Introduction to Purchasing and Supply Chain Management
Chapter One

Purchasing and Supply Chain Management

Learning Objectives

1. To understand the purchasing function’s contribution to profitability.
2. To identify the relationship between the purchasing function and other functional areas.
3. To explore the basic historical development of the purchasing function.
4. To understand the evolution of the basic supply management concept.
5. To differentiate between purchasing, supply management, and supply chain management.
6. To understand the relationship between the purchasing function and inventory, ordering, and transportation costs.
7. To learn the advantages and disadvantages of centralized purchasing organizational designs.
8. To identify various purchasing organizational designs.
9. To learn about careers in purchasing.

INTRODUCTION

After millennia of unchallenged success, businesses and governments around the world are entering a new era of unprecedented openness. The movement to hold corporate officers and politicians accountable is spurred by three powerful forces: economics, technology, and zeitgeist. The entire world is experiencing a deep recession. The Internet, meanwhile, has revolutionized the speed and power of data analysis and dissemination. And financial institutions are being held responsible.

In certain industries, Asian manufacturers dominate the United States’ consumer market. Third-world nations in Central and South America, Southeast Asia, and China continue to attract U.S. manufacturers seeking low wages for laborious tasks. And, in the midst of everything, the United States is a giant consumer base with an enormous command of technology but steadily losing the infrastructure needed to create jobs.

In addition to significant events that have impacted the world’s business environment, individual firms have had to change radically in response to
burgeoning technologies. Historically, the management of materials and component parts was the most neglected element in the production process. Only when the cost of materials and subassemblies increased did management attempt to investigate alternative methods to the planning and control of the acquisition and transformation functions in the organization. Instead, most firms emphasized minimizing the cost of capital and labor. The focus on labor was logical because the industrial revolution had generated many labor-intensive manufacturers. Producing large standardized batches represented the norm for some manufacturers. Some firms have embraced new technologies and invested in technology-driven manufacturing systems. Although these new systems are up and running, too frequently they are being operated just like the old models, thus defeating the very purpose the system was designed to achieve. The reality is that technology is rapidly displacing labor. During the next decade, the supply management function is likely to contribute to profits more than any other function in the company.

**PURCHASING MANAGERS, BUYERS, AND PURCHASING AGENTS**

Supply managers, buyers, and purchasing agents seek to obtain the highest-quality merchandise at the lowest possible purchase cost for their employers. In general, purchasers buy goods and services for use by their business organization. On the other hand, buyers typically buy items for resale. Purchasers and buyers determine which commodities or services are best for the specific requirement, choose the suppliers of the product or service, negotiate the lowest price, and award contracts that ensure that the correct amount of the product or service is received at the appropriate time. In order to accomplish these tasks successfully, purchasing managers, buyers, and purchasing agents identify foreign and domestic suppliers. Purchasing managers, buyers, and agents must become experts on the services, materials, and products they purchase.

Purchasing managers, buyers, and purchasing agents evaluate suppliers on the bases of price, quality, service support, availability, reliability, and selection. To assist them in their search for the right suppliers, they review catalogs, industry and company publications, directories, and trade journals. Much of this information is now available on the Internet. They research the reputation and history of the suppliers and may advertise anticipated purchase actions in order to solicit bids. At meetings, trade shows, conferences, and suppliers’ plants and distribution centers, they examine products and services, assess a supplier’s production and distribution capabilities, and discuss other technical and business considerations that influence the purchasing decision. Once all of the necessary information on suppliers is gathered, orders are placed and contracts are awarded to those suppliers who meet the purchaser’s needs.

All of these—changing economic and political environments, emerging technology versus labor, and the changing nature of purchasing as a discipline—must influence the role of purchasing and supply management. To become a competitive strategic weapon, purchasing and supply management must abandon fragmented approaches. The same company that invests in a technology-based manufacturing system (hard technology) at the same time must invest in results-oriented training programs (soft technology). The purchasing function must
become an integral part of transforming raw materials and component parts into finished goods by utilizing materials, systems, information, and people.

THE SUPPLY MANAGEMENT PROCESS

The primary focus of this text is integrated purchasing and supply management. See Figure 1.1. In the past 20 years, the supply management function has grown from a tactical function of purchasing/procurement into a key strategic role within organizations. Supply management now:

- Contributes to the bottom line.
- Serves as an information source.
- Increases efficiency and productivity.
- Enhances the continuous improvement process.
- Improves competitive position and customer satisfaction.
- Impacts the organization’s image and social policy.
- Develops the organization’s future leaders.

