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# Applying Activity-Based Performance Measures to Service Processes: Process Relationship Maps and Process Analysis

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## EXECUTIVE SUMMARY

- This is the first of two articles that provide a systematic approach to developing and applying activity-based performance measurements to *service processes*, which can be defined as a series of related activities that usually have intangible outputs.
- The articles are intended to help managers improve the efficiency of their organizations by applying *activity-based management* and *performance measurements* to service processes.
- In manufacturing organizations, service processes primarily support and facilitate the design, production, and delivery of tangible outputs to customers. In service organizations, service processes include both support and operational processes.
- Identifying support and operational processes is a critical step toward recognizing and understanding the opportunities available for performance improvement.
- A *process relationship map*—discussed in this article—can be used to identify processes and related activities as either support or operational. Once this distinction is understood, a process analysis can be executed. A process measurement matrix can then be used to develop appropriate performance measures.

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A process relationship map builds on the process classification framework developed in the early 1990s by Arthur Andersen LLP, International Benchmarking Clearing House, and several major international corporations. The idea behind this framework was to create a high-level, generic business model to help organizations understand the relationship between operating and support processes.

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The framework defines the work performed in an organization as a set of *processes* and activities that are classified as either *operational* or *management and support*. Operating processes include the following:

- Understand markets and customers.
- Develop vision and strategy.
- Design products and services.
- Market and sell.
- Produce and deliver.
- Invoice and service customers.

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***The process classification framework clarifies the relationships between important and diverse processes.***

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Management and support processes include the following:

- Develop and manage human resources.
- Manage information.
- Manage financial and physical resources.
- Execute environmental management programs.
- Manage external relationships.
- Manage improvement and change.

By defining the work performed within an organization as consisting of either operating or support processes and then identifying the activities included in each process, the process classification framework clarifies the relationships between important and diverse processes. However, the framework does not specify the linkages with support processes or relate activities to operational processes. These linkages, when they exist, need to be identified—and their costs traced—if an organization wants a clear and comprehensive understanding of its product or service costs. Knowing the costs makes it possible to identify opportunities to enhance the performance of both operational and support processes.

#### **ENCOMPASSING SUPPORT PROCESSES**

To facilitate identifying these linkages, the process relationship map recasts the operational and support processes into a circular model (see Exhibit 1). Two of the processes—“understand market and customer requirements” and “develop vision and strategy”—as “encompassing support processes” form the outer rings of the process relationship map to reflect their determining influence on all other processes and related activities. Neither process, however, should be viewed as a buffer or barrier to interaction between other support and operational processes with outside constituents (e.g., customers and suppliers).

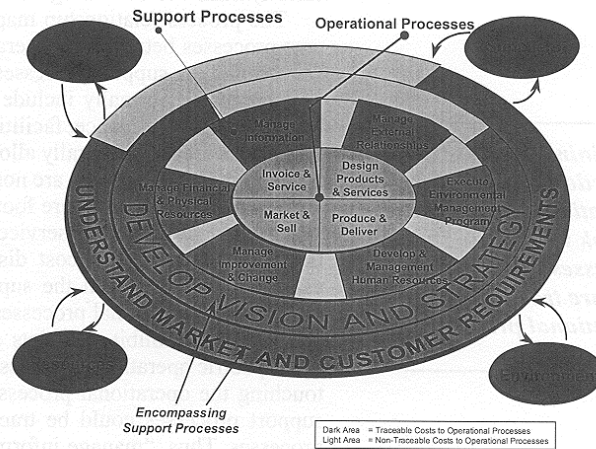
Whereas these two processes help an organization formulate its overall strategic direction, lower-level activities within them may be traced to operational processes; there may be an identifiable causal relationship between them and the product or service outputs of one or more operational processes. For example, activities within the process of “understanding market and customer requirements” include “determining customer needs and wants” and “monitoring changes in market or customer expectations.”

