhead costs to different types and sizes of contracts. Contractors are likely to discover that their overhead costs *vary appreciably* among different types of contracts and that using a percentage-of-

direct-cost method to allocate overhead costs, for example, is inappropriate.

3. A clear identification of *profitable and unprofitable contract types*. Most contractors will discover that they complete some types of contracts very efficiently and profitably with little waste while completing others inefficiently and unprofitably.

In many instances, the results will lead the contractor to develop a “distinctive marketing proposition” or “niche specialization” for the business. In addition, the contractor will likely implement more efficient on- and off-site contract management procedures.

Conclusion

During the 1980s and 1990s, activity-based costing became increasingly popular. Many companies are using activity-based costing to reduce costs and enhance profits. Kaplan (1993) provides four excellent examples of firms (Maplehurst Bakeries, Tektronix Inc., Hewlett-Packard, and Kanthal) that have used ABC, clearly detailing the benefits that can be derived from its use. However, the use of transactions-based systems requires enormous amounts of information and information tracking. The cost of obtaining this information and of tracking it must be considered when applying ABC.

A cost-benefit analysis should be made when selecting the number and type of cost drivers that will be included in an activity-based costing system since information carrying and processing costs are associated with each cost driver. In addition, there are related costs for the necessary planning and control that go hand in hand with costs systems.

With an excessive number of cost drivers, the costs for planning and control can become prohibitively expensive. A balance needs to be found between the benefits associated with the accuracy that the use of multiple cost drivers provides and the costs of data collection, storage, and processing involved with the use of these drivers.

Notes

1 Indirect costs are those not easily traced to particular products or services produced—known as overhead. Some examples of indirect costs include supervisory salaries and benefits, the purchasing and receiving of materials, scheduling, quality control, and plant maintenance.

2 See Miller and Vollman, *The Hidden Factory*, pp. 142–150.

3 See, for example, Banker and Johnson, “An Empirical Study of Cost Drivers in the U.S. Airline Industry.”

4 See Johnson, “Activity-Based Information: A Blueprint for World-Class Management Accounting,” p. 23.

5 See, for example, Kaplan, “Activity-Based Management Part I: Revealing Profit Opportunities with ABM.”

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