2
The Value Chain and Competitive Advantage

Competitive advantage cannot be understood by looking at a firm as a whole. It stems from the many discrete activities a firm performs in designing, producing, marketing, delivering, and supporting its product. Each of these activities can contribute to a firm's relative cost position and create a basis for differentiation. A cost advantage, for example, may stem from such disparate sources as a low-cost physical distribution system, a highly efficient assembly process, or superior sales force utilization. Differentiation can stem from similarly diverse factors, including the procurement of high quality raw materials, a responsive order entry system, or a superior product design.

A systematic way of examining all the activities a firm performs and how they interact is necessary for analyzing the sources of competitive advantage. In this chapter, I introduce the *value chain* as the basic tool for doing so. The value chain disaggregates a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential sources of differentiation. A firm gains competitive advantage by performing these strategically important activities more cheaply or better than its competitors.

A firm's value chain is embedded in a larger stream of activities that I term the *value system,* illustrated in Figure 2–1. Suppliers have value chains *(upstream value)* that create and deliver the purchased inputs used in a firm's chain. Suppliers not only deliver a product but also can influence a firm's performance in many other ways. In addition, many products pass through the value chains of channels *(channel value)* on their way to the

buyer. Channels perform additional activities that affect the buyer, as well as influence the firm's own activities. A firm's product eventually becomes part of its *buyer's value chain.* The ultimate basis for differentiation is a firm and its product's role in the buyer's value chain, which determines buyer needs. Gaining and sustaining competitive advantage depends on understanding not only a firm's value chain but how the firm fits in the overall value system.

The value chains of firms in an industry differ, reflecting their histories, strategies, and success at implementation. One important difference is that a firm's value chain may differ in *competitive scope* from that of its competitors, representing a potential source of competitive advantage. Serving only a particular industry segment may allow a firm to tailor its value chain to that segment and result in lower costs or differentiation in serving that segment compared to competitors. Widening or narrowing the geographic markets served can also affect competitive advantage. The extent of integration into activities plays a key role in competitive advantage. Finally, competing in related industries with coordinated value chains can lead to competitive advantage through interrelationships. A firm may exploit the benefits of broader scope internally or it may form coalitions with other firms to do so. Coalitions are long-term alliances with other firms that fall short of outright merger, such as joint ventures, licenses, and supply agreements. Coalitions involve coordinating or sharing value chains with coalition partners that broadens the effective scope of the firm's chain.

This chapter describes the fundamental role of the value chain in identifying sources of competitive advantage. I begin by describing the value chain and its component parts. Every firm's value chain is composed of nine generic categories of activities which are linked together in characteristic ways. The generic chain is used to demonstrate how a value chain can be constructed for a particular firm, reflecting the specific activities it performs. I also show how the activities in a firm's value chain are linked to each other and to the activities of its suppliers, channels, and buyers, and how these linkages affect competitive advantage. I then describe how scope of a firm's activities affects competitive advantage through its impact on the value chain. Subsequent chapters will illustrate in detail how the value chain can be used as a strategic tool to analyze relative cost

position, differentiation, and the role of competitive scope in achieving competitive advantage.

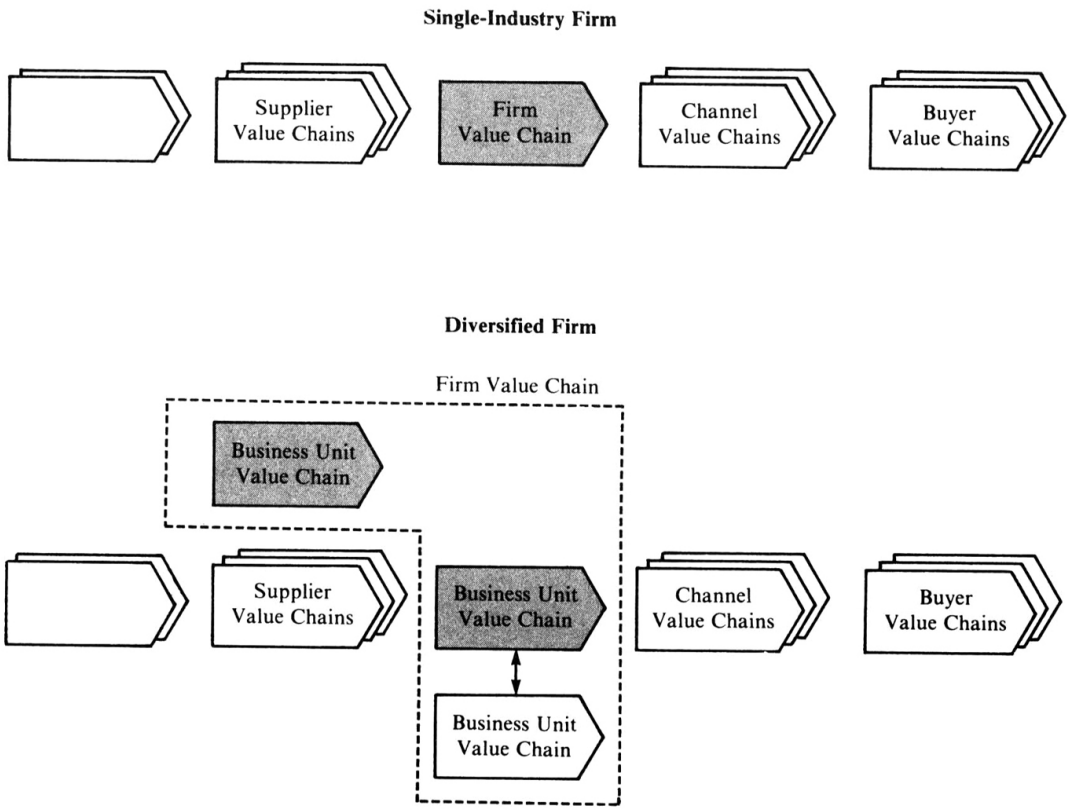


Figure 2–1. The Value System

The Value Chain

Every firm is a collection of activities that are performed to design, produce, market, deliver, and support its product. All these activities can be represented using a value chain, shown in Figure 2–2. A firm's value chain and the way it performs individual activities are a reflection of its history, its strategy, its approach to implementing its strategy, and the underlying economics of the activities themselves.[1]

The relevant level for constructing a value chain is a firm's activities in a particular industry (the business unit). An industry- or sector-wide value chain is too broad, because it may obscure important sources of competitive advantage. Though firms in the same industry may have similar chains the value chains of competitors often differ. People Express and United Airlines both compete in the airline industry, for example, but they have very different value chains embodying significant differences in boarding gate operations, crew policies, and aircraft operations. Differences among competitor value chains are a key source of competitive advantage. A firm's value chain in an industry may vary somewhat for different items in its product line, or different buyers, geographic areas, or distribution channels. The value chains for such subsets of a firm are closely related, however, and can only be understood in the context of the business unit chain.[2]

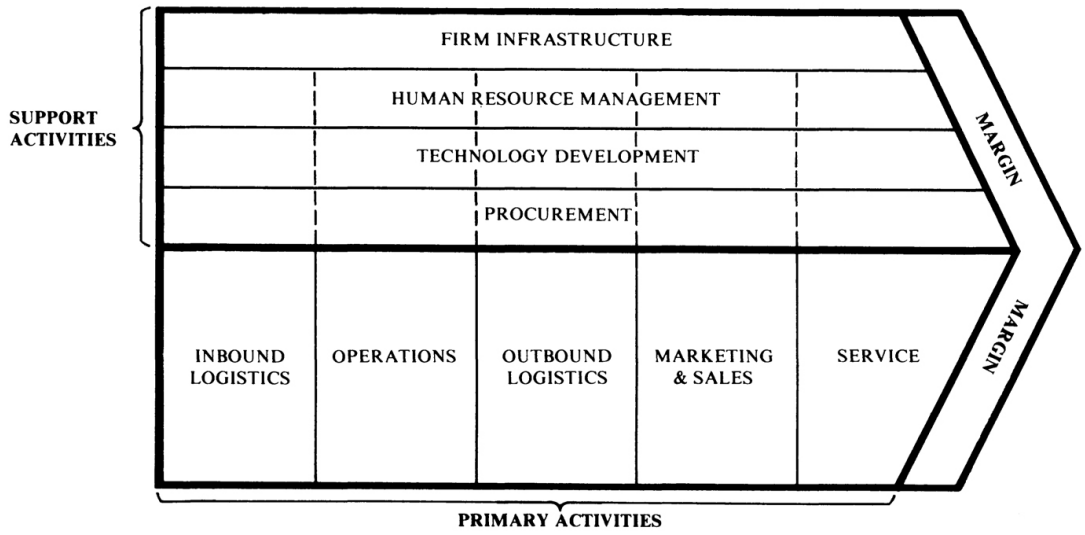


Figure 2–2. The Generic Value Chain

In competitive terms, value is the amount buyers are willing to pay for what a firm provides them. Value is measured by total revenue, a reflection of the price a firm's product commands and the units it can sell. A firm is profitable if the value it commands exceeds the costs involved in creating the product. Creating value for buyers that exceeds the cost of doing so is the goal of any generic strategy. Value, instead of cost, must be used in analyzing competitive position since firms often deliberately raise their cost in order to command a premium price via differentiation.

The value chain displays total value, and consists of *value activities* and *margin.* Value activities are the physically and technologically distinct activities a firm performs. These are the building blocks by which a firm creates a product valuable to its buyers. Margin is the difference between total value and the collective cost of performing the value activities. Margin can be measured in a variety of ways. Supplier and channel value chains also include a margin that is important to isolate in understanding the sources of a firm's cost position, since supplier and channel margin are part of the total cost borne by the buyer.

Every value activity employs *purchased inputs, human resources* (labor and management), and some form of *technology* to perform its function. Each value activity also uses and creates *information,* such as buyer data (order entry), performance parameters (testing), and product failure statistics. Value activities may also create financial assets such as inventory and accounts receivable, or liabilities such as accounts payable.

Value activities can be divided into two broad types, *primary* activities and *support* activities. Primary activities, listed along the bottom of Figure 2–2, are the activities involved in the physical creation of the product and its sale and transfer to the buyer as well as after-sale assistance. In any firm, primary activities can be divided into the five generic categories shown in Figure 2–2. Support activities support the primary activities and each other by providing purchased inputs, technology, human resources, and various firmwide functions. The dotted lines reflect the fact that procurement, technology development, and human resource management can be associated with specific primary activities as well as support the entire chain. Firm intrastructure is not associated with particular primary activities but supports the entire chain.

Value activities are therefore the discrete building blocks of competitive advantage. How each activity is performed combined with its economics will determine whether a firm is high or low cost relative to competitors. How each value activity is performed will also determine its contribution to buyer needs and hence differentiation. Comparing the value chains of competitors exposes differences that determine competitive advantage.[3]

An analysis of the value chain rather than value added is the appropriate way to examine competitive advantage. Value added (selling price less the cost of purchased raw materials) has sometimes been used as the focal point for cost analysis because it was viewed as the area in which a firm can control costs. Value added is not a sound basis for cost analysis, however, because it incorrectly distinguishes raw materials from the many other purchased inputs used in a firm's activities. Also, the cost behavior of activities cannot be understood without simultaneously examining the costs of the inputs used to perform them. Moreover, value added fails to highlight the linkages between a firm and its suppliers that can reduce cost or enhance differentiation.

Identifying Value Activities

Identifying value activities requires the isolation of activities that are technologically and strategically distinct. Value activities and accounting classifications are rarely the same. Accounting classifications (e.g., burden, overhead, direct labor) group together activities with disparate technologies, and separate costs that are all part of the same activity.

Primary Activities

There are five generic categories of primary activities involved in competing in any industry, as shown in Figure 2–2. Each category is divisible into a number of distinct activities that depend on the particular industry and firm strategy:

- *Inbound Logistics.* Activities associated with receiving, storing, and disseminating inputs to the product, such as material handling,

warehousing, inventory control, vehicle scheduling, and returns to suppliers.

- *Operations.* Activities associated with transforming inputs into the final product form, such as machining, packaging, assembly, equipment maintenance, testing, printing, and facility operations.
- *Outbound Logistics.* Activities associated with collecting, storing, and physically distributing the product to buyers, such as finished goods warehousing, material handling, delivery vehicle operation, order processing, and scheduling.
- *Marketing and Sales.* Activities associated with providing a means by which buyers can purchase the product and inducing them to do so, such as advertising, promotion, sales force, quoting, channel selection, channel relations, and pricing.
- *Service.* Activities associated with providing service to enhance or maintain the value of the product, such as installation, repair, training, parts supply, and product adjustment.

Each of the categories may be vital to competitive advantage depending on the industry. For a distributor, inbound and outbound logistics are the most critical. For a service firm providing the service on its premises such as a restaurant or retailer, outbound logistics may be largely nonexistant and operations the vital category. For a bank engaged in corporate lending, marketing and sales are a key to competitive advantage through the effectiveness of the calling officers and the way in which loans are packaged and priced. For a high speed copier manufacturer, service represents a key source of competitive advantage. In any firm, however, all the categories of primary activities will be present to some degree and play some role in competitive advantage.

Support Activities

Support value activities involved in competing in any industry can be divided into four generic categories, also shown in Figure 2–2. As with primary activities, each category of support activities is divisible into a number of distinct value activities that are specific to a given industry. In

technology development, for example, discrete activities might include component design, feature design, field testing, process engineering, and technology selection. Similarly, procurement can be divided into activities such as qualifying new suppliers, procurement of different groups of purchased inputs, and ongoing monitoring of supplier performance.

Procurement. Procurement refers to the *function* of purchasing inputs used in the firm's value chain, not to the purchased inputs themselves. Purchased inputs include raw materials, supplies, and other consumable items as well as assets such as machinery, laboratory equipment, office equipment, and buildings. Though purchased inputs are commonly associated with primary activities, purchased inputs are present in every value activity including support activities. For example, laboratory supplies and independent testing services are common purchased inputs in technology development, while an accounting firm is a common purchased input in firm infrastructure. Like all value activities, procurement employs a "technology," such as procedures for dealing with vendors, qualification rules, and information systems.

Procurement tends to be spread throughout a firm. Some items such as raw materials are purchased by the traditional purchasing department, while other items are purchased by plant managers (e.g., machines), office managers (e.g., temporary help), salespersons (e.g., meals and lodging), and even the chief executive officer (e.g., strategic consulting). I use the term procurement rather than purchasing because the usual connotation of purchasing is too narrow among managers. The dispersion of the procurement function often obscures the magnitude of total purchases, and means that many purchases receive little scrutiny.

A given procurement activity can normally be associated with a specific value activity or activities which it supports, though often a purchasing department serves many value activities and purchasing policies apply firmwide. The cost of procurement activities themselves usually represents a small if not insignificant portion of total costs, but often has a large impact on the firm's overall cost and differentiation. Improved purchasing practices can strongly affect the cost and quality of purchased inputs, as well as of other activities associated with receiving and using the inputs, and interacting with suppliers. In chocolate manufacturing and electric utilities,

for example, procurement of cocoa beans and fuel respectively is by far the most important determinant of cost position.

Technology Development. Every value activity embodies technology, be it know-how, procedures, or technology embodied in process equipment. The array of technologies employed in most firms is very broad, ranging from those technologies used in preparing documents and transporting goods to those technologies embodied in the product itself. Moreover, most value activities use a technology that combines a number of different subtechnologies involving different scientific disciplines. Machining, for example, involves metallurgy, electronics, and mechanics.

Technology development consists of a range of activities that can be broadly grouped into efforts to improve the product and the process. I term this category of activities technology development instead of research and development because R&D has too narrow a connotation to most managers. Technology development tends to be associated with the engineering department or the development group. Typically, however, it occurs in many parts of a firm, although this is not explicitly recognized. Technology development may support any of the numerous technologies embodied in value activities, including such areas as telecommunications technology for the order entry system, or office automation for the accounting department. It does not solely apply to technologies directly linked to the end product. Technology development also takes many forms, from basic research and product design to media research, process equipment design, and servicing procedures. Technology development that is related to the product and its features supports the entire chain, while other technology development is associated with particular primary or support activities.

Technology development is important to competitive advantage in all industries, holding the key in some. In steel, for example, a firm's process technology is the single greatest factor in competitive advantage. The competitive implications of the array of technologies in the value chain are treated in Chapter 5.

Human Resource Management. Human resource management consists of activities involved in the recruiting, hiring, training, development, and compensation of all types of personnel. Human resource management

supports both individual primary and support activities (e.g., hiring of engineers) and the entire value chain (e.g., labor negotiations). Human resource management activities occur in different parts of a firm, as do other support activities, and the dispersion of these activities can lead to inconsistent policies. Moreover, the cumulative costs of human resource management are rarely well understood nor are the tradeoffs in different human resource management costs, such as salary compared to the cost of recruiting and training due to turnover.

Human resource management affects competitive advantage in any firm, through its role in determining the skills and motivation of employees and the cost of hiring and training. In some industries it holds the key to competitive advantage. The world's leading accounting firm Arthur Andersen, for example, draws a significant competitive advantage from its approach to recruiting and training its tens of thousands of professional staff. Arthur Andersen has bought a former college campus near Chicago, and has invested heavily in codifying its practice and regularly bringing staff from around the world to its college for training in the firmwide methodology. Having a deeply understood methodology throughout the firm not only makes all engagements more effective but also greatly facilitates the servicing of national and multinational clients.

Firm Infrastructure. Firm infrastructure consists of a number of activities including general management, planning, finance, accounting, legal, government affairs, and quality management. Infrastructure, unlike other support activities, usually supports the entire chain and not individual activities. Depending on whether a firm is diversified or not, firm infrastructure may be self-contained or divided between a business unit and the parent corporation.[4] In diversified firms, infrastructure activities are typically split between the business unit and corporate levels (e.g., financing is often done at the corporate level while quality management is done at the business unit level). Many infrastructure activities occur at both the business unit and corporate levels, however.