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Exhibit 1. Process Relationship Map



For example, determining the needs and wants of a restaurant's customers can be traced to an operational process because there is a direct causal relationship between it and determining specific menu items. However, monitoring changes in customer lifestyles, although it may influence the menu offerings, is not a directly traceable activity. To reflect this distinction, the dark portion of the circles addresses traceable activities—that is, the distinct steps in output generation that directly add value (sometimes called the value chain)—while the light portion depicts activities that are not traceable.

**Operational processes are usually better understood (and better documented) than support processes.**

**OPERATIONAL PROCESSES**

In the center of Exhibit 1 are the operational processes that produce an organization's products and services—the value the organization creates for its customers and stakeholders. These include the following processes:

- Invoice and service
- Design products and services
- Market and sell
- Produce and deliver

Operational processes are usually better understood (and better documented) than support processes because their output is directly associated with customer deliverables.

Some activities that are actually operational may exist within traditional support functions. To continue the restaurant example, purchas-

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***To minimize cost distortions created by allocations, it is essential to look within the support processes for activities that are traceable to operational processes.***

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ing ingredients might at first be considered a support function. However, It should be classified as an operational activity because it is directly linked to delivering items shown on the menu to customers.

The process relationship map shown in Exhibit 1 also shows support processes between the operational processes at the center and the “encompassing support processes” in the outer rings. The “inner” support processes normally include activities associated with such overhead functions as finance, facilities, and human resources. The costs of these processes are generally allocated rather than traced to operational processes. The allocations are normally based on indirect relationships, such as head count or square footage, whereas tracing is based on time spent, product produced, service provided, or other more direct relationships. To minimize cost distortions created by allocations, it is essential to look within the support processes for activities that are traceable to operational processes.

Although Exhibit 1 depicts specific support processes in contact with specific operating processes (e.g., “manage information” is shown touching the operational process “invoice and service”), all the inner support processes could be traceable to any of the four operational processes. Thus, “manage information” could be traceable not only to “invoice and service” but also to “market and sell,” “produce and deliver,” and “design products and services.”

#### **RECLASSIFYING PROCESSES**

Reclassifying as support processes those processes traditionally viewed as operational and reclassifying support activities as operational are important concepts for enhancing an organization’s understanding of its cost structure—and thus identifying opportunities for improvement. Identifying all activity costs within support processes (which are directly linked with, and thus traceable to, operational processes) will minimize the cost distortions often associated with overhead-related allocation methods. This should be of particular interest to organizations whose accounting systems gather costs by function rather than by process.

Returning to the restaurant example, the amount of time and effort required in purchasing ingredients could vary significantly by menu item. If purchasing ingredients is inappropriately classified and allocated as administrative overhead rather than as a linked operational activity, the restaurant will have an inaccurate understanding of the costs of specific menu items.

By providing a framework to facilitate the classification of processes and their related activities, the process relationship map in Exhibit 1 can be an invaluable tool for cost management. Determining whether processes are operational or support—and whether activities within support processes are actually operational activities—is not always easy, but it is worth doing. The result is a clearer understanding of the actual costs associated with an organization’s products and services as well as functions. Once all processes and related activities are classified correctly, process analysis—the subject of the next section—can begin.

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### PROCESS ANALYSIS

Process analysis is a tool to help trace the consumption of resources (e.g., labor, machine, and materials) to activities or steps. Process analysis also establishes a framework for augmenting cost measures with non-financial measures (such as time and quality measures) to provide a more comprehensive view of process performance. Understanding the interaction among these measures provides a better understanding of processes that can then be used to improve processes and decisionmaking.

The following conditions are prerequisites to process analysis (CAM-I, 1996):

1. Senior management commitment to becoming a process-managed organization.
2. Identifications of a service or process for improvement.
3. Appointment of an "owner" of the service or process (this owner should be appointed and then supported wholeheartedly by senior management).
4. Formation of a process analysis team with representation from all functional organizations affected by the process in question.
5. Communication among, engagement of, and training of people in the process so that they can come to an agreement about activity definitions and process boundaries.

