SECTION 21
SUPPLIER RELATIONS[1]

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INTRODUCTION

> It is a tragedy that, in the West, relations between…buyer and seller have been confrontational and adversarial.…It is not uncommon for a supplier with a history of loyal service to be unceremoniously dumped when the buyer finds another supplier selling more cheaply. Nor is it uncommon for a supplier to gouge a customer during a seller's market and boom time.…In the long haul, this win-lose philosophy can turn both sides into losers. (K. R. Bhote 1987)

For many operations, purchased goods and services represent a significant component of cost. Typically, these goods and services are either: (1) those which are used or consumed or become a part of the end product (for example, raw materials and chemicals) or (2) those which support the production process itself or the personnel involved (for example, plant machinery and equipment, computer equipment, travel services, and office supplies).

[1] In the fourth edition, information on the section covering supplier relations was supplied by Frank M. Gryna.

The quality, or the fitness for use, of these purchased goods and services can heavily influence an operation's finished product quality. Furthermore, poor-quality suppliers can be a major contributor to an operation's overall cost of poor quality. It has been estimated that for the average American manufacturer, the cost of poor quality ranges from 10 to 30 percent of sales, an astounding and too often accepted cost leak (see Section 8, Quality and Costs). By ignoring this "pot of gold," manufacturers have unknowingly contributed to overall customer dissatisfaction and disloyalty, and adversely affected their own competitive positions.

Managing supplier relations has historically been the responsibility of an organization's purchasing department (also known as Procurement, Sourcing, or Materials Management). This section will review the historic roles and responsibilities of the purchasing department, and then describe how the quality revolution has redefined Purchasing's role—from a passive information transfer agent between requisitioner and supplier—to the facilitator of what we will define as the supply chain. We will then demonstrate how quality planning, quality control, and quality improvement can be applied to supplier relations to generate continuous improvement, customer satisfaction, value, and ultimately competitive advantage through the management of this supply chain.

The full value of supplier relations is achievable only if suppliers are viewed as partners with their customers in pursuit of mutual goals, rather than adversaries in a win-lose battle concerning price. The basis for building such supplier relations is cooperation, collaboration, and trust. Those not willing to build supplier relations on this foundation need not read any further.

TRADITIONAL ROLE OF PURCHASING

Following World War II, when growing demand for goods and services was satisfied by increasing plant capacity, Operations was identified as the strategic component of an organization. Purchasing was relegated to a staff support role. Purchasing's mission was to ensure that suppliers provided an uninterrupted supply of required goods and services, delivered on time and at the right price, where "right price" was usually interpreted as "lowest price."

Personnel in Purchasing departments developed competencies in supplier negotiations, bid evaluation and analysis, document administration, and market knowledge. Supplier negotiations were viewed as the major value-added activity of the Purchasing department, and supplier relations developed during these negotiations. This often resulted in adversarial supplier relations, which were focused on short-term performance. Availability and low price became the most important criteria for measuring supplier performance. As Carlisle and Parker wrote (1989): "This adversarial tendency…resulted in a great deal of management energy being spent on both sides in search of ways to capture some of the other's profit margin."

If a supplier change was made, little consideration was given to any resulting costs incurred. The new supplier's product or service might deviate slightly from that of the original supplier, translating into costs in other areas of the production process. This propensity to change suppliers resulted in many disadvantages to the purchaser, including:

- Excess inventory due to obsolescence
- Production shutdowns due to installation or operation requirements
- Transition costs such as training or maintenance testing disposal costs
- Production disruptions due to poor quality detected after the testing had been completed
- Increases in variation in the finished product
- Increases in scrap, product defect, or customer dissatisfaction

Rarely were these costs identified, aggregated, analyzed, and reduced. Furthermore, as Deming (1981) stated: "No one can outguess the future loss of business from a dissatisfied customer." In the adversarial climate that prevailed, little opportunity for collaborative root-cause analysis existed. The

costs of "lowest price" purchasing became part of the Operations overhead, and was accepted by management as a cost of doing business. If action was required, additional supplier changes might occur, thus creating more hidden costs of ownership (see Figure 21.1).

Quality problems stemming from this price fixation are nothing new, as illustrated in a famous letter of September 1, 1865, from Vauban, the Fortifications Commissioner of Louis XIV of France, to his minister, Mr. Louvois, describing quality deficiencies experienced in the fortifications program:

> …There still remain a number of buildings of previous years which are not yet terminated, and which shall never be, if we are to believe the builders. All this is due, Monseigneur, to the confusion caused by the frequent reductions in price which are attributed in your construction contracts. It is a fact that all the broken contracts, agreements not kept, and renewal of adjudications only attract the people who know nothing about the business, rogues, and ignoramuses as contractors, while those who know what they are doing do not even attempt to sign such contracts. I say that in addition they increase the price and delay the construction of the buildings which is thereby much worse.…Pay the correct price. It will always in the long run be the cheapest deal you could make. (Dunaud 1995)

QUALITY REVOLUTION

In the late 1970s and early 1980s, companies in the United States were finally shocked into the realization that quality was vital to long-term success. Basic industries, such as steel and rubber, and producers of major products, such as automobiles, consumer electronics, and optical goods, lost market share to imported goods, especially from Japan. This market-share erosion could not be fully rationalized as resulting from lower prices made possible by a strong dollar, cheap foreign labor, or illegal "dumping" (selling at below manufacturer's cost to gain a foothold in a market).

The success of these imports was largely attributable to superior quality. Put more painfully, U.S. domestic goods had become inferior to imported goods. The automobiles of General Motors, Ford, and Chrysler had a purchased content as high as 70 percent. For these companies, the logical conclusion was that the quality of finished products was largely determined by the quality of purchased goods and services. Thus, senior management of these companies began paying closer attention to supplier quality, which became a critical differentiator in supplier selection.

As Purchasing departments began to focus on supplier quality, the fourth of Deming's 14 points, "End the practice of awarding business on the basis of price tag (alone)" (Deming 1986), became the

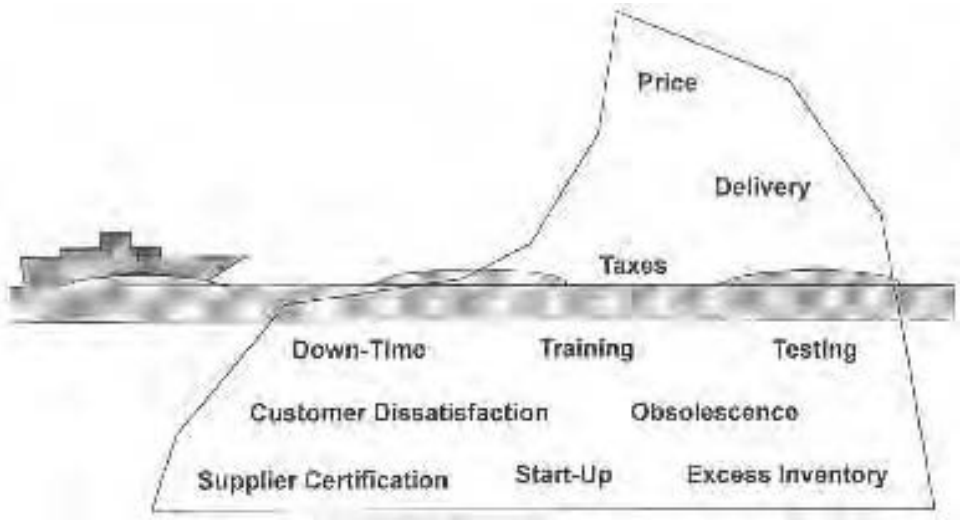

FIGURE 21.1 The total cost of changing suppliers.

framework by which purchasers approached the acquisition of goods and services. Supplier relations evolved from confrontation between adversaries to collaboration between partners trying to satisfy their common customer, the end user of the finished product or service. Because of the demonstrated benefits of this evolution, this new approach to supplier quality in the automobile industry set a pattern which began spreading throughout industry in the developed world.

SUPPLIER RELATIONS CONCEPTS DEFINED

As Purchasing's role has evolved—from passive information transfer agent between requisitioner and supplier to facilitator of the supply chain—the definitions applicable to the Purchasing function have evolved as well.

Purchasing. The tasks, activities, events, and processes required to facilitate the acquisition and delivery of a good or service required by an end user.

Supplier Relations. The tasks, activities, events, and processes required to facilitate the ongoing interface between suppliers of goods and services and the end users of those goods and services.

Supply Chain. The tasks, activities, events, processes, and interactions undertaken by *all* suppliers and *all* end users in the development, procurement, production, delivery, and consumption of a specific good or service. The coordination, integration, and monitoring of this supply chain is referred to as "supply-chain management." The extended enterprise of the supply chain includes the end users, prime supplier or distributor of a product or service, prime manufacturer, and the multiple tiers of suppliers providing goods and services to these prime manufacturers and distributors, as illustrated in Figure 21.2.

Purchasing personnel find the scope of their job expanding. Purchasing is no longer expected simply to acquire goods and services, but to engage in the proactive management of supplier relations, searching for opportunities to add value throughout this supply chain. But what is value, and how can this value be articulated, identified, measured, and managed?

Definitions of Quality and Value. "Quality" may be defined as fitness for use. The fitness for use of an acquisition can only be assessed based on a thorough understanding of the relevant customers and their needs. Value is the relative cost of acquiring quality. If two different supply chains are able to produce a product with identical fitness for use, the chain which can achieve the required fitness for use at the lower total cost of ownership is the one with the greater value. Therefore, the ability to provide a given level of quality at a reduced total cost of ownership [as a result, for example, of an initiative to reduce the cost of poor quality (COPQ)] will always result in value generation.