Firm infrastructure is sometimes viewed only as "overhead," but can be a powerful source of competitive advantage. In a telephone operating company, for example, negotiating and maintaining ongoing relations with regulatory bodies can be among the most important activities for

competitive advantage. Similarly, proper management information systems can contribute significantly to cost position, while in some industries top management plays a vital role in dealing with the buyer.

Activity Types

Within each category of primary and support activities, there are three activity types that play a different role in competitive advantage:

- *Direct.* Activities directly involved in creating value for the buyer, such as assembly, parts machining, sales force operation, advertising, product design, recruiting, etc.
- *Indirect.* Activities that make it possible to perform direct activities on a continuing basis, such as maintenance, scheduling, operation of facilities, sales force administration, research administration, vendor record keeping, etc.
- *Quality Assurance.* Activities that ensure the quality of other activities, such as monitoring, inspecting, testing, reviewing, checking, adjusting, and reworking. Quality assurance is *not* synonymous with quality management, because many value activities contribute to quality, as will be discussed in Chapter 4.

Every firm has direct, indirect, and quality assurance value activities. All three types are present not only among primary activities but also among support activities. In technology development, for example, actual laboratory teams are direct activities, while research administration is an indirect activity.

The role of indirect and quality assurance activities is often not well understood, making the distinction among the three activity types an important one for diagnosing competitive advantage. In many industries, indirect activities represent a large and rapidly growing proportion of cost and can play a significant role in differentiation through their effect on direct activities. Despite this, indirect activities are frequently lumped together with direct activities when managers think about their firms, though the two often have very different economics. There are often tradeoffs between direct and indirect activities—more spending on

maintenance lowers machine costs. Indirect activities are also frequently grouped together into "overhead" or "burden" accounts, obscuring their cost and contribution to differentiation.

Quality assurance activities are also prevalent in nearly every part of a firm, though they are seldom recognized as such. Testing and inspection are associated with many primary activities. Quality assurance activities outside of operations are often less apparent though equally prevalent. The cumulative cost of quality assurance activities can be very large, as recent attention to the cost of quality has demonstrated. Quality assurance activities often affect the cost or effectiveness of other activities, and the way other activities are performed in turn affects the need for and types of quality assurance activities. The possibility of simplifying or eliminating the need for quality assurance activities through performing other activities better is at the root of the notion that quality can be "free."

Defining the Value Chain

To diagnose competitive advantage, it is necessary to define a firm's value chain for competing in a particular industry. Starting with the generic chain, individual value activities are identified in the particular firm. Each generic category can be divided into discrete activities, as illustrated for one generic category in Figure 2–3. An example of a complete value chain is shown in Figure 2–4, the value chain of a copier manufacturer.

Defining relevant value activities requires that activities with discrete technologies and economics be isolated. Broad functions such as manufacturing or marketing must be subdivided into activities. The product flow, order flow or paper flow can be useful in doing so. Subdividing activities can proceed to the level of increasingly narrow activities that are to some degree discrete. Every machine in a factory, for example, could be treated as a separate activity. Thus the number of potential activities is often quite large.

The appropriate degree of disaggregation depends on the economics of the activities and the purposes for which the value chain is being analyzed. Though I will return to this question in later chapters, the basic principle is that activities should be isolated and separated that (1) have different

economics, (2) have a high potential impact of differentiation, or (3) represent a significant or growing proportion of cost. In using the value chain, successively finer disaggregations of some activities are made as the analysis exposes differences important to competitive advantage; other activities are combined because they prove to be unimportant to competitive advantage or are governed by similar economics.

Selecting the appropriate category in which to put an activity may require judgment and can be illuminating in its own right. Order processing, for example, could be classified as part of outbound logistics or as part of marketing. In a distributor, the role of order processing is more a marketing function. Similarly, the sales force often performs service functions. Value activities should be assigned to categories that best represent their contribution to a firm's competitive advantage. If order processing is an important way in which a firm interacts with its buyers, for example, it should be classified under marketing. Similarly, if inbound material handling and outbound material handling use the same facilities and personnel, then both should probably be combined into one value activity and classified wherever the function has the greatest competitive impact. Firms have often gained competitive advantage by redefining the roles of traditional activities—Vetco, an oil field equipment supplier, uses customer training as a marketing tool and a way to build switching costs, for example.

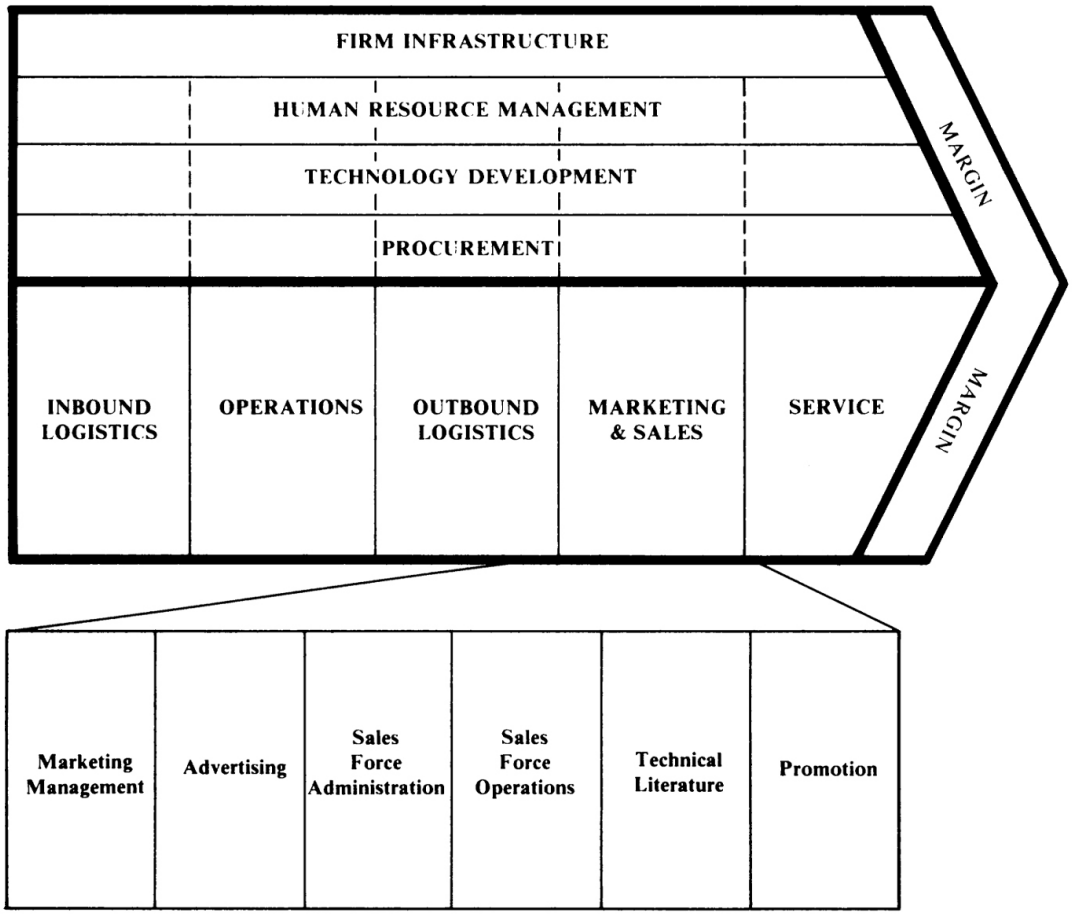


Figure 2–3. Subdividing a Generic Value Chain

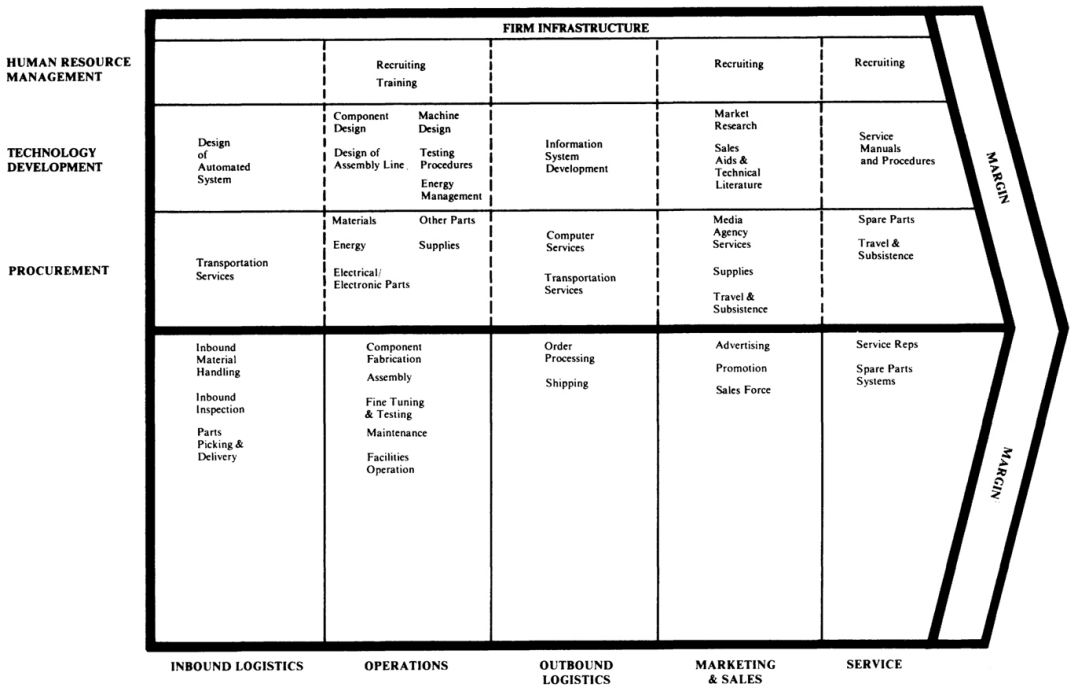


Figure 2–4. Value Chain for a Copier Manufacturer

Everything a firm does should be captured in a primary or support activity. Value activity labels are arbitrary and should be chosen to provide the best insight into the business. Labeling activities in service industries often causes confusion because operations, marketing, and after-sale support are often closely tied. Ordering of activities should broadly follow the process flow, but ordering is judgmental as well. Often firms perform parallel activities, whose order should be chosen to enhance the intuitive clarity of the value chain to managers.

Linkages within the Value Chain

Although value activities are the building blocks of competitive advantage, the value chain is not a collection of independent activities but a system of interdependent activities. Value activities are related by linkages within the value chain. Linkages are relationships between the way one value activity is performed and the cost or performance of another. For example, purchasing high-quality, precut steel sheets can simplify manufacturing and reduce scrap. In a fast food chain, the timing of promotional campaigns can influence capacity utilization. Competitive advantage frequently derives from linkages among activities just as it does from the individual activities themselves.

Linkages can lead to competitive advantage in two ways: optimization and coordination. Linkages often reflect tradeoffs among activities to achieve the same overall result. For example, a more costly product design, more stringent materials specifications, or greater in-process inspection may reduce service costs. A firm must optimize such linkages reflecting its strategy in order to achieve competitive advantage.

Linkages may also reflect the need to coordinate activities. On-time delivery, for example, may require coordination of activities in operations, outbound logistics, and service (e.g., installation). The ability to coordinate linkages often reduces cost or enhances differentiation. Better coordination, for example, can reduce the need for inveninventory throughout the firm. Linkages imply that a firm's cost or differentiation is not merely the result of efforts to reduce cost or improve performance in each value activity individually. Much of the recent change in philosophy towards

manufacturing and towards quality—strongly influenced by Japanese practice—is a recognition of the importance of linkages.

Linkages are numerous, and some are common to many firms. The most obvious linkages are those between support activities and primary activities represented by the dotted lines on the generic value chain. Product design usually affects the manufacturing cost of a product, for example, while procurement practices often affect the quality of purchased inputs and hence production costs, inspection costs, and product quality. More subtle linkages are those between primary activities. For example, enhanced inspection of incoming parts may reduce quality assurance costs later in the production process, while better maintenance often reduces the downtime of a machine. An interactive order entry system may reduce salesperson time required per buyer because salespersons can place orders faster and are freed from the need to follow up on inquiries and problems. More thorough inspection of finished goods often improves the reliability of products in the field, reducing servicing costs. Finally, frequent deliveries to buyers may reduce inventory and accounts receivable. Linkages that involve activities in different categories or of different types are often the most difficult to recognize.

Linkages among value activities arise from a number of generic causes, among them the following:

- *The same function can be performed in different ways.* For example, conformance to specifications can be achieved through high quality purchased inputs, specifying close tolerances in the manufacturing process, or 100 percent inspection of finished goods.
- *The cost or performance of direct activities is improved by greater efforts in indirect activities.* For example, better scheduling (an indirect activity) reduces sales force travel time or delivery vehicle time (direct activities); or better maintenance improves the tolerances achieved by machines.
- *Activities performed inside a firm reduce the need to demonstrate, explain, or service a product in the field.* For example, 100 percent inspection can substantially reduce service costs in the field.

- *Quality assurance functions can be performed in different ways.* For example, incoming inspection is a substitute for finished goods inspection.

Though linkages within the value chain are crucial to competitive advantage, they are often subtle and go unrecognized. The importance of procurement in affecting manufacturing cost and quality may not be obvious, for example. Nor is the link between order processing, manufacturing scheduling practices, and sales force utilization. Identifying linkages is a process of searching for ways in which each value activity affects or is affected by others. The generic causes of linkages discussed above provide a starting point. The disaggregation of procurement and technology development to relate them to specific primary activities also helps to highlight linkages between support and primary activities.

Exploiting linkages usually requires information or information flows that allow optimization or coordination to take place. Thus, information systems are often vital to gaining competitive advantages from linkages. Recent developments in information systems technology are creating new linkages and increasing the ability to achieve old ones. Exploiting linkages also frequently requires optimization or coordination that cuts across conventional organizational lines. Higher costs in the manufacturing organization, for example, may result in lower costs in the sales or service organization. Such tradeoffs may not be measured in a firm's information and control systems. Managing linkages thus is a more complex organizational task than managing value activities themselves. Given the difficulty of recognizing and managing linkages, the ability to do so often yields a *sustainable* source of competitive advantage. The specific role of linkages in cost and differentiation will be discussed in more detail in Chapters 3 and 4.

Vertical Linkages

Linkages exist not only within a firm's value chain but between a firm's chain and the value chains of suppliers and channels. These linkages, which I term vertical linkages, are similar to the linkages within the value chain—

the way supplier or channel activities are performed affects the cost or performance of a firm's activities (and vice versa). Suppliers produce a product or service that a firm employs in its value chain, and suppliers' value chains also influence the firm at other contact points. A firm's procurement and inbound logistics activities interact with a supplier's order entry system, for example, while a supplier's applications engineering staff works with a firm's technology development and manufacturing activities. A supplier's product characteristics as well as its other contact points with a firm's value chain can significantly affect a firm's cost and differentiation. For example, frequent supplier shipments can reduce a firm's inventory needs, appropriate packaging of supplier products can lower handling cost, and supplier inspection can remove the need for incoming inspection by a firm.

The linkages between suppliers' value chains and a firm's value chain provide opportunities for the firm to enhance its competitive advantage. It is often possible to benefit both the firm and suppliers by influencing the configuration of suppliers' value chains to jointly optimize the performance of activities, or by improving coordination between a firm's and suppliers' chains. Supplier linkages mean that the relationship with suppliers is *not a zero sum game* in which one gains only at the expense of the other, but a relationship in which both can gain. By agreeing to deliver bulk chocolate to a confectionery producer in tank cars instead of solid bars, for example, an industrial chocolate firm saves the cost of molding and packaging while the confectionery manufacturer lowers the cost of in-bound handling and melting. The division of the benefits of coordinating or optimizing linkages between a firm and its suppliers is a function of suppliers' bargaining power and is reflected in suppliers' margins. Supplier bargaining power is partly structural and partly a function of a firm's purchasing practices.[5] Thus *both* coordination with suppliers and hard bargaining to capture the spoils are important to competitive advantage. One without the other results in missed opportunities.

Channel linkages are similar to supplier linkages. Channels have value chains through which a firm's product passes. The channel markup over a firm's selling price (which I term channel value) often represents a large proportion of the selling price to the end user—it represents as much as 50 percent or more of selling price to the end user in many consumer goods,

such as wine. Channels perform such activities as sales, advertising, and display that may substitute for or complement the firm's activities. There are also multiple points of contact between a firm's and channels' value chains in activities such as the sales force, order entry, and outbound logistics. As with supplier linkages, coordinating and jointly optimizing with channels can lower cost or enhance differentiation. The same issues that existed with suppliers in dividing the gains of coordination and joint optimization also exist with channels.

Vertical linkages, like linkages within a firm's value chain, are frequently overlooked. Even if they are recognized, independent ownership of suppliers or channels or a history of an adversary relationship can impede the coordination and joint optimization required to exploit vertical linkages. Sometimes vertical linkages are easier to achieve with coalition partners or sister business units than with independent firms, though even this is not assured. As with linkages within the value chain, exploiting vertical linkages requires information and modern information systems are creating many new possibilities. I will discuss the role of supplier and channel linkages in competitive advantage more fully in Chapters 3 and 4.

The Buyer's Value Chain

Buyers also have value chains, and a firm's product represents a purchased input to the buyer's chain. Understanding the value chains of industrial, commercial, and institutional buyers is intuitively easy because of their similarities to that of a firm. Understanding households' value chains is less intuitive, but nevertheless important. Households (and the individual consumers within them) engage in a wide range of activities, and products purchased by households are used in conjunction with this stream of activities. A car is used for the trip to work and for shopping and leisure, while a food product is consumed as part of the process of preparing and eating meals. Though it is quite difficult to construct a value chain that encompasses everything a household and its occupants do, it is quite possible to construct a chain for those activities that are relevant to how a particular product is used. Chains need not be constructed for every household, but chains for representative households can provide an

important tool for use in differentiation analysis, to be discussed in more detail in Chapter 4.