Supply management exists to explore business opportunities and implement supply strategies that deliver the most value possible to the organization, its suppliers, and its customers. Strategic supply management is the organization’s

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**FIGURE 1.1**
Integrated Purchasing and Supply Management Process

1. Fundamentals of Purchasing and Supply Management
   - Purchasing procedure
   - E-purchasing
   - Determining specifications
   - Supplier evaluation
   - Supplier relationships
   - Supply chain power
   - Global sourcing
   - Quality control
   - Supplier market research
   - Supplier visits
   - Reverse auctions
   - Supply chain risk management

2. Purchasing Administration
   - Purchasing and strategic business integration
   - The legal aspects of purchasing
   - Buyer development and performance
   - Invoice and payment documentation control

3. Materials Management
   - Materials management
   - Inventory management
   - Just-in-time (lean) purchasing

4. Price/Cost Analysis
   - Price determination
   - Bargaining and negotiations

5. Special Purchasing Applications
   - Purchasing transportation service
   - Equipment acquisition and disposal
   - Health care purchasing and supply management
   - Procuring professional services
primary source for collecting market intelligence and developing cost-reduction programs. Given the strategic nature of the supply function, the top supply management professional is usually a member of the organization’s senior management team. In this leadership role, supply management professionals must be knowledgeable and understand all areas of the business in order to develop strategies consistent with the organization’s goals and successful business procedures.

With the increasing technology and demand for global operations, supply management is often involved in finding sources for products and/or services from international suppliers. An understanding of global business concepts is increasingly important for those in the profession.

In most firms, functional managers within each area make independent decisions using similar techniques. The approach introduced in this chapter proposes that the supply management decision should be integrated. Integrative materials management consists of the planning, acquisition, and conversion of raw materials and component parts into finished goods. In this scenario, each functional manager reports to the same superior. What’s more, the managers should work for the overall purpose of delivering high-quality products to the customer on time. An important objective of this approach is to provide high-quality customer service while minimizing the cost of producing the service.

Integrative supply management is not related to the size of the firm. Realistically, the purchasing subfunctions must first be integrated before the supply function will be synergistic with other business functions.

The purpose of supply management is to support the transformation of raw materials and component parts into shipped or inventory goods. The function of inventory in general is to decouple the entire transformation process. During the transformation process, materials are combined with labor, information, technology, and capital.

The supply planning system is central to the acquisition of part and component needs in an assemble-to-order environment. The material requirements planning (MRP) function is the most important input into a manufacturing planning and control system. Although many productive companies have embraced just-in-time (JIT) philosophies, they continue to use MRP concepts to enhance the effectiveness of the manufacturing mission. Perhaps the most significant change in the past decade has been in the purchasing function. During the time period 1960–1980, most American manufacturing firms fabricated 60–80 percent of the product’s value (see Figure 1.2). On the other hand, in the past decade, a large number of manufacturing firms purchased between 60 and 80 percent of the product’s value (see Figure 1.3). Since this impressive shift in percentages, the complexity of the manufacturing system has been greatly reduced. As can be seen in Figure 1.3, the complexity in the fabrication operation has been shifted upstream to the supplier. Under the traditional model, the firm transformed significantly more raw materials and labor into the end product. Today, since industrial firms are purchasing more and more subassemblies (component parts), the manufacturing focus is shifted downstream to the assembly operation. This significant shift has elevated the importance and profile of purchasing professionals.

A vice president of purchasing for a Fortune 500 company suggested that the discount acceptance decision cannot be made independently from the open order rescheduling decision. He went on to suggest that inventory record accuracy and open order rescheduling were key inputs into determining whether to accept or reject a specific discount schedule.
The expected economic benefit from the creation and continuous improvement of an integrated purchasing and supply management process is supply chain profit maximization. See Figure 1.3.

**PURCHASING DOLLAR RESPONSIBILITY**

The cost of acquiring, storing, and moving materials is an increasingly large fraction of the *cost of goods sold*. To gain a different perspective about the importance of materials-related expenditures, consider the dollar responsibility of one General Motors materials management group:

1. Parts and materials = 10 times direct labor dollars
2. Supply management expenditures = $100 billion
3. Transportation bill = $3 billion
4. Purchasing buys 97 percent of all component parts.

The mission of GM’s supply management group in this division is to manage purchasing, planning, scheduling, and the transportation of material required for specific products in a manner that will provide a significant competitive advantage to the division in the production of quality trucks and cars. Integrative purchasing and supply management make possible the production of vehicles in terms of cost and quality that are competitive in the world.

Thus, we see that the dollar responsibility of supply management is very large in both relative and absolute terms. More importantly, supply management is responsible—it contributes to the competitive stance and long-run survival of the firm.

The following are ratios of materials-related costs that are typically cited in fabrication–assembly industries, for example, consumer durable goods.

- Cost of purchase = 80 percent of sales
- Cost of marketing (sales) = 10 percent of sales
- Cost of transportation = 10 percent of sales

These ratios are increasing for various reasons: material shortages, increased use of synthetic materials, inflation, and thoroughly complex high-value products.