Total Cost of Ownership. Sometimes referred to as life-cycle cost or total system cost, total cost of ownership is the sum of all costs associated with the acquisition, installation, operations, maintenance, and retirement of a good or service.

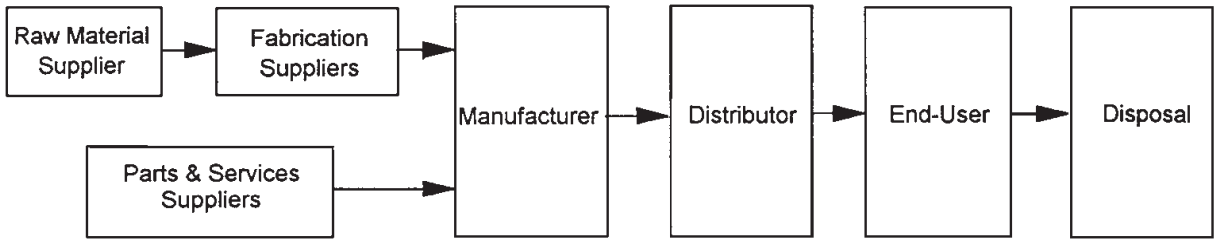

FIGURE 21.2 Elements of a supply chain.

QUALITY INCORPORATED INTO TRADITIONAL PURCHASING

Purchasing as a Strategic Process. Consider the potential opportunity if time, resources, energy, and management priorities focus on the *processes* by which these goods and services were scheduled, designed, manufactured, and purchased, rather than simply focusing on the acquisition alone. Quality and cost reduction opportunities can be identified, measured, and managed. Where two firms compete in identical markets, the ability of one firm to identify, measure, and manage these opportunities faster than another firm creates a clear competitive advantage.

Therefore, purchasing, while traditionally thought of as a utility, nonvalue-added function, is increasingly being recognized as a strategic function—an opportunity for process management and improvement and a tool for achieving competitive advantage.

> On average, manufacturers shell out 55 cents of each dollar of revenue on goods and services, from material to mail. Shrinking that bill by 5 percent can add almost 3 percent to net profits. The same arithmetic applies to service businesses.
>
> Cutting purchasing costs has surprisingly little to do with browbeating suppliers. Purchasers at companies like AT&T and Chrysler aim to reduce the total cost—not just the price—of each part or service they buy. They form enduring partnerships with suppliers that let them chip away at key costs year after year. Companies are also packaging once fragmented purchases of goods and services into company-wide contracts for each.
>
> Allied-Signal's mastery of purchasing has led to an expected 21 percent surge in profits. When the company signs a supplier, it expects a steep price cut and also demands that the supplier commit to lowering the components total cost by 6 percent in real terms each year.
>
> One way purchasing will reshape U.S. business: Look for super-suppliers to emerge as customers buy more from fewer suppliers. (Tully 1995)

Importance of Supplier Quality. To identify supplier-relations opportunities and to capitalize on them, an understanding of supplier's quality is of paramount importance. Consider the following:

- The costs associated with poor quality suppliers are high. For one home appliance manufacturer, 75 percent of all warranty claims were traced to poor quality of purchased items.
- The growing interdependency of suppliers and end users in identifying and implementing such opportunities as "just-in-time" delivery, electronic data interchange (EDI), electronic funds transfer (EFT), cycle-time reduction, and outsourcing initiatives.
- The trend to minimize incoming inspection.
- The growing trend of purchase decisions being made not on lowest price but on the total cost of ownership of the product or service.

These considerations require the purchasing function to abandon its traditional role of transaction-performance management. Expressions of this emerging approach are contained in statements from two eminent American companies.

From AT&T in 1995:

Mission: Provide worldwide professional procurement services that are a competitive advantage for AT&T and its customers.

Vision: Be THE benchmark for procurement excellence.

From Chrysler Corporation:

Mission: Manage and prepare the extended enterprise to the maximum benefit of Chrysler and its customers.

The implications of this role change are profound.

- Supplier selection is no longer the sole prerogative of the Purchasing department.
- Cooperation, collaboration, and joint problem solving among internal customers, purchasing, and suppliers is required.

- Purchasing personnel focus on process, abandoning the focus on transaction.
- Within the end user's firm, the purchasing function is elevated to a strategic level and its transaction activities and responsibilities minimized or eliminated.

A successful transition to a strategic approach to purchasing requires everyone in an organization to embrace a new belief system concerning purchasing. In the transition, senior management will find it necessary to aggressively promote the new view, which might be summarized as follows:

> Purchasing has become a key strategic process within our organization, requiring a staff of highly skilled professionals committed to working with our end users and suppliers, in a collaborative, problem-solving environment, facilitating quality and continuous improvement.

Shift to Strategic Purchasing. The differences between the traditional view of purchasing and the strategic view are dramatic. They are summarized in Table 21.1. The differences require some significant changes in culture and behavior.

Total Cost of Ownership. The most fundamental shift in the purchasing professional's behavior is to base purchase decisions on the total cost of ownership. Taking a total process approach (rather than a transactional approach) to quantifying the total cost of ownership will result in the identification of supplier, end-user, and joint costs which will need to be identified and measured. Many of these costs will be reduced through joint problem solving. Table 21.2 offers a sample list of elements of Total Cost of Ownership.

TABLE 21.1 Traditional Versus Strategic View of the Purchasing Process

Aspect in the purchasing process	Traditional view	Strategic view
Supplier/buyer relationship	Adversarial, competitive, distrusting	Cooperative, partnership, based on trust
Length of relationship	Short term	Long term, indefinite
Criteria for quality	Conformance to specifications	Fitness for use
Quality assurance	Inspection upon receipt	No incoming inspection necessary
Communications with suppliers	Infrequent, formal, focus on purchase orders, contracts, legal issues	Frequent, focus on the exchange of plans, ideas, and problem-solving opportunities
Inventory valuation	An asset	A liability
Supplier base	Many suppliers, managed in aggregate	Few suppliers, carefully selected and managed
Interface between suppliers and end users	Discouraged	Required
Purchasing's strategy	Manage transactions, troubleshoot	Manage processes and relationships
Purchasing business plans	Independent of end-user organization business plans	Integrated with end-user organization business plans
Geographic coverage of suppliers	As required to facilitate leverage	As required to facilitate problem solving and continuous improvement
Focus of Purchasing decisions	Price	Total cost of ownership
Key for Purchasing's success	Ability to negotiate	Ability to identify opportunities and collaborate on solutions

TABLE 21.2 Sample Checklist for Total Cost of Ownership Consideration

Category	Subcategory	Cost component
Preacquisition	Preprocurement cost	Engineering/design Supplier survey Supplier audit/site visits Product testing/technical review Regulatory compliance Market assessment Customer reviews/briefings
Acquisition	Material equipment cost	Price of material/equipment Cost of special features Shipping/handling/storage Spare parts Leased items Taxes
	New technology costs	Modification/retrofit Additional training
	Foreign acquisition costs	Foreign surtax Import duties Foreign currency risk Additional testing requirements
	Installation/start-up costs	Labor Subcontractor Special testing Construction equipment Required overhead Training Special tools Service engineering Inspection
Ownership	Operating/maintenance costs	Administration/overhead Ongoing labor Routine testing requirements Ongoing training Energy usage Preventative maintenance
	Inventory costs	Personnel required Inventory carrying costs
	Failure costs	Cost of expected down time Replacement parts
	Obsolescence costs	Energy efficiency Productivity loss
	Other costs of ownership	Environmental impact Licensing, permitting Environmental control equipment Conformance costs Standardization costs
Disposal	Disposition cost	Removal Salvage costs/value Disposal

SUPPLY-CHAIN OPTIMIZATION

The goal of a strategic purchasing function is to facilitate the performance of the supply chain. This process facilitation includes participation of the end users and suppliers. Supply-chain optimization is the *ongoing* management and continuous measurable improvement in the performance of this supply chain, generating value for *all* involved. The entire supply chain must be considered, including indirect suppliers, manufacturers, distributors, and end users. Note that the key words in this definition are:

- *Ongoing:* Supply-chain optimization is not an event, but an ongoing process
- *Measurable:* The results of supply-chain optimization are tangible benefits
- *Improvement:* The foundation of supply-chain optimization is continuous improvement
- *All:* True supply-chain optimization requires participation of all parties involved to share in the benefits

Axioms of Supply-Chain Optimization. The Consortium for Advanced Manufacturing—International (CAM—I) group of Arlington, TX, is a not-for-profit organization that was formed in 1972 to further the cooperative research and development efforts of companies with common interests in competitive business practices and enabling technologies. In 1992, CAM—I's membership began to focus on the performance and optimization of the supply chain. They conducted extensive benchmarking on Best Practices in customer-supplier relations. They have developed axioms for successful supply-chain optimization (Figure 21.3).

The last axiom, concerning competition, was written to quell the fears of those who said that supply-chain relationships may cause suppliers to lose touch with the marketplace.

Goal of Supply-Chain Optimization. The overriding goal of quality-focused supplier chain optimization is increased customer satisfaction through the joint (suppliers and end user) creation of value in the supply chain. On the supplier side, participation in such an initiative as supply chain optimization extends beyond the role of the account executive and includes the participation of those actually involved in the manufacturing and delivery of the product in question.

In addition, on the end user side, participation in such a venture extends beyond the Purchasing department, and includes participants from the core operating business units. In fact, while such a team effort is typically facilitated by a Purchasing individual, the team should be lead, and accountability of results assigned to, a member of the core business unit. More will be said about organizing for supplier relations later.

Supply-chain optimization creates value in the following six areas:

Quality Improvement: Continuous reduction in product variation and the ability to plan and build quality into each component and service, with measurable results.