A firm's differentiation stems from how its value chain relates to its buyer's chain. This is a function of the way a firm's physical product is used in the particular buyer activity in which it is consumed (e.g., a machine used in the assembly process) as well as *all* the other points of contact between a firm's value chain and the buyer's chain. Many of a firm's activities interact with some buyer activities. In optoelectronic parts, for example, a firm's product is assembled into the buyer's equipment—an obvious point of contact—but the firm also works closely with the buyer in designing the part, providing ongoing technical assistance, troubleshooting, order processing, and delivery. Each of these contact points is a potential source of differentiation. "Quality" is too narrow a view of what makes a firm unique, because it focuses attention on the product rather than the broader array of value activities that impact the buyer.

Differentiation, then, derives fundamentally from creating value for the buyer through a firm's impact on the buyer's value chain. Value is created when a firm creates competitive advantage for its buyer—lowers its buyer's cost or raises its buyer's performance.[6] The value created for the buyer must be perceived by the buyer if it is to be rewarded with a premium price, however, which means that firms must communicate their value to buyers through such means as advertising and the sales force. How this value is divided between the firm (a premium price) and the buyer (higher profits or more satisfaction for the money) is reflected in a firm's margin, and is a function of industry structure. The relationship between the buyer's value chain and the firm's value chain in creating and sustaining differentiation will be described in detail in Chapter 4.[7]

Competitive Scope and the Value Chain

Competitive scope can have a powerful effect on competitive advantage, because it shapes the configuration and economics of the value chain. There are four dimensions of scope that affect the value chain:[8]

- *Segment Scope.* The product varieties produced and buyers served.

- *Vertical Scope.* The extent to which activities are performed in-house instead of by independent firms.
- *Geographic Scope.* The range of regions, countries, or groups of countries in which a firm competes with a coordinated strategy.
- *Industry Scope.* The range of related industries in which the firm competes with a coordinated strategy.

Broad scope can allow a firm to exploit the benefits of performing more activities internally. It may also allow the firm to exploit interrelationships between the value chains that serve different segments, geographic areas or related industries.[9] For example, a shared sales force may sell the products of two business units, or a common brand name may be employed worldwide. Sharing and integration have costs, however, that may nullify their benefits.

Narrow scope can allow the tailoring of the chain to serve a particular target segment, geographic area or industry to achieve lower cost or to serve the target in a unique way. Narrow scope in integration may also improve competitive advantage through the firm's purchasing activities that independent firms perform better or cheaper. The competitive advantage of a narrow scope rests on *differences* among product varieties, buyers, or geographic regions within an industry in terms of the value chain best suited to serve them, or on differences in resources and skills of independent firms that allow them to perform activities better.

The breadth or narrowness of scope is clearly relative to competitors. In some industries, a broad scope involves only serving the full range of product and buyer segments within the industry. In others, it may require both vertical integration and competing in related industries. Since there are many ways to segment an industry and multiple forms of interrelationships and integration, broad and narrow scope can be combined. A firm may create competitive advantage by tuning its value chain to one product segment and exploiting geographic interrelationships by serving that segment worldwide. It may also exploit interrelationships with business units in related industries. I will discuss these possibilities in more detail in Chapter 15.

Segment Scope

Differences in the needs or value chains required to serve different product or buyer segments can lead to a competitive advantage of focusing. For example, the value chain required to serve sophisticated minicomputer buyers with in-house servicing capabilities is different from that required to serve small business users. They need extensive sales assistance, less demanding hardware performance, user-friendly software, and service capability.

Just as differences among segments favor narrow scope, however, interrelationships between the value chains serving different segments favor broad scope. General Motors' value chain for large cars is different from that for small cars, for example, but many value activities are shared. This creates a tension between tailoring the value chain to a segment and sharing it among segments. This tension is fundamental to industry segmentation and to the choice of focus strategies, the subject of Chapter 7.

Vertical Scope

Vertical integration defines the division of activities between a firm and its suppliers, channels, and buyers. A firm may purchase components rather than fabricate them itself, for example, or contract for service rather than maintain a service organization. Similarly, channels may perform many distribution, service, and marketing functions instead of a firm. A firm and its buyers can also divide activities in differing ways. One way a firm may be able to differentiate itself is by assuming a greater number of buyer activities. In the extreme case, a firm completely enters the buyer's industry.

When one views the issue of integration from the perspective of the value chain, it becomes apparent that opportunities for integration are richer than is often recognized. Vertical integration tends to be viewed in terms of physical products and replacing whole supplier relationships rather than in terms of activities, but it can encompass both. For example, a firm may rely on a supplier's applications engineering and service capability, or it may perform these activities internally. Thus there are many options regarding

what value activities a firm performs internally and what value activities it purchases. The same principles apply to channel and buyer integration.

Whether or not integration (or de-integration) lowers cost or enhances differentiation depends on the firm and the activity involved. I have discussed the factors that bear on this question in *Competitive Strategy.* The value chain allows a firm to identify more clearly the potential benefits of integration by highlighting the role of vertical linkages. The exploitation of vertical linkages does not require vertical integration, but integration may sometimes allow the benefits of vertical linkages to be achieved more easily.

Geographic Scope

Geographic scope may allow a firm to share or coordinate value activities used to serve different geographic areas. Canon develops and manufactures copiers primarily in Japan, for example, but sells and services them separately in many countries. Canon gains a cost advantage from sharing technology development and manufacturing instead of performing these activities in each country. Interrelationships are also common among partially distinct value chains serving geographic regions in a single country. For example, food service distributors such as Monarch and SISCO have many largely distinct operating units in major metropolitan areas that share firm infrastructure, procurement, and other support value activities.

Geographic interrelationships can enhance competitive advantage if sharing or coordinating value activities lowers cost or enhances differentiation. There may be costs of coordination as well as differences among regions or countries that reduce the advantage of sharing, however. The sources of competitive advantage from a global strategy and the impediments to employing one are discussed in *Competitive Strategy* and elsewhere.[10] The same principles apply to national or regional coordination of value chains.

Industry Scope

Potential interrelationships among the value chains required to compete in related industries are widespread. They can involve any value activity,

including both primary (e.g., a shared service organization) and support activities (e.g., joint technology development or shared procurement of common inputs). Interrelationships among business units are similar in concept to geographic interrelationships among value chains.

Interrelationships among business units can have a powerful influence on competitive advantage, either by lowering cost or enhancing differentiation. A shared logistical system may allow a firm to reap economies of scale, for example, while a shared sales force offering related products can improve the salesperson's effectiveness with the buyer and thereby enhance differentiation. All interrelationships do not lead to competitive advantage. Not all activities benefit from sharing. There are also always costs of sharing activities that must be offset against the benefits, because the needs of different business units may not be the same with respect to a value activity. I will describe interrelationships among business units and their implications for both corporate and business unit strategy in Chapters 9–11.

Coalitions and Scope

A firm can pursue the benefits of a broader scope internally, or enter into *coalitions* with independent firms to achieve some or all of the same benefits. Coalitions are long-term agreements among firms that go beyond normal market transactions but fall short of outright mergers. Examples of coalitions include technology licenses, supply agreements, marketing agreements, and joint ventures. Coalitions are ways of broadening scope without broadening the firm, by contracting with an independent firm to perform value activities (e.g., a supply agreement) or teaming up with an independent firm to share activities (e.g., a marketing joint venture). Thus there are two basic types of coalition—vertical coalitions and horizontal coalitions.

Coalitions can allow sharing of activities without the need to enter new industry segments, geographic areas, or related industries. Coalitions are also a means of gaining the cost or differentiation advantages of vertical linkages without actual integration, but overcoming the difficulties of coordination among purely independent firms. Because coalitions involve long-term relationships, it should be possible to coordinate more closely

with a coalition partner than with an independent firm, though not without some cost. Difficulties in reaching coalition agreements and in ongoing coordination among partners may block coalitions or nullify their benefits.

Coalition partners remain independent firms and there is the question of how the benefits of a coalition are to be divided. The relative bargaining power of each coalition partner is thus central to how the gains are shared, and determines impact of the coalition on a firm's competitive advantage. A strong coalition partner may appropriate all the gains of a shared marketing organization through the terms of the agreement, for example. The role of coalitions in competitive advantage is discussed in my book on global strategy, because they are particularly prevalent in international competition.[11]

Competitive Scope and Business Definition

The relationship between competitive scope and the value chain provides the basis for defining relevant business unit boundaries. Strategically distinct business units are isolated by weighing the benefits of integration and de-integration and by comparing the strength of interrelationships in serving related segments, geographic areas, or industries to the differences in the value chains best suited for serving them separately. If differences in geographic areas or product and buyer segments require very distinct value chains, then segments define business units. Conversely, strong and widespread benefits of integration or geographic or industry interrelationships widen the relevant boundaries of business units. Strong advantages to vertical integration widen the boundaries of a business unit to encompass upstream or downstream activities, while weak advantages to integration imply that each stage is a distinct business unit. Similarly, strong advantages to worldwide coordination of the value chains imply that the relevant business unit is global, while strong country or regional differences necessitating largely distinct chains imply narrower geographic business unit boundaries. Finally, strong interrelationships between one business unit and another may imply that they should merge into one. Appropriate business units can be defined, then, by understanding the optimal value chain for competing in different arenas and how the chains are related. I

will return to this issue after the principles of industry segmentation have been discussed in Chapter 7.

The Value Chain and Industry Structure

Industry structure both shapes the value chain of a firm and is a reflection of the collective value chains of competitors. Structure determines the bargaining relationships with buyers and suppliers that is reflected in both the configuration of a firm's value chain and how margins are divided with buyers, suppliers, and coalition partners. The threat of substitution to an industry influences the value activities desired by buyers. Entry barriers bear on the sustainability of various value chain configurations.

The array of competitor value chains is, in turn, the basis for many elements of industry structure. Scale economies and proprietary learning, for example, stem from the technology employed in competitors' value chains. Capital requirements for competing in an industry are the result of the collective capital required in the chain. Similarly, industry product differentiation stems from the way firms' products are used in buyers' value chains. Thus many elements of industry structure can be diagnosed by analyzing the value chains of competitors in an industry.

The Value Chain and Organizational Structure

The value chain is a basic tool for diagnosing competitive advantage and finding ways to create and sustain it, the subject that will dominate the chapters that follow. However, the value chain can also play a valuable role in designing organizational structure. Organizational structure groups certain activities together under organizational units such as marketing or production. The logic of those groupings is that activities have similarities that should be exploited by putting them together in a department; at the same time, departments are separated from other groups of activities because of their differences. This separation of like activities is what organizational theorists call "differentiation." With separation of organizational units comes the need to coordinate them, usually termed "integration." Thus integrating mechanisms must be established in a firm to

ensure that the required coordination takes place. Organizational structure balances the benefits of separation and integration.[12]

The value chain provides a systematic way to divide a firm into its discrete activities, and thus can be used to examine how the activities in a firm are and could be grouped. Figure 2–5 shows a value chain with a typical organizational structure superimposed. Organizational boundaries are often not drawn around the groups of activities that are most similar in economic terms. Moreover, organizational units such as the purchasing and R&D departments frequently contain only a fraction of the similar activities being performed in a firm.

The need for integration among organizational units is a manifestation of linkages. There are often many linkages within the value chain, and organizational structure often fails to provide mechanisms to coordinate or optimize them. The information necessary for coordinating or optimizing linkages is also rarely collected throughout the chain. Managers of support activities such as human resource management and technology development often do not have a clear view of how they relate to the firm's overall competitive position, something the value chain highlights. Finally, vertical linkages are often not well provided for in organizational structure.

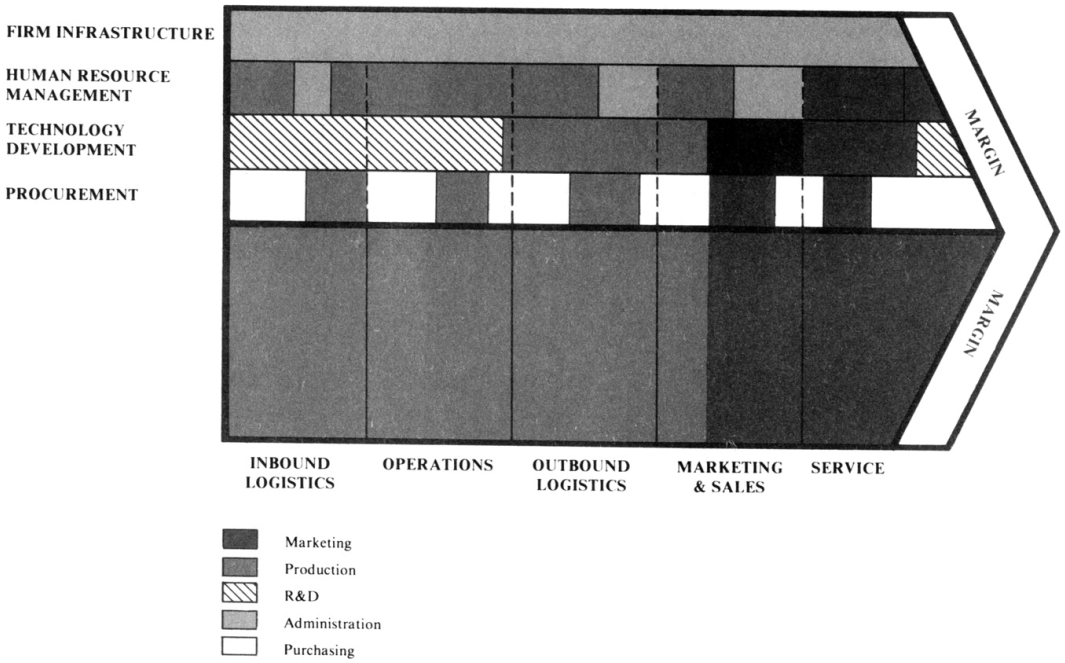


Figure 2–5. Organizational Structure and the Value Chain

A firm may be able to draw unit boundaries more in tune with its sources of competitive advantage and provide for the appropriate types of coordination by relating its organizational structure to the value chain, and the linkages within it and with suppliers or channels. An organizational structure that corresponds to the value chain will improve a firm's ability to create and sustain competitive advantage. While this subject cannot be treated in detail here, it remains an important issue in the implementation of strategy.

3
Cost Advantage

Cost advantage is one of the two types of competitive advantage a firm may possess. Cost is also of vital importance to differentiation strategies because a differentiator must maintain cost proximity to competitors. Unless the resulting price premium exceeds the cost of differentiating, a differentiator will fail to achieve superior performance. The behavior of cost also exerts a strong influence on overall industry structure.

Managers recognize the importance of cost, and many strategic plans establish "cost leadership" or "cost reduction" as goals. However, the behavior of cost is rarely well understood. Wide disagreement often exists among managers about a firm's relative cost position and the reasons underlying it. Cost studies tend to concentrate on manufacturing costs and overlook the impact of other activities such as marketing, service, and infrastructure on relative cost position. Moreover, the cost of individual activities is analyzed sequentially, without recognizing the linkages among activities that can affect cost. Finally, firms have great difficulty assessing the cost positions of competitors, an essential step in assessing their own relative positions. They often resort to simplistic comparisons of labor rates and raw material costs.

This chapter has benefited from joint work with John R. Wells.

The absence of a systematic framework for cost analysis in most firms underlies these problems. Most cost studies address narrow issues and take a short-term viewpoint. Popular tools like the experience curve are often misused in cost analysis. The experience curve can serve as a starting point,

but it ignores many of the important drivers of cost behavior and obscures important relationships among them. Cost analyses also tend to rely heavily on existing accounting systems. While accounting systems do contain useful data for cost analysis, they often get in the way of strategic cost analysis. Cost systems categorize costs in line items—such as direct labor, indirect labor, and burden—that may obscure the underlying activities a firm performs. This leads to aggregation of the costs of activities with very different economics, and to the artificial separation of labor, material, and overhead costs related to the same activity.

This chapter describes a framework for analyzing the behavior of costs, the determinants of relative cost position, and the way firms can gain a sustainable cost advantage or minimize their cost disadvantage. The framework can also reveal the cost of differentiation, and the ways a differentiated competitor can lower costs in the areas that do not undermine its differentiation. The same tools can also be used to analyze supplier and buyer cost behavior, important to both cost position and achieving differentiation.

The value chain provides the basic tool for cost analysis. I begin by showing how to define a value chain for cost analysis purposes and how to associate costs and assets with value activities. I then describe how to analyze the behavior of cost, using the concept of *cost drivers.* Cost drivers are the structural determinants of the cost of an activity, and differ in the extent to which a firm controls them. Cost drivers determine the behavior of costs within an activity, reflecting any linkages or interrelationships that affect it. A firm's cost performance in each of its major discrete activities cumulates to establish its relative cost position.

Having presented a framework for analyzing cost behavior, I turn to how a firm can assess the relative cost of competitors and achieve a sustainable cost advantage. I then describe some important pitfalls in developing an understanding of cost position. The chapter concludes with a discussion of the steps in strategic cost analysis. The techniques outlined in this chapter do not constitute a substitute for the detailed analysis of cost necessary for operations management or pricing, nor do they diminish the need for financial and cost accounting. Rather, the framework aims to help a firm understand the behavior of cost in a broad, holistic way that will guide the

search for a sustainable cost advantage and contribute to the formulation of competitive strategy.

The Value Chain and Cost Analysis

The behavior of a firm's costs and its relative cost position stem from the value activities the firm performs in competing in an industry. A meaningful cost analysis, therefore, examines costs within these activities and not the costs of the firm as a whole. Each value activity has its own cost structure and the behavior of its cost may be affected by linkages and interrelationships with other activities both within and outside the firm. Cost advantage results if the firm achieves a lower cumulative cost of performing value activities than its competitors.

Defining the Value Chain for Cost Analysis

The starting point for cost analysis is to define a firm's value chain and to assign operating costs and assets to value activities. Each activity in the value chain involves both operating costs and assets in the form of fixed and working capital. Purchased inputs make up part of the cost of every value activity, and can contribute to both operating costs (purchased operating inputs) and assets (purchased assets). The need to assign assets to value activities reflects the fact that the amount of assets in an activity and the efficiency of asset utilization are frequently important to the activity's cost.