Only after these conditions are met should the actual process analysis begin.

It is arguably more difficult to apply activity-based management (ABM) concepts such as process analysis within a service or white-collar environment—where the outputs are intangible—than in a manufacturing environment. In a manufacturing environment, processes and their component activities are typically repeated frequently and use a prescribed amount of resources within well-prescribed bounds to produce a tangible output. Such processes are likely to be documented relatively well.

But in a service environment (e.g., serving a dinner in a restaurant), the process may lack some or all of these characteristics. The activities associated with serving a dinner may vary from table to table and person to person at a given table. Providing service to two different people—even when they order the same menu items—often differs and may well use different quantities of resources. What's more, the definition of "good service" is likely to be ambiguous. Nevertheless, the boundaries of a process must be specified before the related activities can be defined. Identifying the specific activities must be done within the process boundaries.

#### Defining Boundaries

An important first step to effectively managing service processes using ABM tools and methods is to clearly define the boundaries and activities that form the cross-functional value chain associated with the service in question.

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**Exhibit 2. Service Structure Questions**

Question	Answers for a Service Process	Answers for a Manufacturing Process
1. Is the process defined sufficiently to communicate boundaries, inputs, outputs, customers, and suppliers?	Because services may be taken for granted or not be readily apparent, they have not been defined. Significant attention to defining services may not have been a priority. Definitions must be created.	Analyses of manufacturing processes have called for definitions to be created so that responsibilities are known.
2. How will process information support your ability to make effective decisions in managing your process?	The different ways that the services are performed may not be known. The provider may not understand how it wants to manage the process. What seems to be a single service may require multiple processes. A restaurant may have different processes for washing pots and pans than for washing dishes. A mover may use different processes for moving and reconnecting computers versus desks.	Different methods of producing the output are known. Already know how decisions affect resource allocations.
3. Do you understand the process?	The activities have not been identified because the service has not been defined.	The activities are identified and documented.

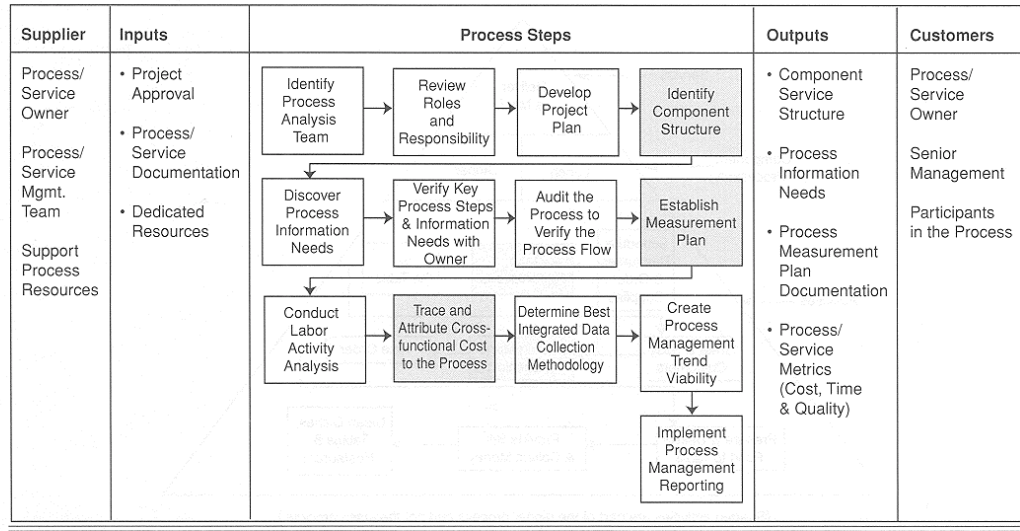
*The goal in using a process model is to demonstrate how process analysis leads to the practical application of ABM techniques in a service process.*

The questions and answers in Exhibit 2, filled out with a typical company's responses, show some of the differences between dealing with a service process and dealing with a manufacturing process. The first question, for example, focuses on defining the process and its elements. The second question addresses the use of the information. The third question is concerned with developing a working understanding of the process. As the answers indicate, working with a service process probably requires more effort to develop fundamental data than is necessary for a manufacturing process.