1. There is a shared specific focus on satisfying their common end consumer.
2. There is an alignment of vision.
3. There is a fundamental level of cooperation, commitment to performance, and trust.
4. There is open and effective communication.
5. Decisions are made by maximizing the use of the competencies and knowledge on both sides of the relationship.
6. All stakeholders are committed to generating long-term mutual benefits.
7. There is a common view of how success is measured.
8. Both sides are committed to continuous improvement and breakthrough advancements.
9. Whenever competitive pressures exist in the environment they are allowed to exist in the extended enterprise.

FIGURE 21.3 Axioms for successful supply-chain optimization (Reprinted with permission of CAM—I. Zampino, Boykin, Doyle, Parker and CAM—1 1995.)

Cycle-Time Reduction: Continuous reduction in the time required to make and implement key decisions and perform various processes.

Cost of Poor Quality Reduction: Continuous measurement and reduction of costs associated with the prevention, inspection, and failure resulting from poor quality.

Total Cost of Ownership Reduction: Purchasing decisions based on total cost of ownership, including preprocurement, acquisition, operation, and disposal costs, rather than price alone. Continuously manage the ongoing acquisition based on the identification and elimination of root-cause cost drivers which contribute to total cost of ownership.

Technology/Innovation: Continuous identification and deployment of value-added technologies through joint planning and development.

Shared Risk: Continuous identification of opportunities to identify and share risk throughout the supply chain.

Successful supply chain optimization requires that the sourcing process operate as a single seamless entity, rather than a set of discrete processes. Members of the supply chain establish goals and work together toward these goals, which target the satisfaction of customer needs. As stated by Parker and Doyle (1995), "the goal of supply chain optimization is to have the three or more links function as one organism, where real-time decision making occurs throughout the supply chain."

ORGANIZING FOR SUPPLIER RELATIONS—INTERNAL

The following paragraphs will review the internal organizational characteristics required for the successful initiation, implementation, and ongoing nurturing of supplier relations which generate value within the supply chain. First, we will briefly review the sourcing process. Second, we will review two of the classic organization structures currently in use—Functional and Process-Based Organizations—and briefly outline the strengths and weaknesses of each. Third, we will identify 10 principles which facilitate the supply chain in highly effective purchasing organizations. Fourth, we will discuss the skill set required for strategic purchasing. Last, we will review the possible impact several contemporary organizational issues are having upon the successful management of the sourcing process.

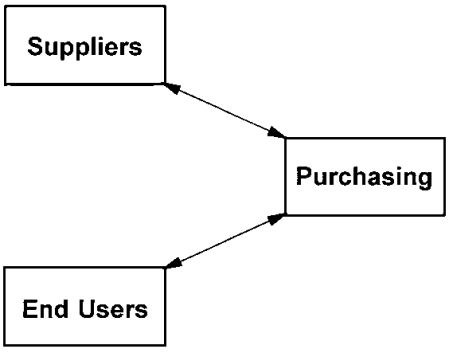

FIGURE 21.4 Traditional role of Purchasing department: managing the transaction between supplier and end users.

The Sourcing Process. As previously stated, supplier relations are defined as those tasks, activities, events, and processes required to facilitate the ongoing interface between suppliers of goods and services and the end users of those goods and services. Historically, these processes were thought to be incorporated in the buying process, and therefore Purchasing departments became collective groups of buyers, whose job was to buy the correct requisitioned item at as low a cost as possible. These relationships are represented in Figure 21.4.

Increasingly, organizations developed an understanding of the potential value-added activities in the ongoing management of the supply chain. More and more, companies are identifying the tasks, activities, events, and processes required to facilitate the ongoing interface between suppliers of goods and services and the end users of those goods and services as including:

- Quality planning
- Business planning and customer goal alignment

- Market assessments and analysis
- Customer identification
- Customer needs assessments
- Design specification determination and analysis
- Forecasting of Purchasing activity
- Consolidation of forecasted Purchasing activity
- Supplier evaluations and selection
- Establishment of supplier agreements
- Communication of supplier agreements
- Spot buying in response to emergency events
- Shipment and logistics planning and optimization
- Inventory control and optimization
- Quality control
- Accounts payable
- Value analysis
- Customer satisfaction assessments
- Quality improvement

Purchasing now becomes the facilitator of the sourcing process, requiring joint participation of purchasing, end users, and suppliers. The new purchasing relationships are represented by Figure 21.5.

The redefined role of purchasing, and the activities required to facilitate supplier relations, are such that the successful planning, control, and improvement of these processes will provide a higher value generated to the end user. Furthermore, an enterprise-wide commitment to a strategic approach to managing supplier relations would likely result in that firm gaining a competitive advantage vis-a-vis a competitor using its Purchasing department in a more traditional, nonstrategic role.

Process-Based Organizations Replacing Functional Organizations. Given the strategic Purchasing role and the goal of supply chain optimization, how should Purchasing people be organized to enable this process to operate at an optimum level for an extended period of time? Businesses are constantly redrawing their lines within workgroups, departments, divisions, even entire companies, trying to enable productivity increases, cycle-time reduction, revenue enhance-

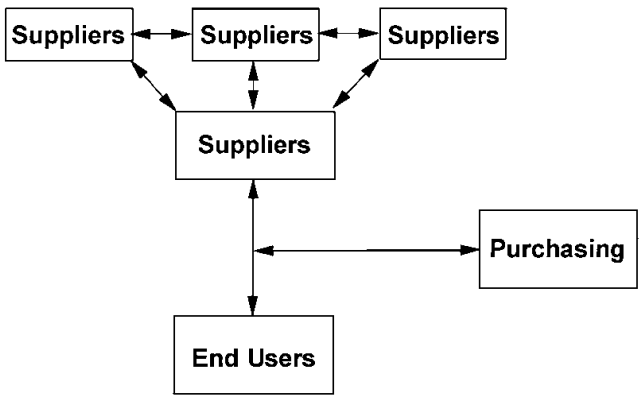

FIGURE 21.5 Revised role of Purchasing department: managing the transaction between supplier and end users.

ment, or an increase in customer satisfaction. The recent trend, often initiated by re-engineering projects or downsizing initiatives, is the shift from function-based to process-based organizations.

Function-Based Organizations. In a function-based organization, departments are established based on specialized expertise. Responsibility and accountability for process and results are usually distributed piecemeal among departments. Figure 21.6 depicts the organization of a function-based manufacturing facility.

A function-based organization typically develops and nurtures talent, and fosters expertise and excellence within the functions themselves. Therefore, it offers several long-term benefits. However, function-based organizations can result in a slow, bureaucratic decision-making apparatus, as well as the creation of functional business plans and objectives which may be inconsistent with overall strategic business unit plans and objectives. Many organizations are beginning to experiment with an alternative to the function-based organization in response to today's "make it happen fast" world. Increasingly, organizations are being rotated 90° into processed-based organizations.

Process-Based Organizations. In a process-based organization, reporting responsibilities are associated with a process and accountability is assigned to a process owner. In a process-based organization, each process is provided with the functionally specialized resources necessary. This has the effect of eliminating the barriers associated with the traditional function-based organization, making it easier to create cross-functional teams to manage the process on an ongoing basis. Figure 21.7 depicts such an organization. In this example, four processes are depicted: Sourcing; Product Development; Budgeting; and Recruiting.

Process-based organizations are usually accountable to the business unit or units which receive the benefits of the process under consideration. Therefore, process-based organizations are usually associated with responsiveness, efficiency, and customer focus.