For purposes of cost analysis, the disaggregation of the generic value chain into individual value activities should reflect three principles that are not mutually exclusive:

- the size and growth of the cost represented by the activity
- the cost behavior of the activity
- competitor differences in performing the activity

Activities should be separated for cost analysis if they represent a significant or rapidly growing percentage of operating costs or assets. While most firms can easily identify the large components of their cost, they

frequently overlook smaller but growing value activities that can eventually change their cost structure. Activities that represent a small and stagnant percentage of costs or assets can be grouped together into broader categories.

Activities must also be separated if they have different cost drivers, to be defined in more detail below. Activities with similar cost drivers can be safely grouped together. For example, advertising and promotion usually belong in separate value activities because advertising cost is sensitive to scale while promotional costs are largely variable. Any activity a business unit shares with others should also be treated as a separate value activity since conditions in other business units will affect its cost behavior. The same logic applies to any activity that has important linkages with other activities. In practice, one does not always know the drivers of cost behavior at the beginning of an analysis; hence the identification of value activities tends to require several iterations. The initial breakdown of the value chain into activities will inevitably represent a best guess of important differences in cost behavior. Value activities can then be aggregated or disaggregated as further analysis exposes differences or similarities in cost behavior. Usually an aggregated value chain is analyzed first, and then particular value activities that prove to be important are investigated in greater detail.

A final test for separating value activities is the behavior of competitors. Significant activities should be treated separately when a competitor performs them in a different way.[1] For example, People Express and other no-frills airlines offer very different on-board service than the established trunk carriers such as American, Eastern, TWA, and United. Differences among competitors raise the possibility that an activity is the source of a relative cost advantage or disadvantage.

Assigning Costs and Assets

After identifying its value chain, a firm must assign operating costs and assets to value activities. Operating costs should be assigned to the activities in which they are incurred. Assets should be assigned to the activities that employ, control, or most influence their use. The assignment of operating costs is straightforward in principle, although it can be time-consuming.

Accounting records must often be recast to match costs with value activities rather than with accounting classifications, particularly in areas such as overhead and purchased inputs.

Since assets are expensive and their selection and use often involve tradeoffs with operating costs, assets must be assigned to value activities in some way that will permit an analysis of cost behavior. Assignment of assets to activities is more complex than assignment of operating costs. Asset accounts must usually be regrouped to correspond to activities, and assets must be valued in some consistent way. There are two broad approaches to assigning assets. They may be assigned at their book or replacement value and compared to operating costs in this form, or book or replacement value may be translated into operating costs via capital charges. Either valuation approach poses difficulties. Book value may be meaningless because it is sensitive to the timing of initial purchase and to accounting policies. Calculating replacement value is also frequently a difficult task. Similarly, depreciation schedules are often arbitrary, as are capital charges for both fixed and current assets. The particular method chosen to value assets should reflect industry characteristics, which in turn will determine the most significant biases inherent in the data and the practical considerations in collecting it. The analyst must recognize the biases inherent in whatever method is chosen.[2] It may prove illuminating for cost analysis to assign assets in several ways.

The costs and assets of shared value activities should be allocated initially to the value chain of the business unit using whatever methodology the firm currently employs, typically based on some allocation formula. The cost behavior of a shared value activity reflects the activity as a whole and not just the part that is attributable to one business unit. The cost of a scale-sensitive shared activity will depend on the volume of all involved business units, for example. In addition, the allocation formulas covering shared activities may not reflect their economics but may have been set based on convenience or political considerations. As the analysis proceeds, the costs of shared activities can be refined using more meaningful allocation methods based on the cost behavior of the activities.

The time period chosen for assigning costs and assets to value activities should be representative of a firm's performance. It should recognize seasonal or cyclical fluctuations and periods of discontinuity that would

affect cost. The comparison of costs at different points in time can illuminate the effect of strategy changes, as well as help diagnose cost behavior itself. Looking at the cost of an activity during successive periods can highlight learning effects, for example, while comparing costs during periods of widely differing levels of activity may give some indications about scale sensitivity and the role of capacity utilization.

It is important to remember that assigning costs and assets does not require the precision needed for financial reporting purposes. Estimates are often more than sufficient to highlight strategic cost issues, and can be employed in assigning costs and assets to value activities where generating accurate cost figures would require great expense. As the analysis proceeds and particular value activities prove to be important to cost advantage, greater efforts at precision can be made. Finally, a firm may find that competitors assign their operating costs and assets differently. The way in which competitors measure their costs is important because it will influence their behavior. Part of the task of competitor cost analysis is to attempt to diagnose competitor costing practices.

First Cut Analysis of Costs

The allocation of costs and assets will produce a value chain that illustrates graphically the distribution of a firm's costs. It can prove revealing to separate the cost of each value activity into three categories: purchased operating inputs, human resource costs, and assets by major category. The proportions of the value chain can be drawn to reflect the distribution of costs and assets among activities as shown in Figure 3–1.

Even the initial allocation of operating costs and assets to the value chain may suggest areas for cost improvement. Purchased operating inputs will often represent a larger proportion of costs than commonly perceived, for example, because all the purchased inputs in the value chain are rarely cumulated. Other insights can result from grouping value activities into direct, indirect and quality assurance activities as defined in Chapter 2, and cumulating costs in each category. Managers often fail to recognize burgeoning indirect costs and have a tendency to focus almost exclusively on direct costs. In many firms, indirect costs not only represent a large

proportion of total cost but also have grown more rapidly than other cost elements. The introduction of sophisticated information systems and automated processes is reducing direct costs but boosting indirect costs by requiring such things as sophisticated maintenance and computer programmers to prepare machine tapes. In valve manufacturing, for example, indirect cost represents more than 10 percent of total cost. Firms can also find that the sum of all quality assurance activities in the value chain is strikingly large. In many industries, this has led to the growing conclusion that other approaches to quality assurance besides inspection, adjusting, and testing can yield large cost savings.

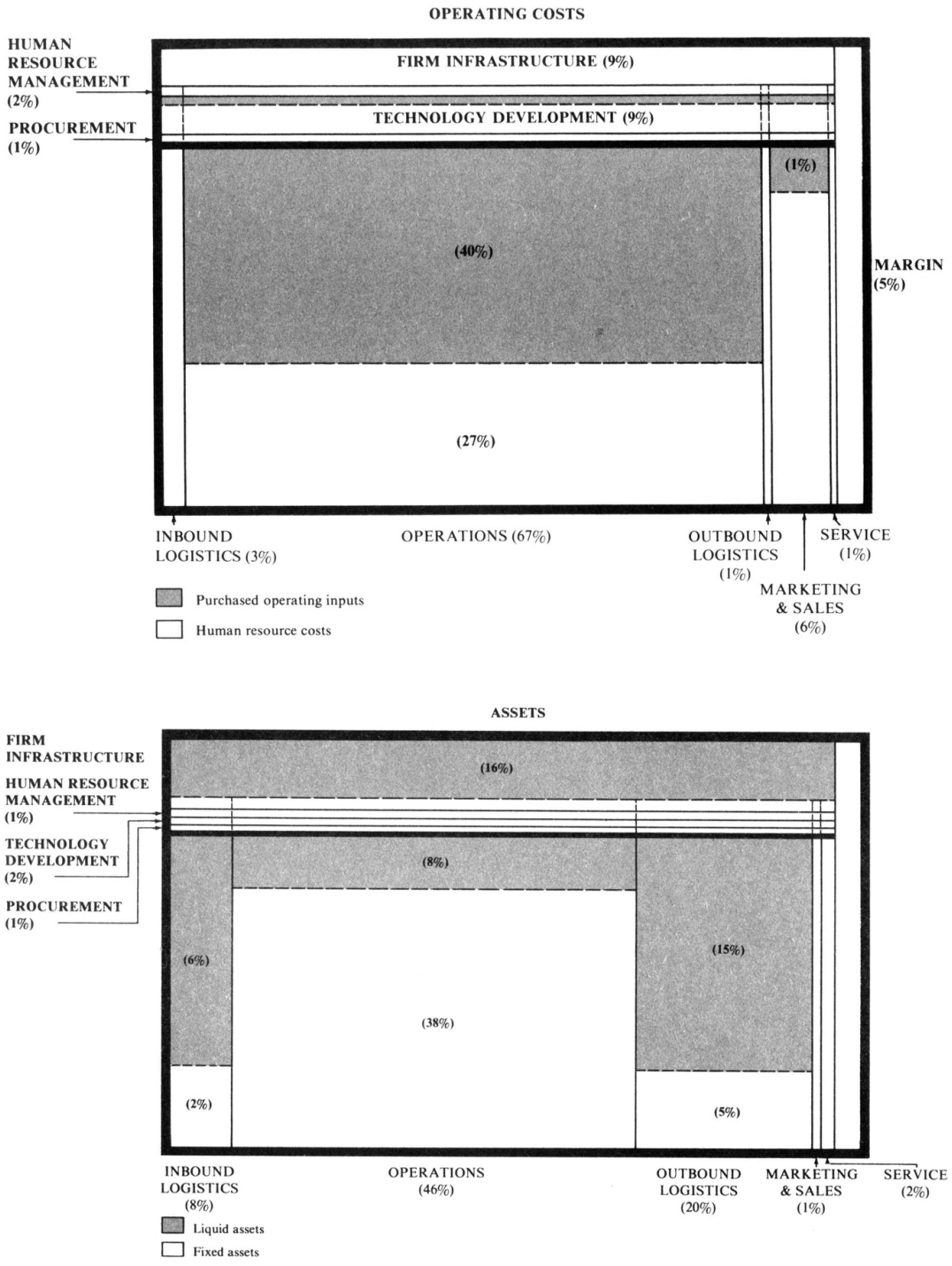


Figure 3–1. Distribution of Operating Costs and Assets in Flow Control Valves

Cost Behavior

A firm's cost position results from the cost behavior of its value activities. Cost behavior depends on a number of structural factors that influence cost, which I term *cost drivers.* Several cost drivers can combine to determine the cost of a given activity. The important cost driver or drivers can differ among firms in the same industry if they employ different value chains. A firm's relative cost position in a value activity depends on its standing vis-à-vis important cost drivers.

Cost Drivers

Ten major cost drivers determine the cost behavior of value activities: economies of scale, learning, the pattern of capacity utilization, linkages, interrelationships, integration, timing, discretionary policies, location, and institutional factors. Cost drivers are the structural causes of the cost of an activity and can be more or less under a firm's control. Drivers often interact to determine the cost behavior of a particular activity, and the relative impact of cost drivers will differ widely among value activities. Thus no one cost driver, such as scale or the learning curve, is ever the sole determinant of a firm's cost position. Diagnosing the cost drivers of each value activity allows a firm to gain a sophisticated understanding of the sources of its relative cost position and how it might be changed.

Economies or Diseconomies of Scale

The costs of a value activity are often subject to economies or diseconomies of scale. Economies of scale arise from the ability to perform activities differently and more efficiently at larger volume, or from the ability to amortize the cost of intangibles such as advertising and R&D over a greater sales volume. Economies of scale can result from efficiencies in the actual operation of an activity at higher scale as well as from less than proportional increases in the infrastructure or overhead needed to support an activity as it grows. In a bauxite mine, for example, actual mining costs go down less with scale than do infrastructure costs.

Economies of scale must be clearly distinguished from capacity utilization. Increasing capacity utilization spreads the fixed costs of existing facilities and personnel over large volume, while economies of scale imply that an activity operating at full capacity is more efficient at larger scale. Mistaking capacity utilization for economies of scale can lead a firm to the false conclusion that its costs will continue to fall if it expands capacity once its existing capacity is full.

Increasing complexity and costs of coordination can lead to diseconomies of scale in a value activity as scale increases. When the number of lines in a metal can plant exceeds about 15, for example, the complexity of the plant becomes unwieldy. Increasing scale also sometimes dampens employee motivation and may increase wage or purchased input costs. For example, a large plant may have a greater likelihood of unionization or lead to higher expectations and greater stridency of union negotiators. Diseconomies of scale in procurement can also occur if large requirements meet an inelastic supply, forcing up input prices. Diseconomies of scale appear to be present in many fashion-sensitive industries and professional services, which rely heavily on fast response times and creative individuals who do not function well in large organizations.

The scale sensitivity of activities varies widely. Value activities such as product development, national advertising, and firm infrastructure are typically more scale-sensitive than activities such as procurement and sales force operations because their costs are heavily fixed no matter what the firm's scale is. However, economies (and diseconomies) of scale can be found to some extent in virtually every value activity of a firm.

Economies of scale reflect not only the technology in a value activity but also the manner in which a firm chooses to operate it. Scale economies in a plant can be strongly affected by the number of product varieties produced and the length of runs chosen. Similarly, the deployment of a sales force can influence economies of scale in sales force operation. In a sales force organized geographically, costs tend to fall as regional sales volume grows because a salesperson can write larger orders on each sales call and/or because travel time between accounts is reduced by greater density. If the sales force is organized by product line, however, an increase in volume in

one region may create diseconomies by requiring salespersons to travel more to that region than to other regions closer to home base.

Economies of scale are not all equivalent. The relevant *measure of scale* differs among value activities and industries. Firms that overlook this often undermine their relative cost positions. For some value activities, global or worldwide scale is the relevant cost driver. For other value activities, national scale, regional scale, local scale, plant scale, project scale, scale per production line, scale per buyer, scale per order, or some other measure of scale may underlie the behavior of cost.[3]

In product R&D, for example, global or national scale are often the relevant measure of scale. Developing a new model requires a fixed investment that is amortized over all the units sold. The development cost of a standard model sold worldwide is sensitive to global scale, while the development cost of a product that must be customized for individual countries may be more sensitive to national scale. Economies of scale in transportation typically hinge on regional or local scale or on scale per buyer, depending on the mode of transportation employed. Local or regional scale is a proxy for the density of buyers and hence the distances between deliveries to different buyer's locations. Transportation suppliers also frequently offer discounts on containerload, carload, or trainload shipments to a given area that contribute to local or regional scale sensitivity. Finally, the cost of delivery to a given buyer often remains largely fixed regardless of the buyer's order size, making large buyers less costly to serve. Understanding how economies of scale affect cost, therefore, requires an identification of the specific mechanisms underpinning them and the measure of scale that best captures these mechanisms.

The appropriate measure of scale is a function of how a firm manages an activity. For example, modifying products by country instead of selling a standard product worldwide, a policy choice, changes the appropriate measure of scale. Similarly, the authorization cost of a credit card processing firm that authorizes merchant charges electronically rather than manually becomes much more sensitive to the overall volume of transactions. Thus a firm can influence not only the extent of economies of scale but also the type of scale that most determines its cost in an activity. This suggests that a firm should manage its activities to maximize their sensitivity to the type of scale in which the firm has the greatest advantage

over its competitors. A regional firm should accentuate the value of its regional scale, for example, while a national competitor without leadership in any region should manage its activities to maximize the value of its national scale.

Learning and Spillovers

The cost of a value activity can decline over time due to learning that increases its efficiency. The mechanisms by which learning can lower cost over time are numerous, and include such factors as layout changes, improved scheduling, labor efficiency improvement, product design modifications that facilitate manufacturing, yield improvements, procedures that increase the utilization of assets, and better tailoring of raw materials to the process. Learning can also reduce the cost of constructing plants, retail outlets, or other facilities. Thus the possibilities for learning in an activity are much broader than learning by personnel to perform their functions more efficiently.[4] The rate of learning varies widely among value activities because each offers differing possibilities for learning improvements.[5] Learning is often the cumulation of many small improvements rather than major breakthroughs. The rate of learning may increase during slack periods when attention is focused on reducing costs rather than meeting demand. Moreover, learning tends to vary with the amount of management attention devoted to capturing it.

Learning can spill over from one firm in an industry to another, through mechanisms such as suppliers, consultants, ex-employees, and reverse engineering of products. Where spillover of learning among firms is high in a value activity, the rate of learning may stem more from total industry learning than from the learning of one firm. Since a sustainable cost advantage results only from proprietary learning, the rate of spillover also determines whether learning serves to create a cost advantage for a firm or simply lowers cost for the industry.[6] Analysis of the rate of spillover plays a crucial role in diagnosing the relative cost differences among competitors due to differential rates of learning.

As with scale economies, the appropriate measure of the rate of learning is different for different value activities. The appropriate measure of

learning reflects the specific mechanisms of learning that account for the fall in costs over time in a value activity. This will vary because mechanisms for learning are diverse and because of the influence of spillovers. In a value activity where learning affects cost behavior through improving worker efficiency, for example, the rate of learning may be tied to the cumulative volume in that activity. In this case, the rate of learning is correlated with scale because high scale makes learning accumulate rapidly. Where learning occurs through the introduction of more efficient machinery, however, its rate may reflect the rate of technological change in machinery and have little to do with the firm's volume. The rate of learning can also be a function of calendar time or the level of investment expended in modifications to an activity. Understanding the specific mechanisms for learning in each value activity and identifying the best measure of its rate are necessary if a firm is to improve its cost position.[7] The rate of learning is often subject to diminishing returns, and hence it may decline over time for some value activities as an industry matures.

Some alternative measures that may serve as a proxy for the rate of learning in an activity and typical value activities in which they apply are shown in Table 3–1.

Pattern of Capacity Utilization

Where a value activity has substantial fixed cost associated with it, the cost of an activity will be affected by capacity utilization. Fixed costs create a penalty for underutilization, and the ratio of fixed to variable cost indicates the sensitivity of a value activity to utilization. Different ways of configuring a value activity will affect its sensitivity to capacity utilization. For example, the use of food brokers to sell to supermarkets usually reduces sensitivity to capacity utilization when compared to an in-house sales force. Brokers typically receive a commission on sales, while an in-house sales force is paid a fixed salary and expenses over and above commissions.