There are various process analysis models. The columns in Exhibit 3 depict the major elements found in most process models: suppliers, inputs, process steps, outputs, and customers.

The goal in using a process model is to demonstrate how process analysis leads to the practical application of ABM techniques in a service process. To that end, the focus here is on those parts of process

Exhibit 3. Service Process Interest Group Analysis Model



analysis that are especially challenging when considering service processes.

Three steps (the shaded boxes) in the process analysis model shown in Exhibit 3 require special attention for analyzing services:

- Identify component structure
- Establish measurement plan
- Trace and attribute cross-functional cost to the process

*The difficulty with this step is defining the output of the service in terms of the customer and balancing that perspective with how to manage the service within the enterprise.*

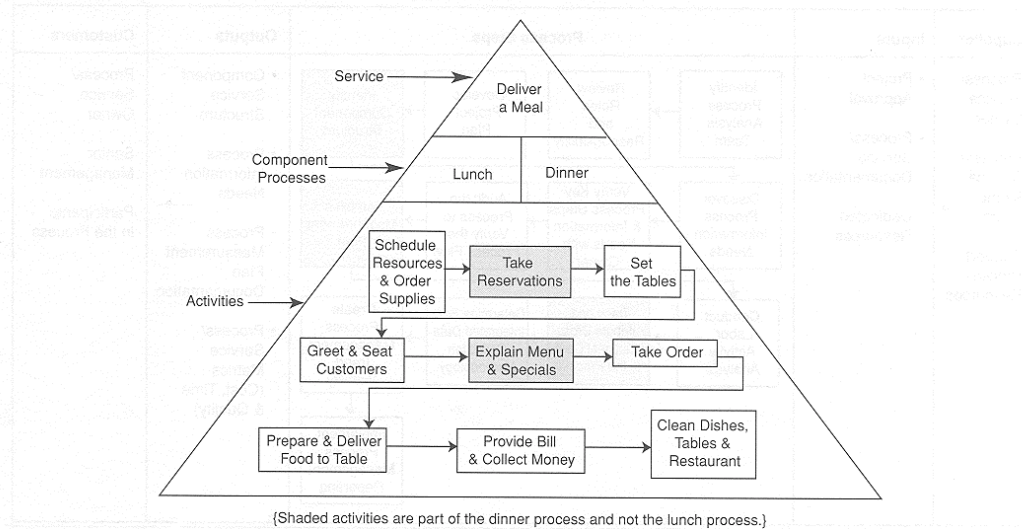
Regardless of the process analysis model used, these issues must be addressed. The following sections discuss the difficulties associated with each of these three steps and illustrate methods to deal with them.

Note that using the model is an iterative process. One must identify a process before initiating process analysis and identifying the process analysis team. Also, to “identify component structure” involves analyzing the selected service to identify the processes and activities within that service. Doing so may mean identifying new team members, redefining roles, and creating a revised plan (i.e., reworking what was done in previous steps in the process analysis).

**Identifying Component Structure**

The first step requiring special attention is “identify component structure.” The difficulty with this step is defining the output of the service in terms of the customer and balancing that perspective with how to manage the service within the enterprise.