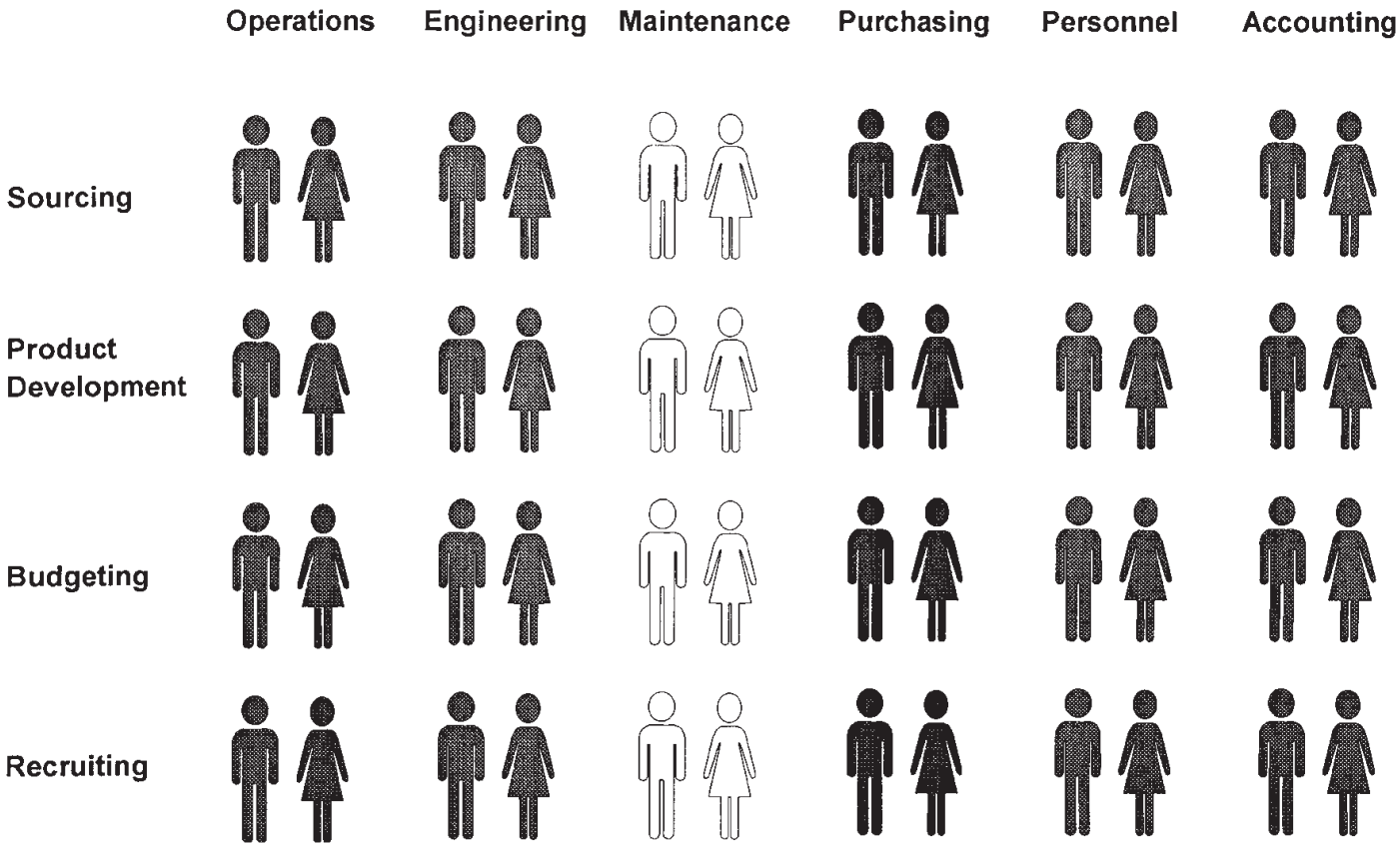

FIGURE 21.6 Function-based organization.

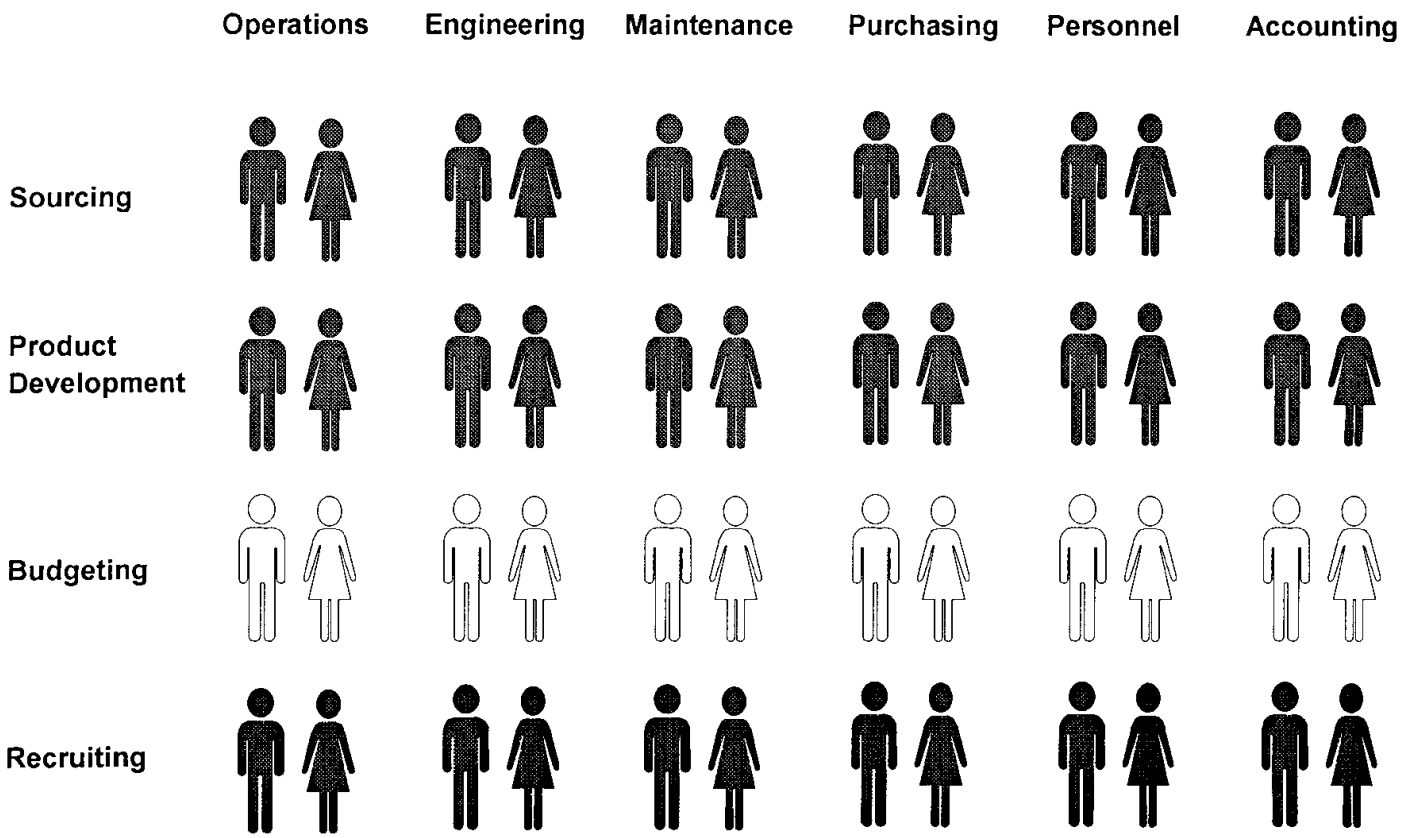

FIGURE 21.7 Process-based organization.

However, over time, pure process-based organizations run the risk of diluting and diminishing the skill level within the various functions. Furthermore, a lack of process standardization can evolve, which can result in inefficiencies and organizational redundancies. Additionally, such organizations frequently require a matrix reporting structure, which can result in some confusion if the various business units have conflicting objectives.

Merging Functional Excellence with Process Orientation. There is no exact way to organize internally a Purchasing department to nurture and develop supplier relations to an optimum level systematically. What is required, however, is an organization which identifies and captures the benefits of supply chain optimization in a responsive, customer-focused manner, while promoting and nurturing the expertise required to manage and improve continuously the Sourcing process on an ongoing basis.

This organization will likely be a hybrid of the functional and process-based organizations, with the business unit accountable for objectives, priorities, and results, and the functional department accountable for process management and improvement and resource development. Although the exact makeup of the organization will vary firm to firm, the following principles should be adhered to in organizing for supply relations.

10 Principles for Organizing for Supplier Relations

1. Recognize the Purchasing function as a strategic, highly value-added function within an organization, to be staffed by highly skilled professionals.

Purchasing value added is not in generating and managing transactions, but in facilitating ongoing relationships between commercial establishments in a way that is constantly generating value.

The Purchasing function should never be used, then, as a "dumping ground" for otherwise misplaced professionals.

2. Assign leadership within the Purchasing function to visionary, results-oriented individuals, who have both the full support of senior corporate management, as well as credibility at the operations plant level.

Purchasing management must establish and effectively communicate the sourcing vision, facilitating quantum leaps in performance of the sourcing process, and eliminating barriers, ensuring the continuous improvement of the sourcing process performance.

3. Develop purchasing strategies in alignment with business unit strategies.

The strategic value of a Purchasing department is recognized and captured only when these activities are driven by, and ultimately contribute to, a larger business unit strategy.

4. Hold the business unit management accountable for the successful implementation of the sourcing strategies.

The implementation of purchasing strategies can result in a competitive advantage. The likelihood of successful implementation is greatly enhanced when those held accountable for business strategy implementation are also the focal point for purchasing strategy implementation.

5. Hold the Purchasing management accountable for the performance and continuous improvement of the sourcing process. While the business unit is held accountable for the results of the purchasing strategy, functional management should be held accountable for the execution of the sourcing process, specifically that: the correct process is being adhered to, the process reflects industry best practices, the individuals are sufficiently trained to manage the sourcing process, and the process is measured, managed, and improved.

6. Organize cross-functional teams to manage the acquisition of goods and services.

A cross-functional team approach to strategy development helps facilitate a customer-driven, fact-based approach to the development and implementation of purchasing strategies which are consistent with overall business unit objectives.

7. Maintain an ongoing focus of the cross-functional team on the total supply chain performance, including the total cost of ownership, the identification of opportunities for increased value, and identifying and achieving competitive advantage.

The value added of a procurement strategy is realized when a total cost of ownership approach is used, as opposed to a low-price focus. A cross-functional team is best equipped to identify, measure, and manage this total cost of ownership of an acquisition.

8. Develop, implement, and manage purchasing strategies by consolidating and segmenting procurement activities across strategic business unit boundaries wherever feasible.

This principle is required if purchasing is to optimize adequately the total cost of ownership of the good or service to be acquired over an extended period of time, as well as to minimize redundant purchasing activity across an entire enterprise.

9. Maintain open, honest, and frequent communications with and between end users. This is critical for the ongoing successful identification and implementation of purchasing strategies.

Open, honest, and frequent communications are required to understand and consolidate customers' needs, as well as to measure customer satisfaction and identify and attack continuous improvement opportunities.

10. Base the development and implementation of purchasing strategies on collaboration and cooperation between business units, a decision-making process based on facts, and a measurement system whereby continuous improvement is built into the ongoing relationship between end user and supplier.

Analysis and decisions affecting the total cost of ownership of an acquisition, supplier selection, and continuous improvement initiatives must be based on fact and collaboration if the full, long-term benefits of enhancing supplier relations are to be realized.