TABLE 3–1 Typical Measures of Learning

Cumulative volume in the activity (typical for determining machine speed or reject rates in fabrication operations)

Time in operation (typical for work-flow layout in assembly)

Cumulative investment (typical for plant efficiency)

Cumulative industry volume (typical for product design improvements that lower cost where spillovers are high)

Exogenous technical change (typical for basic process improvements)

Capacity utilization at a given point in time is a function of seasonal, cyclical, and other demand or supply fluctuations unrelated to competitive position. Thus the pattern of utilization over the entire cycle is the correct cost driver instead of utilization at one point in time. Changes in the level of capacity utilization will involve costs of expanding or contracting, so that a firm that changes its utilization will have higher costs than one that keeps its utilization constant, though they both have the same average utilization. The pattern of utilization reflects such changes, and is thus the appropriate cost driver rather than the average level of utilization. The pattern of capacity utilization of an activity is partly determined by environmental conditions and competitor behavior (particularly competitor investment behavior) and is partly under a firm's control through its policy choices in areas such as marketing and product selection.

LINKAGES

The cost of a value activity is frequently affected by how *other* activities are performed. As described in Chapter 2, two broad types of linkages exist: linkages within the value chain and vertical linkages with the value chains of suppliers and channels. These linkages mean that the cost behavior of a value activity cannot be understood by examining that activity alone. Linkages create the opportunity to lower the total cost of the linked activities. They provide a potentially powerful source of cost advantage because linkages are subtle and require joint optimization or coordination of activities across organizational lines. Competitors often fail to recognize their presence or are incapable of harnessing them.

Linkages within the Value Chain

Linkages among value activities pervade the value chain. Some of the most common linkages are those between direct and indirect activities (e.g., machining and maintenance), quality assurance and other activities (e.g., inspection and after-sale service), activities that must be coordinated (e.g., inbound logistics and operations), and between activities that are alternative ways of achieving the result (e.g., advertising and direct sales, or writing airline tickets on-board the plane instead of at ticket counters or gates). Identifying linkages requires asking the question, "What are all the other activities elsewhere in a firm that have or might have an impact on the cost of performing this activity?"

When activities in the value chain are linked, changing the way one of them is performed can reduce the total cost of both. *Deliberately* raising cost in one activity may not only lower the cost of another activity but also lower total cost. As described in Chapter 2, linkages lead to opportunities for cost reduction through two mechanisms: coordination and optimization. Better coordination of linked activities such as procurement and assembly can reduce the need for inventory, for example. Inventory is typically a manifestation of a linkage between activities, and reducing inventory is possible by managing the linkage better. Jointly optimizing activities that are linked involves resolving tradeoffs among them. In copier manufacturing, for example, the quality of purchased parts is linked to the adjustment of copiers after assembly. Canon found it could virtually eliminate the need for adjustment in its personal copier line by purchasing higher precision parts.

Vertical Linkages

Vertical linkages reflect interdependencies between a firm's activities and the value chains of suppliers and channels. The firm can identify them by examining how the behavior of suppliers or channels affects the cost of each of its activities and vice versa. Vertical linkages are frequently overlooked, because identifying them requires a sophisticated understanding of supplier and channel value chains.

Linkages with suppliers tend to center on the suppliers' product design characteristics, service, quality assurance procedures, packaging, delivery procedures, and order processing. Supplier linkages also take the form of a

supplier performing an activity that the firm might otherwise undertake. In these and other areas, the manner in which a supplier performs activities within its value chain can raise or lower a firm's cost. Typical examples of supplier linkages important to cost include the linkage between the frequency and timeliness of supplier deliveries and a firm's raw material inventory, the linkage between supplier application engineering and a firm's technology development cost, and the linkage between a supplier's packaging and a firm's material handling cost. As described in Chapter 2, for example, delivery of bulk chocolate in liquid form instead of ten pound molded bars can reduce a confectioner's processing costs. Often linkages with suppliers provide opportunities for cost reduction on both sides—e.g., delivery of liquid chocolate can reduce the supplier's cost as well, since it eliminates the cost of molding bars and packaging them.

Managing supplier linkages can lower total cost through coordination or joint optimization, as in all linkages. The easiest linkages to exploit are those where both a firm's and a supplier's cost fall. Sometimes exploiting a linkage requires that a supplier's cost go *up* to achieve a more than compensating fall in a firm's costs, however. A firm must be prepared to raise the price it gives suppliers in such cases to make exploiting the linkage worthwhile. The opposite case is also possible, and the firm must be prepared to elevate its own internal cost if the supplier offers a more-than-compensating price cut.

A similar analysis applies to *linkages with channels.* The typical linkages mirror those with suppliers. For example, the location of a channel's warehouses and the channel's materials handling technology can influence a firm's outbound logistical and packaging cost. Similarly, sales or promotional activities of channels may reduce a firm's sales cost. As with supplier linkages, channel linkages may allow both the firm and its channels to lower cost. However, exploiting channel linkages may require the channel to raise cost for a more than offsetting reduction in the firm's cost. It may be desirable, then, to *raise* margins paid to channels in return for changes in the way they operate that will reduce a firm's cost. In the United States, for example, Seiko paid its jewelers a generous fee for accepting Seiko watches for repair and shipping them to Seiko. This minimized Seiko's need for service locations and lowered the cost of processing repairs and of informing customers about repair procedures.

Since vertical linkages involve independent firms, reaching agreement on how to exploit them and how to divide the resulting gains can be difficult. Linkages that require a supplier or channel to raise cost to benefit the firm are quite difficult to achieve unless the firm has considerable bargaining power. Exploiting linkages may also require the creation of switching costs as a byproduct, tying one or both sides to the other. This often further complicates the task of agreeing on ways to exploit linkages, because reaching agreement involves a high level of commitment and trust. The payout to exploiting linkages may be great, however, because they are hard for competitors to match.

Interrelationships

Interrelationships with other business units within a firm affect cost, as will be discussed in detail in Chapter 9. The most important form of interrelationships is when a value activity can be shared with a sister unit. American Hospital Supply has found that sharing an order processing and distribution organization across many units producing medical supplies has yielded a significant cost improvement, for example, while shared marketing and distribution are benefiting such financial services firms as Citicorp and Sears. Another form of interrelationship, that I term an intangible interrelationship, involves the sharing of know-how between separate but similar value activities. Emerson Electric, for example, uses cost reduction expertise gained in one division to help lower cost in others.

Sharing a value activity raises throughput in the activity. It reduces unit costs if cost in the activity is sensitive to economies of scale or learning, or if sharing improves the pattern of capacity utilization because different business units place demands on the value activity at different times. Sharing is potentially a way to achieve scale, go down the learning curve faster, or load capacity outside of the boundaries of a single industry. Sharing is thus a potential substitute for position in a particular industry. Sharing a value activity always involves costs, however, that must be weighed against any benefits from sharing. The other form of interrelationship, sharing know-how between separate activities, lowers cost if the activities are similar and if the know-how is significant to improving

the efficiency of the activity. In effect, sharing know-how is transfering the fruits of learning from one activity to another.

Integration

The level of vertical integration in a value activity may influence its cost. The cost of an order processing system can be lower if the firm owns its own computer and software instead of contracting with a computer service bureau, for example, while the cost of an outbound logistics activity may vary depending on whether or not a firm owns its own fleet of trucks. Every value activity employs or could employ purchased inputs, and thus involves explicit or implicit integration choices.

Integration can reduce cost in a number of ways. It avoids the costs of using the market, such as procurement and transportation costs. It can allow the firm to avoid suppliers or buyers with considerable bargaining power. Integration can also lead to economies of joint operation, as where steel does not have to be reheated if it moves directly from the steelmaking to the fabrication process. However, integration can raise cost by creating inflexibility, bringing activities in-house that suppliers can perform more cheaply, undermining incentives for efficiency because the relationship with the supplying unit becomes captive, or raising exit barriers.[8] Whether integration raises, lowers, or has no effect on cost thus depends on the particular value activity and purchased input involved. Sometimes de-integration is indicated.

A firm must assess the potential benefits of integration for each important purchased input in a value activity. Conversely, it must examine those functions currently performed internally to determine whether de-integration would lower the cost of the activity without undermining the firm's strategy. Firms often ignore the de-integration option in their cost analyses. Integration and de-integration analysis must not limit itself to major inputs but should also examine ancillary services and other supporting functions. A product might be purchased without service, for example, though the two are often bundled.[9] Firms can often lower cost by integrating into some ancillary services while continuing to buy the basic product.

Timing

The cost of a value activity often reflects timing. Sometimes a firm may gain first-mover advantages from being among the first to take a particular action. The first major brand in the market may have lower costs of establishing and maintaining a brand name, for example. Gerber exploited this advantage in baby food. Learning is also inextricably linked to timing, because the timing of moves determines when learning begins. Disadvantages may also accrue to first movers. Late movers can enjoy benefits such as purchasing the latest equipment (an advantage today in computers and steel) or avoiding high product or market development costs borne by early movers. A late mover may also be able to tailor the value chain to prevailing factor costs. Another late-mover advantage may be a less senior, and therefore less costly, workforce. Newly established airlines such as People Express have much less senior workforces than established carriers such as PanAm. Furthermore, workforces assembled during difficult economic conditions may prove less interested in unionization. First-mover and late-mover advantages are discussed extensively in Chapter 5.

Timing's role in cost position may depend more on timing with respect to the business cycle or market conditions than on timing in absolute terms. For example, the timing of purchase of an offshore drilling rig in the industry's cycle strongly influences not only the interest cost but the purchase price of the rig. ODECO has purchased rigs during downturns when prices are depressed as an integral part of its cost leadership strategy. Depending on the value activity, then, timing can either raise or lower costs relative to competitors. Timing can lead to either sustainable cost advantage or a short-term cost advantage. A firm that has low cost assets because of fortuitous timing, for example, may find that the eventual need to replace those assets dramatically raises its relative cost position.

Discretionary Policies Independent of Other Drivers

The cost of a value activity is always affected by policy choices a firm makes, quite independently of other cost drivers. Discretionary policy choices reflect a firm's strategy and often involve deliberate tradeoffs

between cost and differentiation. For example, an airline's cost position is determined by such policy choices as the quality of meals, which airports are used, the level of amenities in terminals, the baggage allowance offered, and whether the airline sells tickets on-board or has in-terminal ticketing and downtown ticket offices. A "no-frills" airline reduces cost by having no meals or charging for them, using secondary airports with spartan terminals, having no free baggage allowance, and ticketing on board.

Some of the policy choices that tend to have the greatest impact on cost include:

- product configuration, performance, and features
- mix and variety of products offered
- level of service provided
- spending rate on marketing and technology development activities
- delivery time
- buyers served (e.g., small versus large)
- channels employed (e.g., fewer, more efficient dealers versus many small ones)
- process technology chosen, independent or scale, timing, or other cost drivers
- the specifications of raw materials or other purchased inputs used (e.g., raw material quality affects processing yield in semiconductors)
- wages paid and amenities provided to employees, relative to prevailing norms
- other human resource policies including hiring, training, and employee motivation
- procedures for scheduling production, maintenance, the sales force and other activities

Though policy choices always play an independent role in determining the cost of value activities, they also frequently affect or are affected by other cost drivers. Process technology is often dictated partly by scale and partly by what product characteristics are desired, for example. Moreover, other cost drivers inevitably affect the *cost* of policies. For example, an

automated ticketing and seat selection system may well be subject to economies of scale that make such a system very costly for a small airline to adopt.

Policies typically play a particularly essential role in differentiation strategies. Differentiation often rests on policy choices that make a firm unique in performing one or more value activities, deliberately raising cost in the process (see Chapter 4). A differentiator must understand the costs associated with its differentiation and compare them to the price premium that results. This can be done only by isolating the effects of policies on cost. Frequently, firms choose seemingly benign policies to differentiate themselves that prove enormously costly once their role in cost behavior becomes clear. In other cases, firms forego policies that can enhance differentiation with little impact on cost—or that are less expensive for them to implement than for their competitors. A market leader such as Owens-Corning Fiberglas, for example, can potentially differentiate itself at lower cost than other fiberglass competitors through a high spending rate on advertising. The resulting brand awareness is cheaper for Owens-Corning to achieve than competitors because of scale economies in advertising that are driven by national share.

Policies play a vital role in determining cost, and cost analysis must uncover their impact. Yet many firms do not recognize the extent to which the explicit and implicit policy choices they make determine cost. A firm must scrutinize each value activity to identify the explicit and implicit policy choices embodied in it. Sometimes policy choices are nearly invisible, because they are inherited or represent conventional wisdom that is unchallenged. An examination of competitors' policies in each activity often yields insight into the firm's explicit or implicit policy choices and suggests ways they might be modified or improved to lower costs. Policy choices can often be changed rapidly, yielding immediate cost reduction.

Location

The geographic location of a value activity can affect its cost, as can its location relative to other value activities. While location frequently reflects a policy choice, it can also stem from history, the location of inputs, and other factors. Hence, location should be treated as a separate cost driver.

The location of a value activity affects cost in a number of ways. Locations differ in the prevailing costs of labor, management, scientific personnel, raw materials, energy, and other factors. Prevailing wage levels and tax rates vary markedly by country, region within a country, and city, for example. Eaton Corporation has capitalized on this in automotive components, employing plants in Spain and Italy to achieve a low-cost position in Europe. Location can also affect the cost of a firm's infrastructure because of differences in available local infrastructure. Climate, cultural norms, and tastes also differ by location. These affect not only product needs but also the way in which a firm can perform value activities. The amenities required in a plant, for example, are partly a function of local norms. Finally, logistical costs often hinge on location. Location relative to suppliers is an important factor in inbound logistical cost, while location relative to buyers affects outbound logistical cost. Location of facilities relative to each other affects the costs of transshipping, inventory, transportation, and coordination. Location also shapes the transportation modes and communication systems available to a firm, which can affect cost.

Location has some influence, then, on the cost of almost every value activity. Firms do not always understand the impact of location beyond obvious differences such as wage rates and taxes, however. Opportunities often exist for reducing cost through relocating value activities or by establishing new patterns of location of facilities relative to each other. Changing location often involves tradeoffs—it lowers some costs while raising others. Locating to minimize transportation or other costs also frequently trades off against scale economies. Technological change that alters scale economies may alter historical tradeoffs, however, as may shifts in relative wages and other costs. Thus firms may be able to create a cost advantage through recognizing opportunities for changing location first.

Institutional Factors

Institutional factors, including government regulation, tax holidays and other financial incentives, unionization, tariffs and levies, and local content rules, constitute the final major cost driver. Institutional factors represent perhaps the single most important cost driver in the trucking industry in the

United States in the 1980s, for example. Regulatory approval for the use of double trailers could have as much as a 10 percent impact on cost. At the same time, unionized carriers have much higher wage costs relative to nonunion carriers. These two factors outweigh all the other major cost drivers by a considerable margin in determining the relative cost position of trucking firms. Another example of the role of institutional factors as a cost driver is in power costs, the single largest determinant of cost position in aluminum smelting. Power costs depend on the rates charged by power companies, a highly political issue in areas where governments own power companies. Rapid escalation of power rates in some countries has made them uncompetitive smelting locations. Favorable institutional factors can lower costs just as unfavorable ones can raise them. While institutional factors often remain outside a firm's control, means may exist to influence them or minimize their impact.

Diagnosing Cost Drivers

The same cost drivers determine asset utilization as well as operating costs in an activity. Finished good inventory turnover, for example, is often determined by the scale of the order processing activity and policies regarding delivery time. Tradeoffs can often be made between asset utilization and operating costs. A large-scale plant may have low operating costs but less asset turnover than a small-scale one, for example. Such tradeoffs must be identified in order to optimize the combination of assets and operating cost to lower total cost. Some illustrative drivers of asset utilization are shown in Table 3–2.

The cost behavior of a value activity can be a function of more than one cost driver. While one driver may exert the strongest influence on the cost of a value activity, several drivers often interact to determine cost. For example, the cost of gate operations for an airline reflects policies regarding how much service the airline provides, local scale (which influences the efficiency with which personnel and facilities are utilized), and the pattern of capacity utilization (which is a reflection of the flight schedule). Figure 3–2 illustrates the most important cost drivers in a consumer durable manufacturing firm.

A firm must attempt to quantify the relationship between cost drivers and the cost of a value activity whenever possible. This will require estimating for each activity the slope of the scale or learning curve, the cost impact of each important policy, the cost advantage or penalty of timing, and so on for each driver. Though a high degree of precision is not required, some level of quantification is necessary in order to determine the relative significance of each cost driver. Quantification will also greatly facilitate estimates of relative cost position vis-à-vis competitors.

The technology employed in a value activity is not itself a cost driver, but rather an outcome of the interplay of cost drivers. Scale, timing, location, and other drivers shape the technology employed in combination with policy decisions a firm makes. The relationship between technology and the cost drivers is important in determining the feasibility of technology changes, one of the subjects of Chapter 5.

Interactions Among Drivers. Cost drivers often interact to determine the cost of an activity. These interactions take two forms: drivers either *reinforce* or *counteract* each other. Drivers frequently reinforce or are related to each other in affecting cost. The extent of scale economies in an activity is partly determined by policy choices about how the activity will be performed as well as product mix, for example. The effect of location on cost is often related to institutional conditions such as unionization or regulation, while securing good locations may require early timing in such industries as retailing. Policy choices can also make linkages easier or more difficult to achieve, and the cost of policies is often affected by other drivers as noted earlier. The advantages of early timing can be reinforced by scale economies or learning effects, as will be discussed in Chapter 5. Integration also frequently increases scale economies.