1. **Material shortages.** As natural resources are consumed, more costly methods of exploration, extraction, and processing are necessary. Shortages also result from political events. Former colonies of Western nations, once a low-cost and ready source of supply, have gained their independence. As autonomous nations, these new nations manage their resources to achieve economic, social, and nationalistic objectives.

   In the early 1960s, nearly all the chrome in Rhodesia (Zimbabwe) was owned by U.S. firms. Rhodesia was described as a very comfortable, placid little British colony. The United States had almost no domestic sources of chromium, a material essential for manufacturing a wide range of products used in everyday life and military defense. Yet during the struggle for Rhodesian independence, the U.S. government placed an embargo on imports of chromium from Rhodesia. Prior to the second Gulf war and after the first Gulf war, there was a similar embargo on oil from Iraq.

   Shortages can occur by depletion and by governments. In 1986, the U.S. government wrestled with the question of economic sanctions against the government of South Africa for its apartheid policy.

2. **Synthetic materials.** In our quest for lighter-weight products with sophisticated capabilities, we have turned more and more to man-made materials. These compounds, fabrics, and crystalline structures are the materials from which the marvels of high-tech products are made. For example, automobiles will soon boast rust-free outer skins made of laminates of ferrous and nonferrous materials. They will be powered by an engine built around a ceramic engine block. The design and production costs of such esoteric materials are reflected in their higher cost structure. There are, of course, offsets to higher purchase prices. The operating costs of the products are expected to be lower and their capabilities greater.
3. **Inflation.** During 2005, the materials buyer experienced periodic increases as material prices were adjusted upward in response to the rising costs of energy and labor. Managing materials during inflationary periods, or in developing countries with triple-digit inflation, results in decisions that would make little sense in stable environments.

4. **Complex, high-value products.** Management in the auto industry frequently hears the complaint, “They don’t make them like they used to.” The industry’s response is, “If we did, you wouldn’t buy them.” Consumers demand ever more reliable and capable products. Our cars now have microprocessors to monitor the vehicle’s operation and tell us everything we would want to know about the state of the car. There are seat and steering wheel heaters. There’s an instrument that tells us how many miles we can travel with the gasoline inventory on board. Another device talks to us telling us to shut doors, buckle up, and so on. Recently, vehicles with a communications link that communicates with an Earth-orbiting satellite tell the driver exactly where they are. Maps are displayed on a computer monitor with a cursor showing instantaneously the location of the car. Not all products are so esoteric, but generally today’s products (and those of tomorrow) will utilize more complex materials and components in more configurations with higher degrees of customization. For all these reasons, you should expect no reversal in the trends of increased dollar responsibility and the strategic importance of supply management. Where else is the potential for cost reduction and competitive advantage so great?

### POTENTIAL FOR PROFIT

All supply management activities have potential for cost reduction and, hence, increased profit. The purchase of raw materials is used to illustrate what is called the “profit leverage” argument. We might just as easily have used the distribution or production activities. Suppose a firm has an income statement such as that illustrated in Figure 1.4.

At this level of activity, direct materials are \((500/1,000) \times 100\), or 50 percent of sales. Direct labor is 20 percent. Suppose the purchasing manager is able to reduce the cost of materials by 2 percent. Perhaps the manager bargains more skillfully, or substitutes standard materials for custom-made materials. Or perhaps a value analysis program resulted in the purchase of functionally equivalent but less costly materials. Many opportunities exist to reduce the cost of purchases. If the firm’s sales remained the same, the effect on profit, given the 2 percent reduction of material cost, would look like that in Figure 1.5. For each $1 reduction of material cost, there is a $1 increase in profit. The ratio is 1:1.
FIGURE 1.5
Income Statement
Example 2

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales (000s)</td>
<td>$1,000</td>
</tr>
<tr>
<td>Direct materials</td>
<td>490</td>
</tr>
<tr>
<td>(49% of sales)</td>
<td></td>
</tr>
<tr>
<td>Direct labor</td>
<td>200</td>
</tr>
<tr>
<td>Gross Profit</td>
<td>$310</td>
</tr>
<tr>
<td>Selling and administrative expense</td>
<td>250</td>
</tr>
<tr>
<td>Net Profit</td>
<td>$60</td>
</tr>
</tbody>
</table>

What increase in sales would be necessary to increase profit by $10,000 if material costs were not reduced?