Skill Sets Required for Purchasing Department Professionals. As industry moves away from transaction-based Purchasing departments, the skill sets required of the

Purchasing professional have changed as well. The clerical and "win-lose" negotiating skills of the past are being replaced by leadership, facilitation, communication, consensus building, and creativity skills. Increasingly, Purchasing professionals are asked to lead teams, develop purchasing strategies which support an operation's business strategy, assist in the implementation of information technology related to purchasing, logistics, and accounts payable activities, or deliver presentations to councils of senior management. Clearly, the skill sets of the "historic purchasing model" are inadequate for these strategic activities.

Shaver (1993) offers the following set of skills and aptitudes for the Purchasing professional:

- Adaptability
- Results orientation
- Attention to detail
- Coaching and training
- Communication (nonverbal, oral, written)
- Listening
- Decision making
- Delegation
- Ethics
- Expert power (technical competencies)
- Information power
- Interpersonal
- Intellectual power (memory, formal education, creativity)
- Leadership
- Meeting management (facilitating and controlling)
- Management and supervision (monitoring individual and group behavior)
- Negotiation
- Persuasion skills
- Public speaking
- Reward power (ability to provide resources, outcomes)
- Risk orientation
- Service

Kolchin and Giunipero (1993), in a study commissioned by the Center for Advanced Purchasing Studies, identified the top 10 skills required by Purchasing professionals for the year 2000:

- Interpersonal communication
- Customer focus
- Ability to make decisions
- Negotiation
- Analytical skills
- Managing change
- Conflict resolution
- Problem solving
- Influencing and persuasion
- Computer literacy

A review of this list and Shaver's indicates that the Purchasing individual is viewed as more than just a "buyer." Facilitating ongoing relationships between and within commercial entities and identifying and capitalizing on value-added opportunities requires skills not easily found in today's marketplace for labor.

Empowerment, Outsourcing, Downsizing, Re-engineering. Beginning in the early 1980s, corporate initiatives variously called restructuring, re-engineering, or downsizing, have resulted in sudden, and often dramatic, shifts, changes, and reductions in the work force. The causes, although somewhat complex, generally have to do with the rapid evolution in technology and the streamlining made possible by this automation and the cost pressures of a global marketplace which are forcing companies to rethink the services they provide, as well as who provides those services.

The most common themes of these changes are discussed next.

1. *Empowerment:* Management is beginning to realize that it does not, and in fact cannot, have all the answers regarding successful supply chain management. Therefore, it is giving teams of individuals, as well as individuals themselves, greater accountability for their decision making and performance. Empowerment facilitates not only cycle-time reduction, but a reduction in the number of managers required to operate a business.
2. *Outsourcing:* Defined as identifying and subcontracting to an outside supplier a process currently conducted in house, outsourcing is undertaken to cut costs, improve quality, or both. Generally, outsourcing is confined to utility processes (processes that are required but do not provide a competitive advantage, such as security, facility maintenance and repair, laboratory testing, income tax preparation, and legal services.
3. *Downsizing:* A reduction in the work force, or elimination of entire departments within an organization, for the purpose of reducing costs is called "downsizing."
4. *Re-engineering:* The fundamental change, and radical redesign, of a business process in order to achieve dramatic results is referred to as "re-engineering."

It is important to note that re-engineering and downsizing are two very different activities which are frequently confused. The focus of re-engineering is process and process redesign, while downsizing is purely a cost reduction initiative. So, although re-engineering might possibly produce downsizing as a result, the two are not the same. See Champy (1995) or Hammer and Champy (1993) for further clarification.

In organizing for supplier relations, the effects of these dramatic work force shifts can be significant, and, if not carefully implemented, can be a serious setback for supplier relations. Established strategic sourcing processes and relationships with suppliers can be significantly disrupted if care is not taken in implementing these organization changes. The focus of these restructuring initiatives should be on minimizing transactional activity, thus allowing for the reallocation of resources toward the efficient, effective delivery of strategic sourcing processes.

ORGANIZING FOR SUPPLIER RELATIONS—EXTERNAL

Once a firm is organized internally to capture the competitive advantage offered by supply-chain management, its next step is to organize the supplier base to capture these benefits. A Pareto analysis of the supply base will likely reveal that 80 percent of the potential benefits of strategic supply chain management are achievable by focusing on about 20 percent of the supply base itself. Supply-chain management requires that these vital few suppliers align and champion the process of managing and reducing total systems costs.

There will likely always be a need for some "spot" procurement, where end users need to buy an unanticipated item on a quick turnaround. Furthermore, there will likely be some acquisitions of an unusual, nonrepetitive nature, such as some engineered equipment. Not all commodities are,

therefore, strong candidates for aggressive supply chain management. Supply-chain management is to be reserved for commodities deemed to be of strategic importance to the firm.

The Sourcing Strategy Model. A recommended approach to initiating supply chain management is to analyze your historic commodity spend profile and isolate two factors of the commodities being purchased. The first factor should be the "criticality of the purchase." This will likely be a subjective assessment of a commodity's importance to the business. For example, raw materials or contract labor might be regarded as highly critical, while office supplies or tools might be assigned a lower criticality. The criticality rating of a commodity is a subjective ranking, and should therefore be assessed by a team of senior procurement management in close consultation with senior line management.

The second factor which needs to be captured is the amount of the spend for each commodity family. A petrochemical facility might have a significant expenditure on pipes, valves, and fittings, while its travel services expenditures might be relatively low. Conversely, a consulting company would likely have no amount of expenditure on pipes, valves, and fittings, but a significant spend on travel services.

After collecting this information, organize the information into four groups, as shown in Figure 21.8.

The following strategies should be applied to each quadrant to generate the optimum benefit from strategic supply chain management at a cost commensurate with value:

Quadrant 1 (*low criticality/low expenditure*): Typically, these expenditures represent items of low strategic value and cost. Classic examples might include office supplies, books and publications, or food services. The acquisition of these goods and services offers little opportunity for generating competitive advantage, but can generate a high amount of nonvalue-added transaction work. This quadrant represents utility, rather than competitive advantage activities, and, therefore, is a good candidate for outsourcing. At the very least, these transactions could be, and should be, eliminated by end user direct buying through either an automated system or a mechanism such as a procurement card.

Quadrant 2 (*low criticality/high expenditure*): These expenditures represent a higher strategic component than quadrant 1 and also a significant component of transaction activity within traditional purchasing functions. Classic examples of this quadrant could include pipes, valves, and fittings, miscellaneous electrical supplies, or contract labor. A total cost of ownership analysis of these commodities often reveals that significant cost components include nonstandardization of purchases, excess inventory, and insufficient planning. These commodities represent good candidates for sourcing teams to manage on an ongoing basis. However, their low complexity and

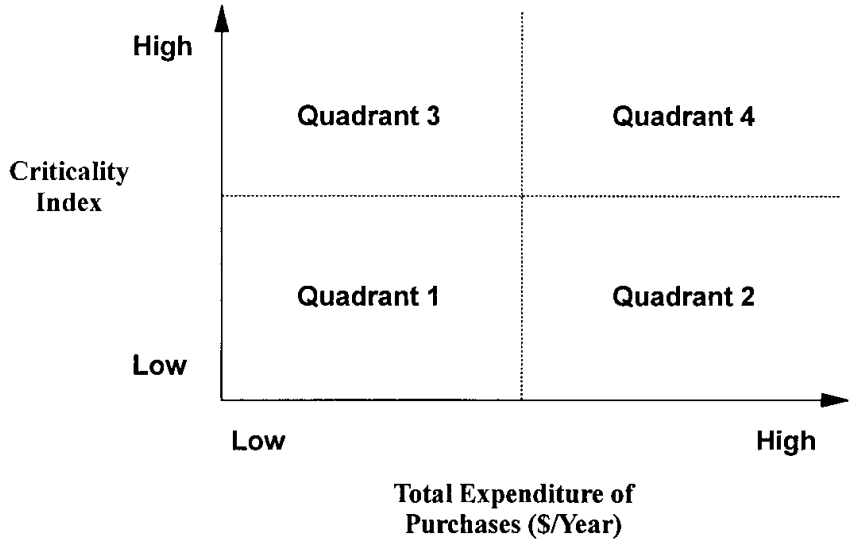

FIGURE 21.8 Classification of purchased commodities.

routine nature often limit the potential benefits of an aggressive supply chain management focus. At the very least, Material Requirement Planning (MRP) Information Systems, Electronic Data Interchange (EDI), Electronic Funds Transfer (EFT), Supply-Base Reduction, and end-user direct releases from established sourcing agreements should be used to minimize the transaction activities of these acquisitions.

Quadrant 3 (*high criticality/low expenditure*): This quadrant might include highly engineered equipment, some fabricated materials, or specialized contract labor. These items can represent a high cost on an individual basis, but a low cost in aggregate due to the infrequency of their purchase. A thorough total cost of ownership analysis often reveals some cost reduction opportunities in this quadrant, especially when issues such as overspecification and nonstandardization of equipment and labor are considered. The infrequent, low aggregate value of these acquisitions makes the suppliers of these commodities poor alliance candidates. This is the one quadrant where some transaction workload may remain after an organization commits to a strategic procurement function.

Quadrant 4 (*high criticality/high expenditure*): This quadrant contains the commodities which are the critical focus of a strategic procurement initiative. Traditionally, these purchases were made on a basis which prevented the supplier and the end user from interacting, thus the purchasing function served as a wedge to prevent collaboration. Strategic purchasing facilitates this end-user/supplier relationship so that potential breakthroughs of supply-chain management can be achieved. For these commodities, sourcing teams should be established, strategic suppliers should be identified and selected, and an ongoing team effort involving end users, purchasing, and the supplier should manage the commodity acquisition, and focus on creating value within the supply chain.

Benefits of the Sourcing Strategy Model. Table 21.3 summarizes the strategies and implications of using this sourcing model.