TABLE 3–2 Illustrative Drivers of Asset Utilization for Selected Value Activities

	Operations			Physical Distribution		Order Processing	
Driver	Raw Materials Inventory	Work-in-Process Inventory	Production Facilities	Logistical Facilities	Finished Goods Inventory	Computer Systems	Accounts Receivable
Scale	Purchasing scale (that determines influence over supplier delivery)	Plant scale	Scale of facilities	Scale of facilities	Regional scale	National scale	Order scale
Learning			Experience in constructing plants	Experience in construction of facilities			
Linkages	Supplier delivery schedule and packaging			Location of channel warehouses	Channel stocking levels		Channel payment policies
Pattern of capacity utilization		Seasonality/ cyclicality of production	Seasonality/ cyclicality of production	Seasonality/ cyclicality of shipments	Fluctuations in demand		
Integration		Vertical integration	Vertical integration	Vertical integration		Vertical integration	
Timing			Date of construction Timing of asset purchases	Timing of technology choice		Timing of technology choice	
Policies	Safety stocks Payment schedule to suppliers	Safety stocks Aging or curing requirements Production technology Stability of production rate	Production technology Speed of construction of facilities	Logistics technology	Aging or curing requirements Delivery time to customers	Systems technology	Payment terms Credit policy Accounts receivable monitoring technology

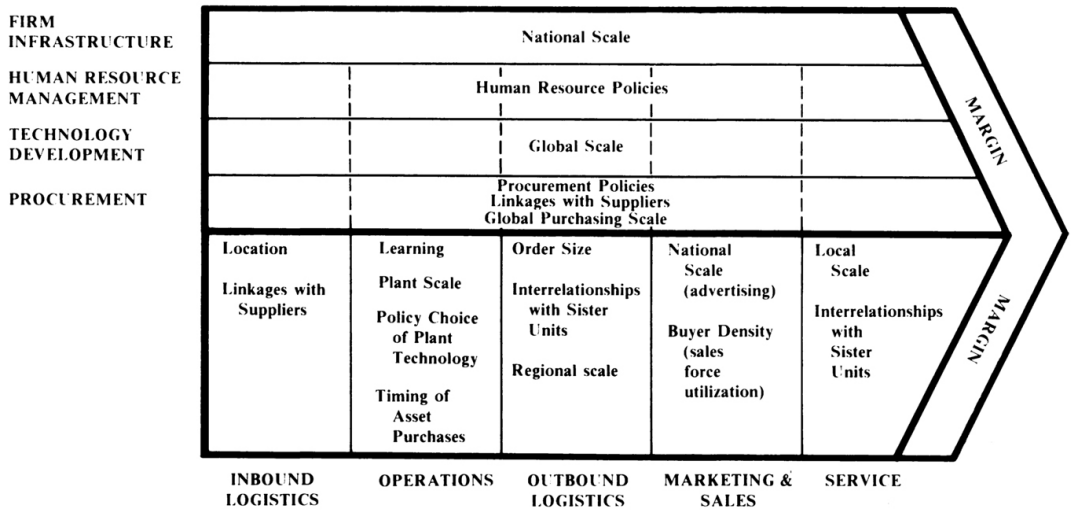


Figure 3–2. Cost Drivers in a Consumer Durable Manufacturing Firm

Cost drivers can also counteract each other, offsetting each other's effects. This means that improving position vis-à-vis one driver may worsen a firm's position vis-à-vis another. Large scale and high levels of vertical integration frequently increase the penalty of underutilizing capacity, for example. Similarly, increased scale can increase the likelihood of unionization, while scale economies can be offset because a single location raises transportation costs.

Identifying interactions among cost drivers is a necessary part of determining the cost behavior of a value activity. Where drivers are reinforcing, a firm must coordinate its strategy in order to achieve the lowest cost. For example, policy choices should enhance the firm's ability to reap the benefits of scale economies or to achieve linkages. Early timing should be exploited by the aggressive pursuit of learning. Eliminating inconsistencies and harnessing the reinforcing effects of cost drivers can significantly improve relative cost position.

The presence of counteracting cost drivers implies the need for optimization. Location must optimize the tradeoff among scale economies, transportation costs, and wage costs, for example. The choice of plant scale must weigh the cost of underutilization. Policy choices can sometimes alter such tradeoffs—for example, the choice of a flexible manufacturing process can change the tradeoff between scale and product variety. Resolving such tradeoffs is only possible if the effect of each driver on the cost of an activity can be quantified.

Interactions among cost drivers are often subtle. They are frequently not recognized, especially if they are changing. The ability to translate insight about the interaction of cost drivers into strategy choices can thus be a sustainable source of cost advantage.

Identifying Cost Drivers. Identifying cost drivers and quantifying their effect on cost may not be easy, and a number of methods can be employed. Sometimes the cost drivers of a value activity will be intuitively clear from examining its basic economics. For example, sales force costs are often driven by local share because high local share lowers travel time. A reasonably accurate estimate of the shape of the relationship between sales force cost and share can be computed by estimating how rising share would cut average travel time. It is often illuminating for understanding and

quantifying cost behavior to employ alternative measures of the efficiency of an activity besides total cost. For example, such measures as yield, scrap rates, labor hours, and others can be employed to probe the sources of cost changes in a value activity and their logic.

Another method of identifying cost drivers is for a firm to examine its own internal experience, particularly if the firm's circumstances have changed over time or it operates multiple units. Past cost data may allow a firm to plot its historical learning curve in a value activity, for example, if it adjusts for inflation and changes in policies, product design, and product mix. Cost levels at different scales of output in the past may shed some light on scale economies. If a firm sells in several geographic regions or manufactures in several plants, differences among them can illuminate cost drivers.

Cost drivers can also be determined from interviews with experts. Individuals who have extensive knowledge of a value activity can be asked "what if" questions about the effects of changing various parameters on cost. For instance, interviews with production managers might address the impact of doubling line speed on such factors as manning levels, energy consumption, and yield.

The final method for identifying cost drivers is to compare a firm's cost in a value activity to its competitors' or compare competitors' costs to each other. Since competitors will usually be situated differently vis-à-vis the cost drivers, such comparisons can expose which cost drivers are most important. Analyzing competitor cost behavior will be discussed below.

The Cost of Purchased Inputs

Procurement has strategic significance in almost every industry, but rarely has sufficient stature in firms. Every value activity employs purchased inputs of some kind, ranging from raw materials used in component fabrication to professional services, office space, and capital goods. Purchased inputs divide into purchased operating inputs and purchased assets. The total cost of purchased inputs as a percentage of firm value provides an important indicator of the strategic significance of procurement. In many industries, the total cost of purchased inputs is a very large

percentage of value, yet it receives much less attention than reducing labor costs.

The cost of purchased inputs is an integral part of the cost of a value activity, and the cost drivers described above determine the behavior of input costs. However, isolating purchased inputs for separate analysis will often yield additional insights into cost behavior. The cost of purchased inputs in an activity is a function of three factors: their unit cost, their rate of utilization in an activity, and their indirect effects on other activities through linkages. While utilization of inputs in an activity and linkages with other activities are best analyzed as part of the overall cost behavior of an activity, the *unit cost* of purchased inputs often has similar drivers across activities. Firmwide procurement practices also affect the unit cost of many inputs. Thus a firm can gain insight into how to lower unit cost by analyzing the unit cost of purchased inputs as a group.

In separating the unit cost of purchased inputs for analysis, however, a firm must recognize all three factors noted above. Better quality steel may improve the yield of a forging operation, as well as simplify machining. In some instances, then, a firm may lower total cost by spending *more* on purchased inputs. Minimizing the unit cost of purchased inputs is not necessarily appropriate. However, it is still clearly desirable to seek the best possible unit cost for purchased inputs after choosing the appropriate type and quality of inputs.

Firms' analyses of purchasing typically focus on the most visible items, especially raw materials and components. However, purchased inputs other than raw materials and components, when aggregated, often constitute an even greater percentage of cost. Standard cost systems often distribute the costs of such inputs among many cost categories rather than highlighting their importance. Purchased services such as maintenance or professional services are often overlooked in purchasing analyses, while purchases from sister units seldom receive the level of examination that is applied to outside purchases. Finally, purchased assets are frequently bought outside the normal procurement system and without the associated expertise. A comprehensive analysis of the unit cost of purchased inputs can be an important tool in gaining cost advantage.

Purchasing Information

The starting point in analyzing the unit cost of purchased inputs is to develop purchasing information. A firm should begin by identifying all significant purchased inputs and determining its yearly or quarterly expenditures on them. The list should include inputs purchased from sister business units. For purchased operating inputs, usage per period represents a relatively easy means of calculating cost. This analysis, however, must account for prepayments, discounts, and inventory changes. For purchased assets, total purchase price can be used as a measure of cost, adjusted for supplier concessions such as free service, free spare parts, or low-cost financing.

All significant purchased inputs should be identified, and listed in the order of importance to total cost. They should then be divided into purchased operating inputs and purchased assets and, within these categories, into items purchased regularly such as raw materials and office space, and irregularly purchased items such as equipment and consulting. Categorizing purchased inputs in this way can direct attention to areas where opportunities for cost reduction are frequently present. Small purchased inputs often provide fruitful opportunities for cost reduction. Managers tend to focus their attention on those few purchases that represent a significant percentage of costs. As a result, suppliers frequently generate their highest margins on purchases that represent a small cost item to the buyer. Irregularly purchased inputs frequently receive inadequate attention as well, while regular purchases are monitored and most firms have procedures to govern them. A firm should also compute the change in the inflation-adjusted cost of each input over time. Such a calculation further highlights those inputs that should be scrutinized. An increase in the real unit cost of an input may indicate that a firm has either paid inadequate attention to controlling cost or that supplier bargaining power has grown.

After sorting purchased inputs by size, regularity of purchase and real cost change, a firm should then identify *where* it makes the purchasing decision. Authority for many purchases rests outside the purchasing department. Yet the purchasing department is the place where procedures, procurement expertise, systems for tracking the costs of purchases, and the mandate to manage cost reside. Although the de facto delegation of procurement authority to other parts of a firm is often a practical necessity, it tends to obscure the cost of many purchased inputs and can lead to less

efficient procurement unless the firm applies the same care as it does in the purchasing department.

A final step in developing information about purchased inputs is to record the suppliers for each item and the proportion of purchases awarded to each supplier over an ordering cycle. The number and mix of suppliers will play an important role in determining the cost of purchased inputs. A firm must also systematically track *potential* suppliers that it does not currently purchase from. This will ensure that alternative suppliers are regularly considered and that a firm can gain perspective on the performance of its own suppliers. Often a simple list of suppliers for each input will lead to some interesting conclusions. For example, single-sourced items may represent a significant fraction of total purchases. Unless special circumstances are present, single sourcing is an indication that suppliers have created switching costs and that unit costs of inputs may be unnecessarily high.

Drivers of Purchased Input Costs

The same cost drivers identified above shape the cost behavior of purchased inputs, in combination with the bargaining relationship between the firm and suppliers that grows out of industry structure.[10] The structural bargaining relationship reflects the broader industry determinants of supplier margin, while the cost drivers address how a firm's specific circumstances can influence it. While a firm must expect to pay suppliers higher margins on some inputs for these structural reasons, the cost of all inputs can be reduced by controlling the drivers. Some drivers have similar effects on the cost of many purchased inputs, and Table 3–3 summarizes some of the most important ones. For each purchased input, position vis-à-vis the drivers will determine the unit cost of purchased inputs of a given quality.

As discussed in Chapter 2, a firm should seek to coordinate or jointly optimize supplier linkages to lower overall costs in addition to create bargaining power with its suppliers. Effective communication with suppliers is necessary to achieve linkages. Ideally, a firm can exploit the available linkages and capture its share of their benefits by exercising its bargaining

power. Procurement policies have an important role in both harnessing supplier linkages and improving a firm's bargaining power.

Supplier Cost Behavior and the Cost of Inputs

The cost behavior of suppliers will have an important influence on both the cost of inputs and the ability of a firm to exploit supplier linkages. Suppliers of a given purchased input will often vary in relative cost position, and identifying the lowest cost source may lead to lower unit purchasing costs in the long term if the firm can exercise its bargaining power. Supplier cost behavior will determine whether placing larger orders will lower suppliers' cost. Supplier cost behavior will also determine the impact on suppliers' cost of other practices a firm adopts or asks its suppliers to adopt. Supplier cost behavior is analyzed in the same way as a firm's cost behavior. Understanding the cost behavior of key suppliers will thus allow a firm to establish better purchasing policies as well as to recognize and exploit linkages.

TABLE 3–3 Drivers of the Unit Cost of Purchased Inputs

Cost Driver	Cost Driver Applied to Procurement	Description
Economies of Scale	Purchasing scale	The volume of purchasing with a given supplier affects bargaining power
Linkages	Linkages with suppliers	Coordinating with suppliers on specifications, delivery, and other activities can lower total costs
Interrelationships	Shared purchasing with other business units	Combining purchases with sister business units can improve bargaining power with suppliers
Integration	Make versus buy	Integration may raise or lower the cost of an input
Timing	History of supplier relationships	Historical loyalty to or problems with suppliers may affect input costs, access to inputs during tight periods, and services provided by suppliers
Policies	Purchasing practices*	Purchasing practices can significantly improve bargaining power with suppliers and the willingness of suppliers to perform extra services, for example:

		• Selection of the number and mix of suppliers • Hedging procedures • Investment in information on supplier costs and availability • Annual contracts versus individual purchases • Utilization of by-products
Location	Supplier location	Location of suppliers can affect the cost of inputs through the cost of transportation and the ease of communication
Institutional Factors	Government and union restrictions	Government policy can restrict access to inputs or affect their cost through tariffs, taxes, and other means. Unions may affect the ability to out-source or whether nonunion suppliers can be used

* Purchasing practices that can lower input costs will be treated more completely below.

Segment Cost Behavior

Thus far I have described how to analyze the cost behavior of a business unit as a whole. In practice, however, a business unit usually produces a number of different product varieties and sells them to a number of different buyers. It may also employ a number of different distribution channels. For example, a shipbuilder constructs both liquid natural gas tankers and containerships while a bank lends to sophisticated high net-worth individuals as well as to middle income customers. Any of these differences may give rise to segments in which the behavior of costs in the value chain may be different. Unless the firm recognizes differences in cost behavior among segments, there is a significant danger that incorrect or average-cost pricing will provide openings for competitors. Thus cost analysis at the segment level must often supplement analysis at the business unit level.

Chapter 7 discusses the identification and analysis of segments in more detail. Differences in cost behavior among products, buyers, channels, or geographic areas is one of the key bases for the existence of segments, and hence cost analysis is an essential input to segmentation. The value chain for segments generally parallels that of the whole business unit. However, segment value chains may differ in some respects that affect cost. For example, the large sizes of a product line may be produced on different machines than small sizes and require different handling, inspection, and

shipping procedures. Similarly, they may require different purchased inputs. Identifying important differences in the value activities for different segments is a starting point in segment cost analysis.

A firm should analyze the costs of those product lines, buyer types, or other portions of its activities that

- have significantly different value chains
- appear to have different cost drivers
- employ questionable procedures for allocating costs

In practice, a firm may want to select representative product varieties or buyers to illuminate differences among segments, rather than analyze every product variety or buyer in complete detail.

The process used to analyze cost behavior for segments is the same as that used for business units. The value chain for the segment is identified and costs and assets are assigned to it. Then the cost drivers of each activity are determined and quantified if possible. While the process remains the same, however, some complications often arise in practice. The prevalence of shared value activities among segments (see Chapter 7) requires the allocation of costs among segments. Standard cost systems often employ arbitrary measures as the basis for allocating cost to segments, such as sales volume or other readily measurable variables. While these measures have the benefit of simplicity, they often have little to do with the true contribution of the segment to overall costs. For example, allocating the costs of a value activity to domestic and international buyers by volume of sales will usually seriously understate the true cost of international sales, because international sales often make disproportionate demands in terms of time and attention. The costs of support activities and the costs of indirect primary activities appear to be most susceptible to misallocation. Such misallocations result in incorrect costs and inappropriate prices for product or buyer segments.

The costs of value activities shared among segments should be allocated based on each segment's actual impact on the effort or capacity of the value activity. Such measures will capture the opportunity cost of using a shared value activity in one segment instead of another. In technology development, for example, allocation should probably be based on the

estimated time spent by engineers and scientists on particular product lines rather than on the products' respective sales volumes.

It is not always feasible or necessary to allocate the costs of shared activities to segments on an ongoing basis. The required analysis for strategic purposes does not require a high degree of precision, and periodic studies can suffice. To allocate R&D costs, for example, engineers can be interviewed to determine the percentage of their time spent on various products and buyers over a period of time long enough to eliminate distortions. Some firms may also be in a position to compute time allocation by sampling engineering change orders or requests for product modifications flowing to the engineering group from the sales force. Similar methods of approximation can provide the basis for allocating effort to segments in almost any shared activity.

Cost Dynamics

In addition to analyzing cost behavior at a point in time, a firm must consider how the absolute and relative cost of value activities will change over time *independent* of its strategy. I term this *cost dynamics.* An analysis of cost dynamics enables a firm to forecast how the cost drivers of value activities may change and which value activities will increase or decrease in absolute or relative cost importance. A firm with insight into cost dynamics may be able to position itself to gain a cost advantage by anticipating these changes and moving quickly to respond to them.

Cost dynamics occur because of the interplay of cost drivers over time, as a firm grows or as industry conditions change. The most common sources of cost dynamics include:

Industry Real Growth. Growth of an industry as a whole often has a number of effects on costs. Growth can flow through to purchased inputs, affecting the scale of supplier industries and thereby the cost of inputs. In some industries, industry growth forces up the cost of purchased inputs by worsening the supply/demand balance, while in others it lowers the cost of inputs by making suppliers more efficient. Industry growth can also open up

possibilities for scale economies by making the introduction of new technologies feasible in value activities.

Differential Scale Sensitivity. Real growth (or decline) in the sales of firms can dramatically change the absolute and relative costs of value activities if activities have differing scale sensitivity. For example, software cost has become increasingly high relative to hardware cost in many electronics-related industries such as computers, video games, and telecommunication equipment, as hardware cost has proven more scale- and learning-sensitive than software cost. The same process can shift the relative cost position of firms that have value chains with differing degrees of scale sensitivity. For example, Eli Lilly's DNA-based technology for manufacturing insulin is believed to be more scale-sensitive than Novo Industries' process. If this proves to be true, Lilly's relative cost position will improve as volume grows.

Different Learning Rates. The relative cost of different value activities will change if learning occurs in them at different rates. Learning reduces the relative costs of those value activities in which it proceeds most rapidly. For example, rapid learning has dramatically reduced assembly costs as a percentage of sales for many electronics firms. As a result, differences among regions and countries in labor rates for assembly workers have diminished in importance in determining relative cost position.

Differential Technological Change. Technological changes that proceed at different rates can clearly affect the relative cost of different value activities and their cost drivers. For example, the availability of low-cost computers and the development of airfreight have fundamentally shifted the economics of many distribution industries. These changes have caused dramatic reductions in order processing costs as a percentage of total costs, and have allowed the restructuring of distributors in the direction of fewer and more centralized warehouses.