Exhibit 4. Component Structure Triangle



For example, Acxiom Corporation viewed itself as a database management and network service provider. From Acxiom's perspective, it provided data lines, application software, CPU time, and database management for automated teller machines (ATMs). From the customer's perspective, Acxiom provided ATM transactions. The customer wanted to track improvements and be billed based on the transactions. To meet customer expectations, Acxiom had to redefine its output and component process structure to report ATM transactions. Although the provider must manage the service process activities to maintain quality and customer satisfaction, the customer may not be interested in the provider's process of delivering the service.<sup>1</sup>

Again using a restaurant as an example, Exhibit 4 portrays the relationships between a service, its component processes, and its activities. The top section of the triangle represents the service delivered by the supplier, as defined from the customer's perspective. The service could be provided to other organizations or represent a support process within the organization. As in the Acxiom example, the service can be viewed from at least two perspectives:

1. From the customer's perspective, a service represents the benefits received. The customer in a restaurant eats a meal and enjoys it.
2. From the provider's perspective, a service includes all the processes and activities necessary to deliver those benefits.



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***How the organization interprets the customers' needs should influence the management and structure of the processes.***

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The middle section of the triangle depicted in Exhibit 4 represents the component processes that management identified as necessary to meet customers' needs. How the organization interprets the customers' needs should influence the management and structure of the processes. If a restaurant manages meal delivery by distinguishing between lunch and dinner, management should be concerned with the activities that make up those processes. If the restaurant does not alter what is provided to the customer (in terms of the level of attention or menu selection) at midday as compared with in the evening, serving lunch and dinner would be one process, not two. Thus, the same set of activities would be applicable. Making the distinction between serving lunch and dinner implies a difference in what is expected by, or delivered to, the customer.

The bottom section of the triangle contains the activities that make up component processes, the task-oriented flows of what is done to produce the process outputs. In Exhibit 4, the lunch process includes a number of activities such as the following:

- Scheduling resources and ordering supplies
- Setting the tables
- Greeting and seating customers
- Taking orders;
- Preparing and delivering food to tables
- Providing bills and collecting money
- Washing dishes and cleaning tables

The dinner process includes additional activities that add complexity, such as taking reservations and explaining the menu and specials. Taken together, the activities for the restaurant shown in Exhibit 4 are the operational processes "market and sell," "produce and deliver," and "invoice and service."

The activities shown in the exhibit can be related to the process relationship map in Exhibit 1 as follows:

- Market and sell process
  - Take reservations
  - Explain menus and specials
  - Greet and seat customers
  - Take orders
- Produce and deliver
  - Purchase supplies
  - Set the table
  - Prepare and deliver food to table
  - Clean dishes, tables, and the restaurant itself
  - Schedule resources
- Invoice and service, and manage financial and physical resources
  - Produce bills and collect money

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***Note that what may have been seen as a support process—"manage financial and physical resources"—has been reclassified as an operational process.***

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Exhibit 4 focuses on the service “delivering a meal.” Items could move up or down in the hierarchy as needed. For example, we could move lunch to the top of the triangle and make the component processes “cooking lunch” and “serving lunch.” This would bring a greater level of detail to the lower level of activities, which could be useful if more detail was desired or if the scope of a process improvement project proved too large.

Moving in the other direction, it would also be possible to shift “deliver a meal” down and make the service “running a restaurant.” Doing this would show a “bigger picture.” It would also provide less detail, thus making a project larger in scope. In attempting to focus in on your process, narrowing or expanding the focus of a project in this way can prove useful.

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***The very nature of service processes creates difficulties in defining the data.***

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***The qualities and characteristics of a service process determine how difficult it is to define, document, and measure.***

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#### **ESTABLISHING A MEASUREMENT PLAN**

The second step requiring special attention is “establishing the measurement plan.” This step involves developing financial and nonfinancial performance measures for the service and for its component processes. The difficulty with this step for a service process is defining what measurement data are necessary for managing the service. The very nature of service processes creates difficulties in defining the data. Certainly, measurements of a food’s characteristics are appropriate for a restaurant—characteristics such as quantity, quality, and appearance. However, the experience of someone who eats at a restaurant is influenced by many other factors, including the behavior of restaurant personnel and of other patrons of the restaurant. Even if we could decide on a set of performance measures for managing serving lunch, collecting the data would probably be difficult. The purpose of this section is to provide a set of tools that can help in identifying the data needed and collecting them.