JURAN TRILOGY AS IT APPLIES TO SUPPLIER RELATIONS

Once an organization has been established to facilitate quality supplier relations, the trilogy of Quality Planning, Quality Control, and Quality Improvement can be applied to the supply chain. The

TABLE 21.3 Implications of Sourcing Model

Quadrant	High-level strategy	Implication of strategy
I	Minimize transactions through automation, direct end-user buying, or outsourcing.	Fewer resources working on non-value added activities.
II	Focus on excess inventory to determine total cost of ownership cost drivers. Standardize, combine purchases across business units, establish long-term agreements with high-quality suppliers.	Transactions eliminated. Inventory reduced. End-user buying against established supplier agreements.
III	Focus on specifications and design to determine total cost of ownership cost drivers.	Reduced risk of overspecifying items.
IV	Focus on primary supply-chain management opportunities.	Look to capture value by working collaboratively with end users and suppliers to improve quality, reduce cycle time, and COPQ; minimize cost drivers impacting the total cost of ownership; identify technological, innovation, and risk-sharing opportunities.

relationship between the trilogy of quality processes and supplier relations is described and illustrated in Table 21.4.

Driving the managing of supplier relations is the identification and satisfying of customer needs. Application of the Trilogy processes to the supply chain fall easily into phases, executed in order, often overlapping: planning, control, improvement. The "planning phase" is concerned with identifying, understanding, and implementing a sourcing strategy which meets those customer needs; the "control phase" with managing process performance and the performance of the suppliers engaged in the process; and the "improvement phase" with identifying and capitalizing on value-added opportunities within the supply chain.

Following is a detailed explanation of the activities and deliverables of these three phases of managing for supplier relations.

Planning for Supplier Relations

> Honda's success on this continent [North America] is a direct result of the company's overall philosophy of manufacturing…manufacturing's success depends on two groups: the people who make the products, and the suppliers that provide the parts and raw material from which the products are made. (Kevin Fitzgerald 1995)

Planning for supplier relations is the activity of identifying customer needs and analyzing and developing a sourcing strategy to meet those needs. One of the key deliverables of the planning process is an initial model detailing the customer's total cost of ownership of the subject commodity. Thus, data collection and analysis will also be required throughout the planning process. The focus of this planning process is the identification of the appropriate customer and assessment of the current and future needs of these customers for the commodity in question (Table 21.5). Additionally, as the output of the planning process is a recommended sourcing process flow, a thorough understanding of the supply industry structure, dynamics, and trends is essential.

TABLE 21.4 Juran Trilogy Applied to Supplier Relations

Process	Definition	Process	Definition
Quality Planning	The activity of developing the products and processes required to meet customer needs.	Planning for supplier relations	The activity of identifying customer needs and analyzing and developing a sourcing strategy to meet those needs.
Quality Control	The activity of evaluating actual performance, comparing actual performance to goals, and taking action on the difference.	Control for supplier relations	The activity of evaluating suppliers' performances, selecting the vital few suppliers capable of optimizing performance, and the measurement of supplier performance.
Quality Improvement	The activity of raising quality performance to unprecedented levels.	Improvement for supplier relations	The activity of identifying and acting upon sourcing process improvement opportunities.

The planning process requires:

1. Early customer involvement to identify current and future sourcing needs
2. Extensive research and data collection regarding the alternative processes available to satisfy these needs.

Most successful sourcing planning has followed a methodology similar to the following:

Step 1. Document the organization's historic, current, and future procurement activity.

In the absence of planning for supplier relations, it is assumed that purchasing is generally handled in a reactive business process which satisfies immediate, local operational needs. The documentation of the historic, current, and anticipated purchase activity across an organization's various business units enables that organization to take the first, necessary step toward achieving purchasing leverage; synergies within and between organization business units; and a strategic, collaborative, proactive approach to managing the sourcing process.

Available tools: data collection, trend analysis.

Step 2. Identify a commodity from the procurement activity which represents both high expenditure and high criticality to the business (quadrant IV commodities).

A simple Pareto analysis will often reveal the vital few commodities which drive an organization's purchasing needs and costs. Focusing resources on these vital few commodities will enable an organization to begin to capture the value of supply-chain management early.

Available tools: pareto analysis, data histograms, stratification, management presentations

Step 3. For this commodity, assemble a cross-functional team. The team includes representatives of the customer and of company functions—technical, purchasing, quality, and financial, for example. The team's mission is to define the customer's sourcing need for this commodity and to develop a sourcing strategy which will meet this need.

Available tools: brainstorming, team building, flow charting.

Step 4. Determine the sourcing needs of the customer through data collection, survey, and other needs assessment activities. This is the critical step which, if not properly and thoroughly conducted, can derail any well-intentioned cross-functional team. It is often fatal to assume that the customer's needs are obvious. Extensive data collection through surveys, customer visits, and focus groups will pay off later on.

Available tools: brainstorming, data collection, flow charting, cause-and-effect diagrams, force field analysis, hypothesis formulation, and testing.

Step 5. Analyze the supply industry's structure, capabilities, and trends.

Once the customer needs have been identified and validated, an industry analysis is required. It is the supply chain, and not the purchase itself, which will ultimately delight the customer with fitness for use and value. Thus, the various supply chains available, and their performance and cost structures, must be understood. This is an extensive research phase of the planning process, and might require the team to split temporarily into several subteams.

TABLE 21.5 Inputs/Outputs to the Planning Process

Customer needs	Recommended sourcing strategy
Industry data	Consolidated buying
Expenditure data	Supplier base reduction
Cost of ownership data	Total cost of ownership model defined

Available tools: industry data collection and analysis, flow charting, benchmarking, process capability analysis.

Step 6. Analyze the cost components of the commodity's total cost of ownership.

This, too, will require extensive data collection and analysis and even benchmarking to identify how others have managed this commodity. This model of total cost of ownership will be redefined, refined, and optimized throughout the life of the commodity management team.

Available tools: data collection and analysis, brainstorming, flow charting, cause-and-effect diagrams, histograms, Pareto analysis.

Step 7. Translate the customer needs into a sourcing process which will satisfy the customer and provide the opportunity to manage and optimize the total cost of ownership.

The customer needs as identified in step 4 will need to be mapped into the various alternative sourcing processes identified in step 5. An optimal sourcing strategy can be determined by optimizing the total cost of ownership, based on the results of step 6. Translation requires extensive dialog and feedback to identify and gauge fitness for use of the sourcing strategy.

Available tools: data collection and analysis, brainstorming, flow charting, cause-and-effect diagrams, histograms, Pareto analysis, force field analysis, customer and supplier visits.

Step 8. Obtain management endorsement to transfer the sourcing strategy into operation. Implement it.

This strategy should now be transferred from the cross-functional team to operations management for implementation. The "selling job" which is often required to facilitate change is reduced by the ongoing involvement on the team of those affected. The strategy should include, at a minimum, the following: scope (for example, global, regional, local); terms and condition of agreement; and method of end-user release. A dry run or a pilot test should be conducted to demonstrate feasibility of concept. Once the pilot has been implemented and the feasibility of concept demonstrated, the revised process should proceed through a site-by-site acceptance test and implementation. Some training will be required.

Available tools: executive briefing, pilot testing, process debugging, acceptance testing, training.

The planning phase of the sourcing initiative in all likelihood resulted in some consolidation of the supplier base, where cross-divisional or multiple business units identified opportunities to exercise economies of scale by consolidating similar purchasing activity with fewer suppliers.

Here is an illustrative example of the planning process applied to the sourcing of personal computers at a financial institution.

> Data analysis indicates that most PCs are purchased at local computer stores from the winner of a three-bid competition. As a result, there is little standardization in the hardware and software used at the institution. PCs are historically purchased in small quantities, generating significant work for the Purchasing, Accounts Payable, and Information Technology support groups, who acquire, pay for, install, maintain, and manage the equipment.
>
> Analysis reveals that purchase price is actually a fraction of the total cost of ownership of the personal computer. Equipment support, software evaluation, training, and inventory control also represent significant, hidden costs.
>
> In this case, the sourcing process recommendation is to standardize the equipment and software, negotiate purchase and service agreements with a single computer distributor with wide geographical coverage, and limit purchases to semi-annual bulk acquisitions. Several local charities are identified for the donation of obsolete equipment. The supplier with the agreement now has specific key performance indicators by which its performance can be measured and monitored.

Control for Supplier Relations. Control is applied to supplier relations in evaluating supplier performance and selecting the vital few suppliers capable of optimizing performance. As in

planning, the focus of control must be the satisfaction of customer needs. However, as a result of the completed planning process, several criteria for performance evaluation and measurement are already in place. The purpose of control is to maintain acceptable performance. Applied to supplier relations, the purpose of control is to maintain the level of customer satisfaction at the level defined in the planning process.

The suppliers identified in the planning process are typically those suppliers which *can* perform the revised sourcing process. A thorough, ongoing evaluation conducted by a cross-functional team further narrows the supplier base and helps facilitate the selection of those few suppliers who *will* be able to optimize the total cost of ownership of the commodity. Therefore, it is in the application of control that the evolution begins from the traditional purchasing approach toward supply-chain management.

Control is a process requiring:

- Clearly defined supply-chain quality goals established in planning
- Extensive, ongoing data collection and evaluation of the performance of the suppliers against these supply-chain quality goals
- Corrective action where required

Most successful sourcing control processes follow a methodology similar to the following:

Step 1. Create a Cross-Functional Team. The cross-functional control team includes customer, purchasing, and operation personnel. Its mission is the ongoing management, measurement, and evaluation of the performance of the supply-chain process established by the planning team during the planning phase. The team will initially need to identify quality goals and key performance indicators. Extensive customer involvement with the team should be expected.