Relative Inflation of Costs. The rate of inflation in key cost elements in value activities often differs and this can significantly shift their relative cost. Differential inflation rates can quickly turn an insignificant value

activity into one of critical strategic importance, or can convert a modest cost item within an activity into the dominant one. For example, because of the rapid inflation in oil prices relative to salaries and equipment, fuel costs now constitute almost 50 percent of airline operating costs. As a result, the fuel efficiency of the fleet, the inherent efficiency of the route system, and operating procedures have taken on critical strategic importance.

Aging. An aging capital base or workforce can shift the relative cost of value activities. Older offshore drilling rigs require more maintenance and insurance, for example, and an older workforce typically has higher salary and benefit costs.

Market Adjustment. The operation of market forces often works to counteract high or low purchased input costs and to eliminate or reduce cost differentials based on favorable purchasing by individual firms. People Express and other new airlines have enjoyed extremely low aircraft costs by purchasing used planes during the recent glut. Imitators of their strategy will eventually eliminate the stock of used planes, and People Express will compete with other airlines on a more equal basis.

Cost dynamics can lead to significant changes in industry structure and relative cost position. In steelmaking, for example, technological change and changing material costs have shifted the stage at which the minimum efficient scale of a steelmaking complex is determined. The primary rolling mill historically set minimum scale, but now the blast furnace stage does. Continuous casting has emerged as a lower-cost process than primary rolling for producing semifinished steel slabs. It is also less scale-sensitive than primary rolling. These shifts have major implications for the relative cost positions of competitors, depending on their process configurations. They have led to the success of mini-mills such as Nucor and Lone Star that use continuous casting technology and also have lower-cost labor than established competitors. Early identification of cost dynamics can yield a significant cost advantage by directing a firm toward those value activities that will have the greatest leverage for *future* relative cost position but may not now be receiving attention.

Cost Advantage

A firm has a cost advantage if its cumulative cost of performing all value activities is lower than competitors' costs.[11] The strategic value of cost advantage hinges on its sustainability. Sustainability will be present if the sources of a firm's cost advantage are difficult for competitors to replicate or imitate. Cost advantage leads to superior performance if the firm provides an acceptable level of value to the buyer so that its cost advantage is not nullified by the need to charge a lower price than competitors.

A firm's relative cost position is a function of

- the composition of its value chain versus competitors'
- its relative position vis-à-vis the cost drivers of each activity

Competitors have value chains that may be similar to or different from the firm's. In airlines, for example, TWA and United employ similar value chains that differ from that of People Express. If competitors' value chains are different from that of the firm, the inherent efficiency of the two chains will determine relative cost position. Differences in value chains usually encompass only a subset of value activities and thus a firm can isolate the effect of different chains on relative cost position by comparing the cost of these differing activities.

A firm's relative cost position in value activities that are the same as competitors' depends on the firm's position vis-à-vis the cost drivers of those activities relative to competitors. If regional scale drives the cost of the sales force, for example, relative sales force cost will reflect the regional shares of competitors and the steepness of the scale curve. A firm should assess the relative cost position of common value activities one by one, and then accumulate them together with the relative cost of different activities to determine overall cost position.

Determining the Relative Cost of Competitors

The value chain is the basic tool for determining competitor costs. The first step in determining competitor costs is to identify competitor value chains and how activities are performed by them. The process is the same as

that employed by a firm to analyze its own value chain. In practice it is often extremely difficult to assess competitors' costs because the firm does not have direct information. It is usually possible to estimate directly the cost of some of a competitor's value activities from commonly available public data as well as from interviews with buyers, suppliers and others. For example, a firm can often learn the number of salespersons a competitor employs as well as their approximate compensation and expense account allowances. In this way, the costs of some of the competitor's value activities can be built up to yield an accurate but partial picture of the competitor's costs.

For value activities where a competitor's costs cannot be estimated directly, the firm should employ comparisons between itself and the competitor. This requires that the relative position of the competitor with respect to the cost drivers of the value activities in question be determined. A firm then uses its knowledge of cost behavior to estimate differences in the competitor's costs. For example, if local share drives logistical costs and the competitor has a higher local share, the competitor probably possesses a cost advantage in that value activity. If the firm can estimate the scale curve for logistical costs, the share difference provides a way of estimating the extent of the firm's disadvantage.

Given the extent to which determining a competitor's costs involves estimates and deduction, it is sometimes only feasible to estimate the *direction,* and not the absolute magnitude, of the relative cost difference with a competitor in a value activity. However, this can still prove extremely useful, since the firm can combine the direction of difference with knowledge of the proportional size of each value activity to develop a general picture of a competitor's relative cost position.

A firm can typically improve the accuracy of estimates of competitors' costs by examining several competitors simultaneously. Information disclosed by one competitor can be cross-checked against the disclosures of other competitors and used to test the consistency of scale curves or other cost models for a particular value activity. In fact, analyzing a firm's cost behavior and determining the relative costs of competitors is often an iterative process.

Gaining Cost Advantage

There are two major ways that a firm can gain a cost advantage:

- *Control cost drivers.* A firm can gain an advantage with respect to the cost drivers of value activities representing a significant proportion of total costs.
- *Reconfigure the value chain.* A firm can adopt a different and more efficient way to design, produce, distribute, or market the product.

The two sources of cost advantage are not mutually exclusive. Even a firm with a very different value chain from its competitors will have some common activities, and its relative cost position in them can enhance or detract from overall cost position.

Successful cost leaders usually derive their cost advantage from *multiple* sources within the value chain. Sustainable cost advantage stems not from one activity but from many, and reconfiguring the chain frequently plays a role in creating cost advantage. Cost leadership requires an examination of every activity in a firm for opportunities to reduce cost, and the consistent pursuit of all of them. More often than not, cost leaders have a culture emanating from senior management that reinforces such behavior. It often includes symbolic practices such as spartan facilities and limited executive perquisites.

Cost reduction may or may not erode differentiation. Every firm should aggressively pursue cost reduction in activities that do not influence differentiation (see Chapter 4). In activities that contribute to differentiation, a conscious choice may still be made to sacrifice all or part of differentiation in favor of improving relative cost position.

Controlling Cost Drivers

Once a firm has identified its value chain and diagnosed the cost drivers of significant value activities, cost advantage grows out of controlling those drivers better than competitors. A firm can potentially achieve superior position vis-à-vis the cost drivers of any activity in the value chain. Activities that represent a significant or growing proportion of cost will

offer the greatest potential for improving relative cost position. While the appropriate cost drivers will vary for each activity, some generalizations about how controlling each of the ten cost drivers can lead to cost advantage in an activity are as follows:

Controlling Scale

Gain the Appropriate Type of Scale. Increasing scale through acquisitions, product line extensions, market expansion, or marketing activity can lower cost. However, the type of scale that drives cost differs by activity. Boosting local or regional scale in an existing region will usually lower sales force or physical distribution costs, while raising national scale by entering a new region may actually raise these costs. By looking throughout the value chain for the types of scale that drive cost, the value of scale (and hence market share) of different types can be assessed. Pursuit of scale should be selectively tuned to the type of scale that drives the cost of important activities in the particular industry. Scale increases in different activities must be balanced, moreover, so that pursuing scale in one activity does not create diseconomies in another.

Set Policies to Reinforce Scale Economies in Scale-Sensitive Activities. Scale economies are partly a function of how activities are managed. Eaton has maximized its scale economies in engine valves, for example, by simplifying its product line.

Exploit the Types of Scale Economies Where the Firm Is Favored. A firm should manage activities in ways that bring out the types of scale economies that most favor it. A firm with high global share should manage product development to emphasize global scale, for example, by stressing world products rather than country-tailored ones.

Emphasize Value Activities Driven by Types of Scale Where the Firm Has an Advantage. Since different types of scale drive the cost of different value activities, a firm should set its strategy to emphasize as much as possible the activities in which it has superior scale of the appropriate type. For a regional producer competing with national firms, for example, this may

imply that sales force assistance and service should be emphasized, rather than rapid new product introduction whose cost is driven by national or global scale.

Controlling Learning

Manage with the Learning Curve. Learning does not occur automatically but results from the effort and attention of management and employees. Attention to learning should not be confined to labor costs but also to the cost of constructing facilities, the cost of scrap, and other significant value activities. Every premise and every practice must be examined for possible revision. Management must demand learning improvements and establish targets for them, rather than simply hope that learning will occur. When setting targets, the rate of learning should be compared across facilities and regions, as well as to industry standards. A firm must also establish mechanisms to facilitate the sharing of learning across facilities and business units. The sharing of learning is often impeded by geographic distance and internal rivalry.

Keep Learning Proprietary. Learning can lower a firm's relative cost position if the firm minimizes the spillover rate to competitors. Keeping learning proprietary can become an important means of achieving cost advantage in learning-sensitive value activities. Means for accomplishing this include:

- backward integration to protect know-how, such as by building or modifying production equipment in-house
- controlling employee publications or other forms of information dissemination
- retaining key employees
- strict non-disclosure provisions in employment contracts

Learn from Competitors. Pride should not interfere with exploiting the learning of competitors. Analysis of competitor value chains allows a firm to uncover good ideas that can be applied in-house. There are many ways to acquire competitor learning, including reverse engineering of competitor

products, studying published material including patent filings and articles about competitors, and maintaining relationships with competitors' suppliers to gain access to knowhow and to the latest purchased inputs.

Controlling the Effect of Capacity Utilization

Level Throughput. A firm can often increase average capacity utilization by finding ways to level the fluctuations of volume through its value chain. For example, Sun-Diamond, the agricultural cooperative that produces Sun Maid raisins, Diamond walnuts, and other products, has reduced the cost of underutilization by promoting year-round baking uses for its products. These have reduced demand differences between the Christmas season and the rest of the year. Similarly, credit card processors can level throughput by serving a mix of accounts that have peak volumes spread throughout the year, e.g., beach clubs and ski areas.

A firm can level throughput through a variety of means, including:

- peak load or contribution pricing
- marketing activity, such as increasing promotion during slack periods and finding off-season uses for the products
- line extensions into less cyclical products, or into products that can intermittently utilize excess capacity (e.g., private label)
- selecting buyers with more stable demand or demands that are counterseasonal or countercyclical
- ceding share in high demand periods and regaining it in low demand periods
- letting competitors serve fluctuating segments[12]
- sharing activities with sister business units with a different pattern of needs (see Chapter 9).

Reduce the Penalty of Throughput Fluctuations. In addition to smoothing throughput fluctuations, a firm can sometimes reduce the costs associated with fluctuations in the volume of activity. Tapered integration, for example, is a means of using suppliers to cover peak needs rather than satisfying them in-house. Canadian steel producers, for example, have avoided excess

capacity despite fluctuating sales by adding capacity for trendline demand growth rather than year-to-year demand. They sell steel produced by subcontractors and foreign firms to cover shortfalls.

Controlling Linkages

Exploit Cost Linkages Within the Value Chain. A firm can improve its cost position if it recognizes linkages among value activities and exploits them. The additional cost of achieving higher precision in machining parts may, for example, be offset by a reduction in inspection costs of the finished products. Recent technological advances are making linkages stronger and more possible to achieve. Information systems are making coordination among activities easier, while computer-aided design and manufacturing is just one example of how microelectronics is linking other activities.

Work with Suppliers and Channels to Exploit Vertical Linkages. Vertical linkages imply that relations with suppliers and channels offer possibilities for all parties to gain through the coordination and joint optimization of their respective value chains. Xerox, for example, provides suppliers with its manufacturing schedule through computer terminals, enabling suppliers to ship parts precisely when needed. Seeking out and pursuing such opportunities will require careful study of supplier and channel value chains, as well as the determination to overcome suspicion, greed, and other barriers to joint action. A firm must be prepared to share the gains of linkages with suppliers and channels in order to ensure that they can be achieved.

Controlling Interrelationships

Share Appropriate Activities. A firm can often reduce its relative costs significantly by sharing value activities with sister business units, or by entering new businesses in which opportunities for sharing exist. Chapter 9 describes in detail how to identify opportunities for sharing that lower cost.

Transfer Know-how in Managing Similar Activities. A diversified firm may also be able to transfer know-how gained in managing a value activity

to other business units with generically similar activities. The issues involved in doing so are also discussed in Chapter 9.

Controlling Integration

Examine Systematically Possibilities for Integration and De-integration. Both integration and de-integration offer the potential of lowering costs. As changes in management attitudes and new information system technology are making supplier linkages easier to achieve, de-integration is becoming more and more attractive in many industries.

Controlling Timing

Exploit First-mover or Late-mover Advantages. The first mover in an industry often reaps a long-lasting cost advantage by tying up the best locations, preempting the best personnel, gaining access to preferred suppliers, or securing patents. In some industries, in fact, only the first mover can gain a significant cost advantage. In other industries, late-movers may gain cost advantages because technology is changing rapidly or they can observe and cheaply imitate the actions of the pioneer. First-mover and late-mover advantages are discussed in Chapter 5.

Time Purchases in the Business Cycle. Purchasing assets during periods of soft demand can yield a major cost savings. This is the case for many capital goods such as machinery, ships, and even complete plants.

Controlling Discretionary Policies

Modify Expensive Policies That Do Not Contribute to Differentiation. Many policies that govern a firm's activities raise cost. Sometimes a firm consciously does so in the hope of creating differentiation. Often, however, firms fail to recognize the cost of a policy. Cost analysis will often highlight the need to modify such policies, and careful scrutiny may also reveal that a policy does not contribute meaningfully to differentiation because its costs outweigh the price premium it generates. Both situations offer opportunities for cost reduction. Chapter 4 will describe how to evaluate the role of value activities in differentiation.

Invest in Technology to Skew Cost Drivers in the Firm's Favor. New technology often underlies cost advantage. Technology can also allow a firm to make its competitor's advantages vis-à-vis cost drivers obsolete. The level of technology investment is a policy choice and most cost leaders invest aggressively. Iowa Beef, for example, spends $20 million or more on plant renovations annually. Some of the important ways in which technology investment lowers costs include:[13]

- *Developing low-cost processes.* For example, Union Carbide's Unipol process for making low-density polyethylene.
- *Facilitating automation.* For example, Iowa Beef's massive beef processing plants and K Mart's automated distribution centers.
- *Low-cost product designs.* For example, Canon's NP200 copier with fewer parts.

In some cases, the ability to apply new low-cost technology depends on scale. In soft contact lenses, for example, Bausch and Lomb's dramatically lower-cost spin casting technology for manufacturing lenses is much more scale-sensitive than lathe technology. However, the choice of technology can also be related to other cost drivers such as timing, location, or integration. A firm should invest in technology development in areas that will skew cost drivers the most in its favor.

Avoid Frills. Most cost leaders control discretionary expenses throughout their value chains. National Semiconductor executives work in spartan surroundings with few private offices, and similar characteristics apply to other cost leaders including Lincoln Electric, People Express, and Crown Cork and Seal. Such policy choices not only reduce costs in their own right but also seem to have important symbolic value.

Controlling Location

Optimize Location. The location of activities in relation to each other as well as to buyers and suppliers often contributes significantly to such things as labor rates, logistical efficiency, and supplier access. The firm that locates its facilities well will often gain a significant cost advantage. The optimal

location of activities changes over time, as is happening today in the steel industry with the emergence of mini-mills.

Controlling Institutional Factors

Do Not Take Institutional Factors as a Given. Firms can influence institutional factors such as government policies and unionization, despite a tendency to view institutional factors as beyond their control. For example, many unionized trucking companies have established nonunion subsidiaries. Firms can also frequently influence regulation through lobbying, as Japanese firms are actively seeking to do in states that have begun taxing foreign profits. A number of states are already committed to repealing their laws to avoid scaring away foreign investors.

Procurement and Cost Advantage

Procurement practices have a potentially major impact on cost position that cuts across activities. A number of possible changes in procurement can reduce costs:

Tune Specifications of Purchased Inputs to Meet Needs More Precisely. A firm can improve its cost position by ensuring that the quality of purchased inputs meets, but does not exceed, the firm's requirements. Clark Equipment, for example, has begun to move toward automotive grade components for some lift truck models, rather than more expensive and unnecessarily high-quality truck grade components.

Enhance Bargaining Leverage Through Purchasing Policies. Firms rarely view purchasing strategically or as a bargaining problem, though purchasing practices can significantly affect cost. Firms can take a number of specific actions to enhance their bargaining power with suppliers:

- Increase bargaining power in purchasing by keeping the number of sources sufficient to ensure competition, but small enough to be an important buyer to each source.
- Select suppliers who are especially competitive with each other, and divide purchases among them.

- Vary the proportion of business awarded to suppliers over time to ensure that they do not view it as an entitlement.
- Solicit occasional proposals from new suppliers, both to test market prices and gather technological intelligence.
- Enhance the leverage of purchasing scale through contracting based on annual volume with phased deliveries, instead of making frequent smaller purchases.
- Seek out opportunities to combine purchases with sister business units.
- Appoint high-quality purchasing executives to allow more sophisticated buying practices.
- Invest in information to understand suppliers' costs and market conditions better.
- Pursue technology development to eliminate or reduce the need for expensive inputs where unit costs cannot be reduced.

Select Appropriate Suppliers and Manage Their Costs. A firm should select those suppliers which are most efficient or those that offer the least costly product to use given the firm's value chain. Purchasing practices should also include promoting supplier cost reduction, aiding suppliers where necessary with technology development, and encouraging supplier practices that lower the firm's cost through linkages. Marks and Spencer, for example, has achieved a low cost position in retailing in the United Kingdom through active efforts to help suppliers adopt the most modern technology. Managing the efficiency or effectiveness of the supplier base, using an analysis of supplier value chains essentially the same as the analysis of its own chain, can be equally as important to cost position as enhancing bargaining power over suppliers.

