

CHAPTER **1**

Introduction to Operations and Supply Chain Management

CHAPTER OUTLINE

Introduction

1.1 Why Study Operations and Supply Chain Management?

1.2 Important Trends

1.3 Operations and Supply Chain Management and You

1.4 Purpose and Organization of This Book

Chapter Summary

Chapter Objectives

By the end of this chapter, you will be able to:

- Describe what the operations function is and why it is critical to an organization's survival.
- Describe what a supply chain is and how it relates to a particular organization's operations function.
- Discuss what is meant by operations management and supply chain management.
- Identify some of the major operations and supply chain activities, as well as career opportunities in these areas.
- Make a case for studying *both* operations management and supply chain management.

INTRODUCTION

Let's start with a question: What do the following organizations have in common?

- **Wal-Mart**, which not only is a leading retailer in the United States, but also has built a network of world-class suppliers, such as GlaxoSmithKline, Sony, and Mattel;
- **Logistics**, a service firm that provides warehousing and transportation services;
- **Soletron Corporation**, a contract manufacturer that assembles everything from Hewlett-Packard printers to television decoding boxes; and
- **SAP**, the world's largest provider of enterprise resource planning (ERP) software.

While these firms may appear to be very different, they have at least one thing in common: a strong commitment to superior operations and supply chain management.

In this chapter, we kick off our study of operations and supply chain management. We begin by examining what operations is all about and how the operations of an individual organization fit within a larger supply chain. We then talk about what it means to *manage* operations and supply chains.

In the second half of the chapter, we discuss several trends in business that have brought operations and supply chain management to the forefront of managerial thinking. We also devote a section to what this all means to you. We discuss career opportunities in the field, highlight some of the major professional organizations that serve operations and supply chain professionals, and look at some of the major activities that operations and supply chain professionals are involved in on a regular basis. We end the chapter by providing a roadmap of this book.





Operations management and supply chain management cover a wide range of activities, including transportation services, manufacturing operations, retailing, and consulting.

1.1 WHY STUDY OPERATIONS AND SUPPLY CHAIN MANAGEMENT?

So why should you be interested in operations and supply chain management? There are three simple reasons.

1. Every organization must make a product or provide a service that someone values. Otherwise, why would the organization exist? Think about it. Manufacturers produce physical goods that are used directly by consumers or other businesses. Transportation companies provide valuable services by moving and storing these goods. Design firms use their expertise to create products or even corporate images for customers. The need to provide a valuable product or service holds true for nonprofit organizations as well. Consider the variety of needs met by government agencies, charities, and religious groups, for example.

The common thread is that each of the above organizations has an operations function, or *operations*, for short. The **operations function** is the collection of people, technology, and systems within an organization that has primary responsibility for providing the organization's products or services. Regardless of what career path you might choose, you will need to know something about your organization's operations function.

As important as the operations function is to a firm, few organizations can—or even want to—do everything themselves. This leads to our second reason for studying operations and supply chain management.

2. Most organizations function as part of larger supply chains. A **supply chain** is a network of manufacturers and service providers that work together to convert and move goods from the raw materials stage through to the end user. These manufacturers and service providers are linked together through physical flows, information flows, and monetary flows. Put another way, supply chains link together the operations functions of many different organizations.

Consider a store at the local mall that sells athletic shoes. Although the store doesn't actually make the shoes, it provides valuable services for its customers—a convenient location and a wide selection of products. Yet the store is only one link in a much larger supply chain that includes:

- Plastic and rubber producers that provide raw materials for the shoes;
- Manufacturers that mold and assemble the shoes;
- Wholesalers that decide what shoes to buy and when;
- Transportation firms that move the materials and finished shoes to all parts of the world;
- Software firms and Internet service providers (ISPs) that support the information systems that coordinate these physical flows; and
- Financial firms that help distribute funds throughout the supply chain, ensuring that the manufacturers and service firms are rewarded for their efforts.

So where does this lead us? To our third reason for studying operations and supply chain management—and the premise for this book.

Operations function

Also called *operations*. The collection of people, technology, and systems within an organization that has primary responsibility for providing the organization's products or services.