Available tools: brainstorming, team building, flow charting, data collection, management presentation.

Step 2. Determine Critical Performance Metrics. Performance metrics will have been proposed in the planning phase. However, the control team will need to identify and establish processes for capturing and reporting this information. Extensive supplier involvement should be expected in this step.

Available tools: data collection, flow charting, check sheet, run chart, scatter diagrams, process capability indices.

Step 3. Determine Minimum Standards of Performance. In addition to critical performance metrics, the team establishes *minimum* standards for suppliers before they are considered for further strategic development. These standards would likely include several financial, legal, and environmental considerations. Some minimum acceptable quality standards might also be proposed such as percent defective, warranty performance, and delivery considerations. These minimum standards, along with the critical performance metrics established in step 2, are communicated to both the customer and supplier community.

Available tools: brainstorming, data collection and analysis; management, supplier, and customer presentation.

Step 4. Reduce the Supplier Base. The team eliminates suppliers unable to achieve the minimum performance requirements, and shifts activity to suppliers who do achieve those performance standards. Through the application of the minimum standards of performance, the control process offers another opportunity for reducing the supplier base.

Available tools: data collection and analysis, management presentation.

Step 5. Assess Supplier Performance. Based on actual supplier performance, begin the process of the ongoing evaluation and assessment of the performance of the remaining suppliers. This typically

involves evaluations of supplier quality systems now in place, supplier capacity and capability, and fitness for use of the commodity being supplied.

Supplier assessment comprises three separate but interrelated assessments, undertaken by the cross-functional team. These assessments ensure conformance to quality and performance standards and establish a baseline for the improvement process.

Assessment 1. Supplier Quality Systems Assessment. This assessment evaluates the quality systems the supplier currently has in place. It requires a visit to the supplier site by an evaluation team or by a third party who will certify the quality system as acceptable. This assessment should evaluate the supplier's:

1. Focus on customer's needs
2. Management commitment to Total Quality Management
3. Defined, documented, and fully implemented quality system
4. Employee empowerment in terms of monitoring their own work for defect
5. Use of fact-based, root-cause analysis to investigate and correct quality problems
6. Programs to encourage and evaluate quality improvement with their suppliers
7. Commitment to continuous improvement in all phases of its operation

Cost considerations may favor reliance on a third-party supplier certification instead of an evaluation by employees of the purchaser. Where this is done, it is important that the end-user organization clearly understand what this certification does and does not include.

The standards for supplier certification most often referred to are:

1. The ISO 9000 standards (ISO 9001, 9002, 9003), designed as models and guidelines of the minimum requirements for an effective quality system. (See Section 11, The ISO 9000 Family of International Standards.)
2. The ISO 14000 standards, designed as models and guidelines of the minimum requirements for an effective environmental system. (See Section 11, The ISO 9000 Family of International Standards.)
3. Quality System Requirements QS-9000, developed by the Chrysler/Ford/General Motors Supplier Quality Requirements Task Force. It is based on ISO 9000 standards, to which may be added automotive interpretations and further requirements (for example, continuous improvement and advanced product quality planning).
4. The Malcolm Baldrige Assessment, designed for applicants of the U.S. Malcolm Baldrige National Quality Award. It evaluates the Process Systems in place and the underlying organization and cultural issues of leadership, degree of empowerment, and utilization of information and information technology in place to facilitate quality planning, quality control, and quality improvement. (See Section 14, Total Quality Management.)

Assessment 2. Supplier Business Management. This assessment evaluates the supplier's capability as an ongoing business entity to meet the end user's current and future business needs. This includes assessment of the supplier's current and future financial and operating performance. This assessment should evaluate the supplier with respect to:

- Research and development initiatives to ensure consistency with its customers' needs and future plans
- Cost structure to ensure financial health
- Production capacity to ensure ongoing capacity to produce and distribute the required goods and services
- Information technology to evaluate willingness and capability to initiate information-sharing initiatives such as Electronic Data Interface (EDI) and Electronic Funds Transfer (EFT)

The assessment includes measurement of such indicators as debt-to-equity ratio, percent of profit reinvested in the business, inventory-to-sales ratio, employee turnover statistics, and capacity utilization.

Assessment 3. Supplier Product Fitness for Use. This assessment evaluates the fitness for use of the product or service being supplied. The focus is on quality, delivery, and service. Specifically, this assessment should evaluate:

- Conformance to customer requirements
- Process capability (Cpk) (see Section 6, Process Management)
- Key performance indicators

The assessment includes measurements of such indicators as the following:

- Percent of nonconforming products shipped
- Cycle times of key processes
- Customer satisfaction
- Identified and measured cost of poor quality

Available tools: supplier site visits, data collection and analysis, third-party evaluations.

Improvement for Supplier Relations. The improvement phase includes:

- The management, measurement, and continuous improvement of the sourcing process
- The expansion of control and initiation of continuous improvement within the supply chain itself to ensure value creation

These improvement initiatives build on the foundations of quality, total cost of ownership, and supply-chain management already established in the planning and control phases. Fundamental to improvement in the performance of the entire supply chain is that trust has been established between all parties in the entire supply chain—from suppliers through end users. The objective of the improvement phase is to develop a supply chain which acts as a single entity, develops common goals, formulates real-time decision making, measures performance through a single set of key performance indicators, and is collectively responsive to the needs of the end user.

With trust as the foundation, supply-chain management and optimization can proceed. This sense of trust cannot be achieved by a single act of signing a long-term contract or by prominently displaying a banner indicating a commitment to quality. It must be demonstrated by behaviors and actions demonstrated over an extended period of time. As the climate of cooperation grows, the degree of trust between all supply-chain participants becomes deeper, and opportunities for value creation, joint problem solving, and innovation are identified and realized.

Five Tiers of Progression. In the control phase, the end user and suppliers have identified and flow charted the entire supply chain. The continuous improvement phase generally progresses through five levels of cooperation: (1) joint team formation, (2) cost reduction, (3) value enhancement, (4) information sharing, and (5) resource sharing.

Level 1. Joint Team Formation. The improvement phase begins with the establishment of a joint (end user/supplier) team. Although the team could have several objectives, the initial focus should be on:

- Alignment of goal
- Analysis of the supply-chain business process
- Identification and remediation of chronic problem

Goal alignment ensures that each link in the supply chain develops goals and objectives and proposes initiatives whose focus is the needs of the end user. Furthermore, goal alignment and the

activities associated with it are a natural first step in developing the synergies and trust required for further supply-chain development.

In conducting the business process analysis of the supply chain, the team begins to identify the elements of the chain and to collect data to measure its performance. This data collection should focus on the areas of the supply chain which have a high probability of generating quality problems, such as excessive cycle time, rework, and scrap, or which are likely to create customer dissatisfaction.

Supply-chain business process analysis represents the initial steps of identifying the chain (typically using flow charting) and collecting data which describe the performance of this supply chain. This data collection phase should focus on the areas of high probability of quality problems, such as cycle time, rework, scrap, or customer dissatisfaction.

Chronic problem identification and remediation offers a preliminary opportunity to work collaboratively on problem solving in this joint-team environment. This offers a classic opportunity for a quality improvement team with membership from the various members of the supply chain. The team's efforts will likely result in near-term process improvement and enhanced customer satisfaction, and offer an opportunity for collaboration and trust to be nurtured within the chain itself.

See Section 5, The Quality Improvement Process, for further discussion of the quality improvement methodology.

Level 2. Cost Reduction. Level 1 initiatives help create a culture of trust and collaboration between supplier and end user, especially as the result of the work of joint problem-solving teams. The teams were established to identify and gather the "low-hanging fruit," that is, reduce the occurrence of chronic problems in their joint business processes which are relatively easy to solve, once identified. Level 2 requires an approach to process improvement in more depth, often involving suppliers to the supplier or customers of the end users. Proactive managing of the supply chain begins at this point to replace the bilateral relationship between end user and supplier.

A COPQ study of the supply chain provides powerful guidance for organizations engaged in cost reduction. The costs are usually sorted into three categories:

- External failure costs (that is, warranty, customer dissatisfaction, recall costs)
- Internal failure costs (that is, scrap, rework, rejected raw material, downtime costs)
- Appraisal costs (that is, inspection, testing, verification costs)

For significant concentrations of COPQ revealed in the supply chain, joint teams are established to reduce those costs, project by project.

See Section 8, Quality and Costs, for further discussion of COPQ analysis.

As activities advance to a higher level, the activities of the lower levels continue. For example, as the chain moves into level 2 and begins measuring and managing cost reduction opportunities, the tools and initiatives of level 1 continue. This accumulating effect continues throughout the five levels.

Level 3. Value Enhancement. As the teams begin reducing COPQ, the supply-chain itself begins to function as a single business process, rather than as a set of separate ones. At this point, the team needs to flow chart the activity of the supplier chain and evaluate the value added by each link in the chain. Two questions addressed at this stage are: "Does this step add value?" and "What would happen if we were to skip this step?" The nonvalue-added steps are identified and eliminated.

Level 4. Information Exchange. At this point in the supply-chain improvement evolution, what was traditionally treated as confidential information is being routinely shared and more widely distributed throughout the chain. Furthermore, electronic commerce tools such as EDI, Internet and Intranet applications, and groupware applications such as Lotus Notes are facilitating the transfer of information, the collaboration of ideas, and real-time decision making.

Level 5. Resource Sharing. In the latter stages of supply-chain management and improvement, the "walls" that traditionally separated departments, divisions, and companies have been eliminated. Fewer are working in corporate silos; the supply chain is beginning to function as a single process—involving personnel from several different suppliers within the chain, from the customer's organization and the end user. Personnel within the chain are routinely collaborating on ideas and improvement opportunities, and performance is continuously measured. Personnel from the various suppliers within the supply chain are often co-located with their customers to further facilitate this collaboration.