#### **Segregation Qualities**

The qualities and characteristics of a service process determine how difficult it is to define, document, and measure. These qualities and characteristics may make a service process appear to be either poorly structured and difficult to analyze or well structured and more amenable to analysis.

Fitzgerald and colleagues (1991) describe these qualities and characteristics and also provide a method for evaluating processes at the organizational level. Fitzgerald and colleagues (1991) identify four characteristics that can be used to define service processes:

- Intangibility
- Heterogeneity
- Simultaneity
- Perishability

#### **Intangibility**

Intangibility is discussed in terms of both process and output. For instance, the output of the service provided within a restaurant and the overall dining experience are considered intangible. However, the food

and its preparation are more tangible. The input is measurable and known; the process is repetitive.

The relative intangibility of a process and its output can be identified by answering such questions as the following:

- Is there a tangible product that can be consistently duplicated and delivered at the end of a systematic, repetitive process?
- Alternatively, does a successful outcome depend on a combination of some output and customized support (e.g., a well-presented meal served by a knowledgeable and helpful server)?
- Can quality be measured through statistical process control?
- Is value likely to be defined differently from one diner to the next?

#### Heterogeneity

Heterogeneity is driven by a high labor component within the process. Hibachi chefs, therapists, seminar leaders, circus clowns, or consultants may perform their respective processes many times, but the outcomes will differ from occurrence to occurrence and from provider to provider. It is difficult to ensure consistent performance from the same individual, let alone to get comparability between individuals.

#### Simultaneity

Simultaneity occurs when production and consumption coincide. Getting a physical exam, renting a hotel room, and having a massage are examples of simultaneous processes.

#### Perishability

Perishability describes a service that cannot be stored; the product is consumed immediately. Haircuts, massages, physical exams, hotel rooms, and seatings at restaurants or theater performances cannot be stockpiled and sold later. Once the event or time has passed, the opportunity for a sale is gone forever.

Each service process is more or less intangible, heterogeneous, simultaneous, and perishable. The position of a process within that spectrum affects the performance measurement system, "not so much in terms of what is measured, but how it is measured" (Fitzgerald et al., 1991, p. 3). Simultaneous processes are normally perishable. Heterogeneous, simultaneous, and perishable processes are quite often intangible. Equipment-focused processes (which are discussed later) are normally more homogeneous and not as simultaneous as people-focused processes.

#### SERVICE TYPES AND CLASSIFICATION DIMENSIONS

Fitzgerald and colleagues (1991) define "three different generic service types: professional services, service shops, and mass services" that are representative of all service businesses.

"Professional services are defined as high-contact organizations where customers spend a considerable time in the service process" (Fitzgerald et al., 1991, p. 9). The processes are people and front-office focused, with process performance emphasized over product, and the

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Exhibit 5. CAM-I Service Classification Grid

Classification Dimension	Mass Service	Service Shop	Professional Service	Classification Dimension
Equipment focus				People focus
Back-office focus				Front-office focus
Product focus				Process focus
Low level of customization of the service to any one customer				High level of customization of the service to any one customer
Minimal discretion available to front-office staff				Considerable discretion available to front-office staff
Minimal contact time available by front-office staff				Considerable contact time available by front-office staff

tasks are heterogeneous in nature. Consulting firms are representative of this service type.

“Service shops are characterized by levels of customer contact, customization, volumes of customers and staff discretion which position them between the extremes of professional and mass services” (Fitzgerald et al., 1991, p. 13). Most wholesale, retail shops, and restaurants will fit this category.