Let \( x \) be the required sales; then \( 0.5x \) is the cost of materials and \( 0.2x \) is labor cost.

\[
\text{Sales} = \text{Variable cost} + \text{Fixed cost} = \text{Profit} \\
\Rightarrow x = 0.5x + 0.2x + 250 + (10 + 50) \\
\Rightarrow x = $1,033,333
\]

Sales must be increased by $33,333 to achieve the same $10,000 increase in profit. The ratio is 33:1. Depending on the market, and the firm’s competitive position, a sales increase of 3.3 percent may be possible only by exerting considerable effort. This is not to say that cost reductions in purchasing are achieved at no cost, but before trying to increase market share, we need to get our operating cost well in hand. Profit efficiency, not market share, should be our first concern.

INTEGRATED SUPPLY MANAGEMENT (ISM)

Whatever the appeal and promise of integrated supply management, achieving integration is a challenge. In firms with conventionally organized subfunctions, supply managers are primarily concerned with satisfying their own subfunctional objective. Purchasing managers minimize purchasing costs; marketing managers minimize distribution costs; and so on. These objectives are local, not systemwide. The decisions of a production-inventory control (PIC) manager may maximize utilization of production equipment, yet poorly serve the requirements of the marketing manager.

The decision of the purchasing manager affects not only the purchasing function but other materials functions. It is the objective of ISM to manage the related considerations. Purchasing should consider the nonpurchasing consequences of its decisions.

Suppose a purchasing manager must decide the order quantity for a material with an annual requirement of 200,000 units. The material is consumed by manufacturing at a constant rate. The unit cost of the material is $1. For transportation purposes, 50,000 units are considered a truckload (TL). Shipments less than 50,000 units are charged at a less-than-truckload (LTL) rate, that is higher per unit.

Asked to state their objectives, the subfunctional managers might respond by saying:

**Purchasing manager:** “Minimize annual ordering cost.”

**PIC manager:** “Minimize work-in-process inventory.”

**Traffic manager:** “Minimize transportation cost.”
If the purchasing manager weighs only the purchasing objective, annual ordering cost is minimized when the annual requirement is ordered once a year. Order cost is the cost to place one order. It is incurred each time an order is placed, or part of an order is scheduled for delivery. Placing a single order for 200,000 units minimizes annual order cost but results in an average inventory of $100,000. We assume no safety stock, and receipt of the material is at the beginning of the year.

Average Inventory = \( \frac{\text{Beginning Inventory} + \text{Ending Inventory}}{2} \)

\[ = \frac{200,000}{2} \]

\[ = 100,000 \text{ units @ $1 per unit, the average inventory value held is $100,000.} \]

The significance of average inventory is that inventory cost is a function of average inventory. Inventory is an asset. Working capital is tied up in material rather than an alternative asset. Opportunity costs as well as costs of storing, insuring, and handling are incurred when inventory exists.

If the purchasing manager considered PIC’s objective (minimize WIP inventory), the order quantities would be 4,000 units, with an order going to the supplier once a week. Assume there are 50 weeks in a year. Because manufacturing requires a uniform flow of material, its weekly requirement is 200,000/50, or 4,000, units per week. The reduction in average inventory when order quantity changes from 200,000 to 4,000 units is offset by the 50-fold increase in annual ordering cost.

To satisfy the traffic manager, the order quantity should be at least 50,000 units. With that quantity, the truckload transportation rate applies and transportation costs are minimized. At 50,000 units, the average annual inventory is $25,000 and 200,000/50,000, or 4, orders per year are placed.

Each manager can make a strong case for the order quantity selected. If the purchasing manager ignores the PIC and traffic manager, manufacturing will have to live with a year’s supply of material in its stockroom. The purchasing manager should try to quantify the inventory and order costs, and ask about other costs that might be relevant.

Suppose the cost of carrying one unit of material in inventory is $1/year, and that the order cost is $100/order. Assume the transportation rates are $20/CWT LTL and $10/CWT TL. CWT means “hundred weight,” that is, 100 pounds. The weight of the material is 1 pound. In tabular form, the annual costs of the order quantities of 200,000, 4,000, and 50,000 are shown in Figure 1.6.

<table>
<thead>
<tr>
<th></th>
<th>Purchasing Cost</th>
<th>Order Quantity</th>
<th>Average Inventory</th>
<th>Orders/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing</td>
<td>$100</td>
<td>200,000</td>
<td>$100,000</td>
<td>1</td>
</tr>
<tr>
<td>PIC</td>
<td>$5,000</td>
<td>4,000</td>
<td>$2,000</td>
<td>50</td>
</tr>
<tr>
<td>Distribution</td>
<td>$400</td>
<td>50,000</td>
<td>$25,000</td>
<td>4</td>
</tr>
</tbody>
</table>

**ANNUAL INVENTORY-ORDERING-TRANSPORTATION COSTS**

At least in terms of the costs quantified, and assuming realistic estimates of inventory cost/unit/year, and cost to place an order, the order quantity of 50,000 units minimizes annual costs. A word of caution: There are often costs that have not