Reconfiguring the Value Chain

Dramatic shifts in relative cost position most often arise from a firm adopting a value chain that is significantly different from its competitors'. Reconfigured value chains stem from a number of sources, including:

- a different production process

- differences in automation
- direct sales instead of indirect sales
- a new distribution channel
- a new raw material
- major differences in forward or backward vertical integration
- shifting the location of facilities relative to suppliers and customers
- new advertising media

No-frills airlines such as People Express and Southwest Airlines provide a striking example of strategies based on reconfiguring the value chain. They have adopted chains that differ markedly from trunk carriers, as shown in Table 3–4.

TABLE 3–4 Alternative Value Chains in Airlines

Trunk Airlines

Ticket Counter Operations
Full service

Gate Operations
Full service

Aircraft Operations
Purchase new aircraft
Union pilots

On-Board Service
Full service

Baggage Handling
Free baggage checking

Ticket Offices
Ticket offices in downtown locations

No-Frills Carriers

TICKET COUNTER OPERATIONS

Secondary airports and terminals
No ticket counter (or check-in only)
Purchase tickets on board the aircraft or from machines
No interline tickets
Few fare options

GATE OPERATIONS

Secondary airports and terminals
First come, first served seating
No ticketing at gates

AIRCRAFT OPERATIONS

Used aircraft
High-density seating
Nonunion pilots
Smaller crews and more flying hours per day

ON-BOARD SERVICE

Nonunion flight attendants
Snack only or no meals
Charge for food and drink served

BAGGAGE HANDLING

Provide carry-on space
Charge for checked baggage
No interline baggage

TICKET OFFICES

None

Two other examples from different industries illustrate the significant cost advantage to be gained through reconfiguration of the value chain. In beef packing, the traditional value chain involved raising cattle on isolated farms and shipping them live to labor-intensive abattoirs in major rail centers like Chicago. After the animal was slaughtered and broken, whole

sides of beef were shipped to markets where they were cut into smaller pieces by retailers. Pursuing an innovative strategy, Iowa Beef Packers built large automated plants near the cattle supply and processed the meat there into smaller "boxed" cuts. This significantly reduced transportation expense, a major cost, as well as raised yield by avoiding the weight loss that occurred when live animals were shipped. Iowa Beef also reduced costs in the operations activities in the value chain by using cheaper nonunion labor, readily available in rural areas where its new plants were located.[14]

Federal Express similarly redefined the value chain for air delivery of small parcels. Traditional competitors such as Emery and Airborne collected freight of varying sizes, shipped it via the airlines, and then delivered it to the addressee. Federal Express limited itself to small packages and flew them on company-owned planes to its central hub in Memphis where the parcels were sorted. It then flew the parcels to their destinations on the same planes and delivered them in company-owned trucks. Other dramatic reconfigurations of the value chain include the early discount retailers, discount stockbrokers, and new long distance telephone companies such as MCI and Sprint.

Reconfiguring the value chain can lead to cost advantage for two reasons. First, reconfiguration frequently presents the opportunity to fundamentally restructure a firm's cost, compared to settling for incremental improvements. The new value chain may prove inherently more efficient than the old one. The success of the no-frills airlines vividly illustrates how adopting a different value chain that is inherently cheaper can allow a firm to establish a new cost standard for an industry. On some routes, no-frills airlines have achieved costs that are as much as 50 percent lower than those of trunk carriers. Not only are activities performed more cheaply in the new value chain, but linkages are exploited. By ticketing on-board, for example, People Express significantly reduces cost in other value activities such as gate operations and ticket counter operations.

The second way an alternate value chain can lead to cost advantage is by altering the basis of competition in a way that favors a firm's strengths. Reconfiguration of the chain may *change the important cost drivers in a way that favors a firm.* Performing an activity differently can change its susceptibility to scale economies, interrelationships, locational effects, and virtually every other cost driver. In aluminum, for example, Japanese firms

are investing in the new carbothermic reduction process that converts bauxite and related ore directly into metal, skipping the intermediate alumina stage. This would nullify the Japanese firms' serious disadvantage in power costs. In the beef processing case, Iowa Beef redefined the role of location as a cost driver and increased scale sensitivity. A firm with a large market share, like Iowa Beef, often benefits from shifting to a more scale-sensitive value chain. In the case of the no-frills airlines, the new value chain is less scale-sensitive than the old one because of the reduction in indirect activities. This has been important to the success of the newly established no-frills carriers.

Coalitions and other interfirm agreements sometimes provide firms with a way to reconfigure the value chain even if they cannot do so independently. A number of multiple system operators of cable television franchises have traded franchises to increase marketing and operating efficiency, for example. Similarly, Allied Chemical and Church & Dwight have worked out a deal to swap identical raw materials produced in different locations to save transportation costs.

To identify a new value chain, a firm must examine everything it does, as well as its competitors' value chains, in search of creative options to do things differently. A firm should ask questions such as the following for every activity:

- How can the activity be performed differently or even eliminated?
- How can a group of linked value activities be reordered or regrouped?
- How might coalitions with other firms lower or eliminate costs?

Reconfiguring Downstream

Where channel costs or other downstream costs represent a significant fraction of cost to the buyer, reconfiguration of downstream activities can reduce cost substantially. Gallo's heavy use of the supermarket channel for wine provides an example. A supermarket's costs of distribution are less than that of the liquor store channel which involves distributors. By emphasizing supermarkets, Gallo has lowered the cost of getting wine to buyers. Gallo's high sales volume and faster turnover also reduce its relative

cost to the supermarket. This has made supermarkets willing to accept lower margins from Gallo than from its competitors.

The efficiency of downstream channels reflects their strategies and degree of fragmentation. Chain stores are often more efficient than single outlets, for example, and large office equipment or automobile dealers are often more efficient than smaller ones. A firm can not only choose more efficient downstream routes to the end user, but also take actions to promote consolidation or otherwise improve the efficiency of downstream entities. In extreme cases, a firm may have to integrate forward to achieve downstream efficiency.

The relative bargaining power of a firm and its downstream channels has an important influence on whether the firm will reduce its relative cost position through downstream reconfiguration. In Gallo's case, supermarkets would reap the benefits of their greater efficiency if they priced wines the same as liquor stores. However, Gallo's "pull-through" effect and intense competition among supermarkets have led to low prices and allowed Gallo to reap most of the benefits.

Cost Advantage Through Focus

A focus strategy may also provide a means for achieving a cost advantage that rests on using focus to control cost drivers, reconfiguring the value chain, or both. Since the cost of value activities as well as the most efficient value chain may differ for different segments, a firm that dedicates its efforts to a well-chosen segment of an industry can often lower its costs significantly. Federal Express based its reconfiguration of the air parcel delivery value chain on small packages requiring rapid delivery. People Express has focused on price-sensitive buyers, allowing it to eliminate many costs. In the hotel/motel industry, La Quinta offers only guest rooms, and has lowered its investment and operating costs per room by eliminating costly restaurants, conference facilities, and other services not desired by its target buyer—the middle-level manager who travels frequently to the same area.

The most dramatic improvements in relative cost position through focus usually stem from employing a different and tailored value chain to serve the target segment. The Federal Express, People Express, and La Quinta

examples all share this characteristic. Focus can also lower costs if the target segment *is associated with a key cost driver.* If regional market share is a key cost driver, for example, a regional focus strategy can yield a cost advantage over larger national competitors with small shares in the particular region.

Successful focus strategies frequently stem from innovative segmentation of an industry. Chapter 7 will describe how to segment industries and how to choose appropriate focus strategies. Industry segments grow, in part, out of product varieties, buyer groups, or geographic areas that require a different value chain or in which cost drivers differ.

Sustainability of Cost Advantage

Cost advantage will result in above-average performance only if the firm can sustain it. Improving relative cost position in unsustainable ways may allow a firm to maintain cost parity or proximity, but a firm attempting to achieve cost leadership strategy must also develop sustainable sources of cost advantage.

Cost advantage is sustainable if there are entry or mobility barriers that prevent competitors from imitating its sources. Sustainability varies for different cost drivers and from one industry to another. Some drivers, however, tend to be more sustainable than others:

- *Scale.* Scale is a key entry/mobility barrier, and the cost of replicating scale is often high because competitors must buy share.
- *Interrelationships.* Interrelationships with sister business units can force a competitor to diversify in order to match a cost advantage. If there are entry barriers into the related industries, sustainability can be high.
- *Linkages.* Linkages are often difficult for a firm to detect and require coordination across organizational lines or with independent suppliers and channels.
- *Proprietary learning.* Learning is difficult to achieve in practice; it can also be hard for competitors to catch up if learning can be kept

proprietary.

- *Policy choices to create proprietary product or process technology.* Replicating product innovations or new production processes often poses great difficulties for competitors if innovations are protected by patents or secrecy. Process innovations are often more sustainable than product innovations because secrecy is easier to maintain.

Timing and integration can also be sources of sustainable cost advantage because they are often hard to replicate. However, their sustainability will be greatest in instances where they also translate into scale or learning advantages. Location, the pattern of capacity utilization, institutional factors, and policy choices can be sources of sustainable cost advantage in some industries, although they tend to create less sustainable cost advantage on average than other drivers. Even sources of cost advantage that are less sustainable, however, can provide formidable barriers if they interact with more sustainable drivers or with each other. Policy choices that elevate scale economies can be difficult to imitate, for example.

Sustainability stems not only from the sources of the cost advantage, but also from their *number.* Cost advantage derived from one or two value activities provides an alluring target for imitation by competitors. Cost leaders usually accumulate cost advantages gained from numerous sources in the value chain that interact and reinforce each other. This makes it difficult and expensive for competitors to replicate their cost position.

Gallo provides a good example of a sustainable cost leadership strategy based on these principles. Gallo's value chain, shown in simplified form in Figure 3–3, contains numerous sources of cost advantage in many value activities. The Gallo cost advantage draws heavily on scale and proprietary technology, two of the most sustainable cost drivers. Gallo has consistently achieved a 15 percent or greater cost advantage over its major rivals. Gallo's strength encouraged Coca-Cola's exit from the wine industry, because Gallo's cost advantage dampened Coke's profitability.

The creation of a new or reconfigured value chain is a final source of sustainability in cost advantage. Competitors almost inevitably face a high cost of matching a reconfigured chain. This is particularly true for well-established competitors, who face significant mobility barriers in moving away from the industry's traditional value chain. Iowa Beef and Federal

Express, for example, have both enjoyed enduring advantages while competitors struggled to respond. Japanese aluminum producers would gain a similarly durable cost advantage in aluminum smelting if carbothermic reduction proves a success.

Implementation and Cost Advantage

This chapter has focused on how to achieve a cost advantage through changes in strategy and the way activities are performed. However, the success of cost leadership hinges on a firm's skills in actually implementing it on a day to day basis. Costs do not go down automatically or by accident but rather as a result of hard work and constant attention. Firms differ in their abilities to lower costs, even when they have similar scale or cumulative volumes or when guided by similar policies. Improving relative cost position may not require a major shift in strategy so much as greater management attention. A firm should never assume its costs are low enough.

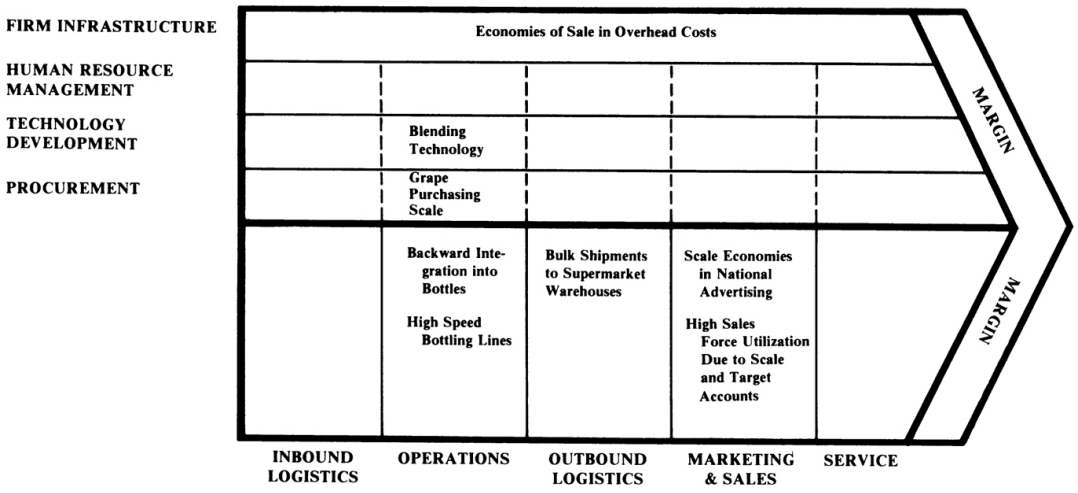


Figure 3–3. Gallo's Source of Cost Advantage in Wine

No cost driver works automatically. Scale economies are not achieved in an activity unless a firm's other activities are coordinated to provide the inputs necessary to operate smoothly at large scale. Policy choices must not dissipate the advantages of scale through product proliferation. Interrelationships will not lower cost unless affected business units actually coordinate their behavior. Learning curve advantages do not occur unless a firm's management strives to capture them.

A number of factors, including the training and motivation of employees, the firm's culture, the adoption of formal cost reduction programs, a constant pursuit of automation, and a strong belief in the learning curve contribute to a firm's ability to achieve cost leadership. Everyone in a firm has the potential to affect cost. Cost leaders have cost control programs in every value activity, not only in manufacturing. They compare activities against themselves over time, and among business units and competitors. The importance of symbolic factors in creating the climate for cost reduction also cannot be overstated. Successful cost leaders usually pay a great deal of attention to discretionary costs, in addition to tuning their strategy to achieve minimum operating costs.

Pitfalls in Cost Leadership Strategies

Many firms do not fully understand the behavior of their costs from a strategic perspective and fail to exploit opportunities to improve their relative cost position. Some of the most common errors made by firms in assessing and acting upon cost position include:

Exclusive Focus on the Cost of Manufacturing Activities. When one mentions "cost," most managers instinctively think of manufacturing. However, a significant, if not overwhelming, share of total cost is generated in activities such as marketing, sales, service, technology development, and infrastructure. These often receive too little attention in cost analysis. An examination of the entire value chain often results in relatively simple steps that can significantly reduce cost position. For example, recent advances in computers and computer-aided design are having dramatic impacts on the cost of performing research.

Ignoring Procurement. Many firms work diligently to reduce labor costs but pay scant attention to purchased inputs. They tend to view purchasing as a secondary staff function and devote few management resources to it. Analysis within the purchasing department too often centers solely on the purchase price of key raw materials. Firms often allow many items to be purchased by individuals with little expertise or motivation to reduce cost. Linkages between purchased inputs and the costs of other value activities go unrecognized. Modest changes in purchasing practices could yield major cost benefits for many firms.

Overlooking Indirect or Small Activities. Cost reduction programs usually concentrate on large cost activities and/or direct activities such as component fabrication and assembly. Activities that represent a small fraction of total cost seldom receive sufficient scrutiny. Indirect activities, such as maintenance and regulatory costs, often escape attention altogether.

False Perception of Cost Drivers. Firms often misdiagnose their cost drivers. For example, a firm with the largest national market share and the lowest costs may incorrectly assume that national market share drives cost. However, cost leadership may actually stem from the firm's large regional share in the regions in which it operates. Failing to understand the sources of its cost advantage may lead the firm to attempt to lower cost by raising national share. As a result it may worsen its cost position by reducing regional focus. It may also concentrate its defensive strategies on national competitors and ignore the more significant threat posed by strong regional competitors.[15]

Failure to Exploit Linkages. Firms rarely recognize all the linkages that affect cost, particularly linkages with suppliers and linkages among activities such as quality assurance, inspection, and service. The ability to exploit linkages underlies the success of many Japanese firms. Matsushita and Canon, among others, recognize and exploit linkages despite the fact that their policies contradict traditional manufacturing and purchasing practices. Failure to recognize linkages also leads to such errors as requiring each department to cut costs by the same amount, even though *raising* cost in some departments may lower total costs.

Contradictory Cost Reduction. Firms often attempt to reduce cost in ways that are contradictory. They try to gain market share to reap the benefits of scale economies while at the same time dissipating scale economies through model proliferation. They locate close to buyers to save freight costs but emphasize weight reduction in new product development. Cost drivers sometimes work in opposite directions, and a firm must recognize the tradeoffs.

Unwitting Cross Subsidy. Firms often engage in unwitting cross subsidy when they fail to recognize the existence of segments in which costs behave differently.[16] Conventional accounting systems rarely measure all the cost differences among products, buyers, channels, or geographic areas described above. Thus, a firm may charge excessive prices on some items in the line or to some buyers while subsidizing prices charged on others. For example, white wine requires less costly cooperage than red wine because of its lower aging requirements. If a winery sets equal prices for white and red wine based on average costs, then the price of lower-cost white wine will subsidize the price of red wine. Unwitting cross subsidy often provides an opening for competitors that understand costs and use them to undercut a firm's prices and improve their market position. Cross subsidy also exposes the firm to focused competitors that only compete in the overpriced segments.[17]

Thinking Incrementally. Cost reduction efforts often strive for incremental cost improvements in the existing value chain, rather than finding ways to reconfigure the chain. Incremental improvement can reach the point of diminishing returns, while reconfiguring the chain can lead to a whole new cost plateau.

Undermining Differentiation. Cost reduction can undermine differentiation if it eliminates a firm's sources of uniqueness to the buyer. Though doing so may be strategically desirable, it should be the result of a conscious choice. Cost reduction efforts should concentrate most on activities that do not contribute to a firm's differentiation. A cost leader will improve performance, moreover, if it differentiates in activities wherever differentiation is not costly.

Steps in Strategic Cost Analysis

The techniques described in this chapter can be summarized by outlining the steps required in strategic cost analysis:

1. Identify the appropriate value chain and assign costs and assets to it.
2. Diagnose the cost drivers of each value activity and how they interact.
3. Identify competitor value chains, and determine the relative cost of competitors and the sources of cost differences.
4. Develop a strategy to lower relative cost position through controlling cost drivers or reconfiguring the value chain and/or downstream value.
5. Ensure that cost reduction efforts do not erode differentiation, or make a conscious choice to do so.
6. Test the cost reduction strategy for sustainability.