“Mass services have many customer transactions, involving limited contact time and little customization. The processes are equipment based and product oriented, with most value added in the back office and little judgment applied by the front office staff” (Fitzgerald et al., 1991, p. 11). Railroads, airlines, and hotels are all indicative of mass service. Each service type is “differentiated in terms of the volume of customers processed by a typical unit per day against six other classification dimensions” (Fitzgerald et al., 1991, p. 9):

- People versus equipment focus
- Front-office versus back-office focus
- Product versus process focus

- Level of customization of the service to any one customer
- Discretion available to front-office staff
- Contact time available by front-office staff

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**The relative ease of cost traceability distinguishes each service type. Professional services are the easiest to trace because of the people-based processes directed toward specific customers.**

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When completed, Exhibit 5 graphically depicts this spectrum. The two outside columns contain the classification characteristics. The three center columns are the service types—from mass services to professional services. The relative ease of cost traceability distinguishes each service type. Professional services are the easiest to trace because of the people-based processes directed toward specific customers. Mass services are most difficult to trace because of the high use of equipment (i.e., capital directed toward many customers simultaneously). Service shops need to be examined on a case-by-case basis depending on where they fall within the continuum. The service-type classification scheme allows businesses within different industries to recognize a commonality of issues, problems, and processes, thus enabling similar measures to be used and external benchmarking to occur.

#### Applying the Classification Dimensions

By viewing each process as an independent entity from an internal or external customer's perspective, it is possible to determine which service type (i.e., professional service, service shop, or mass service) the process most closely resembles. The six classification dimensions listed in Exhibit 5 (the rows of the table) are the attributes used to distinguish the processes by service type.

Answers to questions such as the following facilitate classification of a process by service type:

- Is the process dependent on *people* or *equipment*?
- Is the value the customer receives dependent on the interaction with the organization's *representatives* or the organization's *product*?
- Is the value received from a *tangible product* or does the customer participate in a *service process*?
- Is each iteration, sale, or event *unique* or *customized* to the customer?
- How much *latitude* do employees who interact with the customer have?
- How much *time* do employees spend interacting with customers?

These questions can be applied to any process or activity.

Again considering our restaurant example, we find that the process depends on both people and equipment; the restaurant staff is important in the process, but the food preparation equipment and the furnishings in the dining area are also important. The value received by the customer depends both on interaction with employees of the restaurant in the dining area ("front office") and on the actual meal served from the kitchen ("back office").

A restaurant's customer does receive a tangible product, but the process of delivering it is also important. The manner in which the service is delivered to each customer is quite similar; the restaurant's

***A fast-food franchise is much more equipment focused, and there is a strong product focus.***

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employees do not have much latitude to make decisions affecting the meal that will be served. Finally, the dining-room staff spends considerable time in contact with customers.

Yet if we answered these same questions for a fast-food outlet of a large chain, we would get some different answers. For example, a fast-food franchise is much more equipment focused, and there is a strong product focus. Each sale has less variation than in the restaurant, and dining-room staff is minimal. Employees in a fast-food outlet have virtually no latitude to make decisions regarding what will be served. Finally, minimal time is spent dealing with customers.

If Exhibit 5 is completed for both a restaurant and a fast-food outlet, the results for the restaurant will likely show that it has primarily the characteristics of a service shop, with some characteristics of both mass and professional services. By contrast, the fast-food outlet will have characteristics of a mass service, with some characteristics of a service shop. The identifying characteristics will help in determining what to measure, both from the customer's perspective and from the organization's, which is the subject of the next article in this series.

#### **NOTE**

1. This example is taken from information gathered during the Activity-Based Management Best Practice Study conducted by the American Productivity and Quality Center in March 1995.

#### **REFERENCES**

- Arthur Anderson & Co. and International Benchmarking Clearing House, 1993 Process Classification Framework.
- CAM-I, Process Management Interest Group, CAM-I Process Management Guide (Bedford: CAM-I, 1996.)
- Fitzgerald, L., Johnson, R., Brignall, S., Silvestro, R., and Voss, C., Performance Measurement in Service Businesses (London: CIMA, 1991.)
- The American Productivity and Quality Center and CAM-I, Activity-Based Management: A Survey of Best Practices. (Houston: American Productivity and Quality Center, 1995.)