At the highest level of supply-chain management, the extent of data, resource, and risk sharing has increased to a dramatic level. Not only are personnel co-located with their customers, but technology plans and risk-taking initiatives and investments are shared throughout the supply chain, and benefits and losses are jointly apportioned. A seamless supply-chain process begins to emerge, generating value for customers as well as suppliers.

Agile Supply-Chain Implementation. *The Wheels: A Vehicle for Dialogue* is a comprehensive set of supply-chain assessment tools to help organizations, working with their suppliers, to identify, manage, and achieve breakthroughs in the performance of the supply chain. The tools, developed by a team at the Rochester Institute of Technology, are described by Graham (1996). A key requirement within the supply chain is identified as agility, implying the quick and resourceful manufacturing system required in today's highly competitive, global economy.

Assessments made by using these tools enable a dialogue between customers and suppliers which will facilitate performance improvement of the supply chain. The tool set is built around six questions. By examining customers, suppliers, and the supply chain in light of these six questions, we can develop a thorough picture of the supply chain and its component companies. The six questions are:

- Are we developing and producing the right things?
- Are we producing the right things well?
- Are we delivering the right things quickly enough?
- Are we creating the best operational climate?
- Are we collectively anticipating and improving?
- Are we all becoming more successful?

Further information regarding these tools is available from The Center for Integrated Manufacturing Studies, Rochester Institute of Technology, Rochester, NY.

Results of Supply-Chain Management. Parker and Doyle (1995) report the impressive results of some supply-chain optimization efforts selected from their experience:

- *Quality:* 20 to 70 percent reduction in variability
- *Cycle-time:* 30 to 90 percent reduction
- *Waste:* 15 to 30 percent reduction in cost of poor quality
- *Technology:* R&D resources increased by a factor of 3 or more by utilizing the entire supply chain
- *Risk:* overall reduction of hazards/obstacles through sharing

The Chrysler Experience. Dyer (1996) describes the experience and the significant benefits generated through sustained collaboration, trust, and joint problem solving between Chrysler and its suppliers. In 1989, Chrysler began a program to identify and develop supplier partners. At that time, their production supplier base was 2500 suppliers. The first step in supplier partnering required an aggressive supply-base reduction, and, between 1989 and 1994, they reduced their base by 54 percent. As of 1996, more than 90 percent of the remaining suppliers are assured of business for the life (and frequently beyond) of the automobile model for which they were supplying parts. The average term of a supplier's contract was reported to be 4.4 years, more than twice what it had been in 1989, when it was 2.1 years. Furthermore, Chrysler had replaced the detailed supply contracts with more flexible oral agreements.

According to Dyer, Chrysler collaborated with its remaining supply base to find ways to reduce the cost of making automobiles, while assuring suppliers that any savings would be shared among the Chrysler/supplier participants. For each of its five vehicle platforms (large cars, small cars, minivans, Jeeps, and trucks) Chrysler organized itself into cross-functional teams. Each team chose suppliers

very early in the vehicle's concept-development phase, and gave the suppliers near-total responsibility for a given component or system's design.

Chrysler also used a concept called "target costing." Starting with a prediction of the market price of the vehicle, the team worked backwards to establish the allowable cost of every system, subsystem, and component. Using target costing, Chrysler managed to completely change its supplier relationships from adversarial price buying to collaborative cost reduction.

Chrysler also instituted a cost-reduction program called the "supplier cost reduction effort (SCORE)." SCORE enabled suppliers to identify and formally submit cost-improvement suggestions, which in turn would be reviewed and endorsed by Chrysler management. The results of this strategic shift in supplier relations are impressive.

- *Product development cycle time:* The time Chrysler needs to develop a new vehicle is approaching 160 weeks, down from 234 weeks during the 1980s.
- *Cost reduction:* Since its inception in 1990, Chrysler has implemented over 5000 suggestions from its suppliers as part of the SCORE Program, and generated savings in excess of $1.7 billion.
- *Reduced procurement transaction costs:* Since 1988, Chrysler has reduced the number of buyers by 30 percent, and sharply increased the dollar value procured by each of the remaining buyers. This has been accomplished largely by supply-base reduction and the near elimination of the competitive bidding process.
- *Revenue and profit enhancement:* Since 1989, Chrysler's U.S. market share has increased from 12.2 to 14.7 percent. Furthermore, their profit per vehicle produced has increased from $250 to $2,110 per vehicle.
- *Continuous improvement:* The long-term supplier relationships, tied to measurable performance improvement, target costing, and cost reduction resulted in a developing culture of continuous improvement throughout the supply chain.

The next step for Chrysler and its suppliers is to roll out this supplier-relations culture to additional tiers in the supply chains. Suppliers to Chrysler will be expected to replicate programs such as early supplier involvement, target costing, cross-functional teams, and a SCORE-type program with their suppliers. Eventually, the entire supply chain will be involved in the proactive, collaborative effort.

Legal Issues in Supplier Relations. "Law" consists of those principles, practices, rules, statutes, and requirements of behavior, formally adopted and enforced by a society as a whole, so that an orderly society can exist. Law can be subdivided into public law (those areas dealing with the relationship between individuals and the state as a whole) and private law (those areas dealing with the relationship between individuals or groups of individuals with each other). The laws of contracts are contained within private law.

The contract remains a primary facilitator of commercial transactions conducted within the business world. Therefore, a broad understanding of contract law is essential for any professional whose job is to manage and facilitate supplier relations. Within general contract law is the statutory law of the Uniform Commercial Code (UCC). The UCC governs the sale of goods, and is applicable in 49 of the 50 United States (Louisiana being the only exception).

International transactions, growing in volume and strategic importance, are governed by the Convention of the International Sale of Goods (CISG).

In the evolving world of supplier alliances and supply-chain management, there still remains the nagging question of how formal the relationships between supplier and customer should be. Several leaders in the application of supply-chain management, such as Honda of America, have effectively streamlined and simplified this relationship. Honda's typical agreement contains no mention of length of time of the agreement and no mention of quantity or dollar value. Basically, it is an agreement to buy from the supplier without restrictions regarding specific part or length of time of the agreement. Honda and its major suppliers have effectively created contracts which establish a relationship, without the restrictive or punitive language typical of the traditional contract.

However, other companies still cling to the traditional lengthy contracts containing indemnifications, prohibitive warranties, force majeure clauses, termination clauses, and other restrictive clauses which require extensive legal reviews, revisions, and negotiations.

To facilitate an ongoing relationship of collaboration, cooperation, and trust, the shorter, simplified contract is preferred as easier to establish and administer. This approach may not be practical in the early stages of a developing supplier relationship. However, as the relationship is developed, and trust within the supply chain grows, the parties will find that the contract review process can be streamlined, and lengthy contract documentation can also be simplified and, in some cases, eliminated.

Several leaders in supply-chain management have almost totally abandoned the use of lengthy contracts, and have opted for the use of their standard purchase order form, containing broad, simple language that allows the supply chain to be optimized with few restrictions imposed by legal requirements. The key is to establish the relationship and aggressively commit to and facilitate an environment of collaboration, cooperation, and trust. Increasingly simplified contracts reflect the growing mutual trust and sharing of risk and reward which characterize the successful supply chain.

REFERENCES

Bhote, K. R. (1987). *Supply Management,* AMA Publications Division, New York.

Carlisle, J. A. and Parker, R. C.(1989). *Beyond Negotiation,* John Wiley & Sons, Chichester, England.

Champy, James (1995). *Re-engineering Management,* Harper Business, New York.

Deming, W. Edwards (1981). Seminar notes for "Japanese Methods for Productivity and Quality," Course No. 617, W. Edwards Deming, Washington, DC.

Deming, W. Edwards (1986). *Out of the Crisis,* Massachusetts Institute of Technology, Center for Advanced Engineering Study, Cambridge, MA.

Dunaud, Michel (1995). "How the French Arms Industry Mastered Quality." J. M. Juran, ed., *A History of Managing for Quality,* Quality Press, Milwaukee, WI, p. 421.

Dyer, Jeffrey H. (1996). "How Chrysler Created An American Keiretsu," *Harvard Business Review,* July-August, vol. 74, no. 4, pp. 42–56.

Fitzgerald, Kevin (1995). "For Superb Supplier Development," *Purchasing Magazine,* September 21, pp. 32–40.

Graham, Robert (1996). *The Wheels: A Vehicle for Dialogue,* Rochester Institute of Technology, Rochester, NY.

Hammer, Michael, and Champy, James (1993). *Re-engineering the Corporation,* Harper Business, New York.

Juran, J. M. (1995). "A History of Managing for Quality," *Quality Progress,* August 1995, pp. 125–129.

Kolchin, Michael, and Giunipero, Larry (1993). *Purchasing Education and Training Requirements and Resources,* Center for Advanced Purchasing Studies, Tempe, AZ.

Parker and Doyle (1995). "Strategic supply-chain Management Program of the Consortium for Advanced Manufacturing—International," Rochester Institute of Technology, Rochester, NY.

Shaver, Robert (1993). "Potential Sources of Power, Influence and Control in Your Career," teaching notes. Madison School of Business, University Of Wisconsin, Madison, WI.

Tully, Shawn (1995). "Purchasing's New Muscle," *Fortune Magazine,* vol. 131, no. 3, Feb. 20, pp. 75–83.

Zampino, Boykin, Doyle, Parker & CAM-I (1995). *Axioms of Supply-chain Management,* Consortium for Advanced Manufacturing International, Arlington, TX.