Supply chain

A network of manufacturers and service providers that work together to convert and move goods from the raw materials stage through to the end user. These manufacturers and service providers are linked together through physical flows, information flows, and monetary flows.



Athletic shoes at a retailer represent the last stage in a supply chain that crosses the globe and involves many different companies.

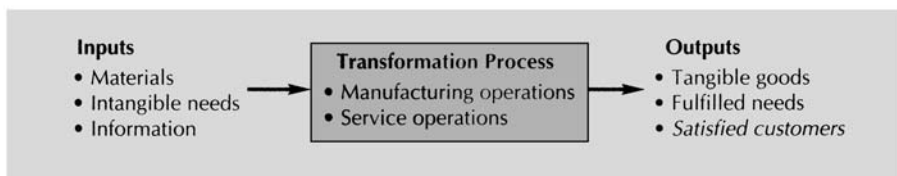
3. Organizations must carefully manage their operations and supply chains in order to prosper, and, indeed, survive. Returning to our example, think about the types of decisions facing a shoe manufacturer. Some fundamental operations decisions that it must make include the following: “How many shoes should we make and in what styles and sizes?” “What kind of people skills and equipment do we need?” “Should we locate our plants to take advantage of low-cost labor or to minimize shipping costs of the finished shoes?”

In addition to these operations issues, the shoe manufacturer faces many decisions with regard to its role in the supply chain: “From whom should we buy our materials—the lower-cost supplier or the higher-quality one?” “Which transportation carriers will we use to ship our shoes?” The right choices can lead to higher profitability and increased market share, while the wrong choices can cost the company dearly, or even put it out of business.

Operations Management

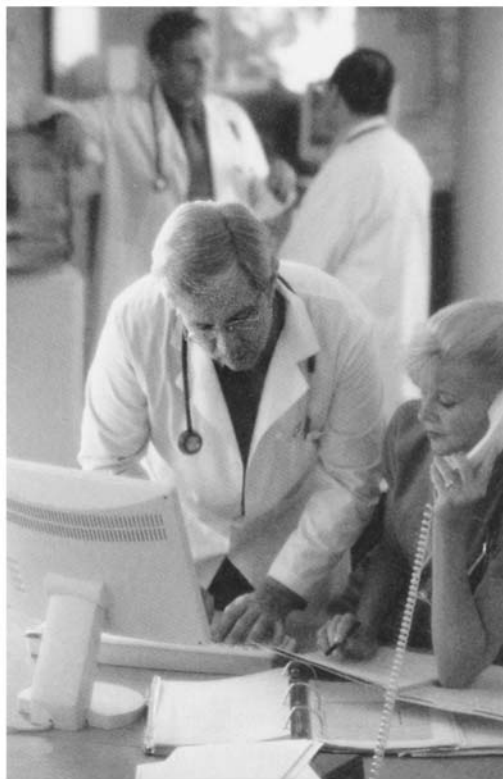
Let’s begin our detailed discussion of operations and supply chain management by describing operations a little more fully and explaining what we mean by operations management. As we noted earlier, all organizations must make products or provide services that someone values, and the operations function has the primary responsibility for making sure this happens.

FIGURE 1.1
Viewing Operations as a
Transformation Process



The traditional way to think about operations is as a *transformation process* that takes a set of inputs and transforms them in some way to create outputs—either goods or services—that a customer values (Figure 1.1). Consider a plant that makes wooden chairs. Even for a product as simple as a chair, the range of activities that must occur to transform raw lumber into a finished chair can be overwhelming at first. Raw lumber arrives as an input to the plant, perhaps by truck or even train car. The wood is then unloaded and moved onto the plant floor. Planing machines cut the lumber to the right thickness. Lathes shape pieces of wood into legs and back spindles for the chairs. Other machines fabricate wood blanks, shaping them into seats and boring holes for the legs and back spindles.

In addition to the equipment, there are people who run and load the machines, conveyors, and forklifts that move materials around the plant, and there are other people who



Health care services use highly skilled individuals as well as specialized equipment to provide physiological transformation processes for their patients.

assemble the chairs. Once the chairs are finished, still more people pack and move the chairs into a finished goods warehouse or onto trucks to be delivered to customers. In the background, supervisors and managers use information systems to plan what activities will take place next.

The operations function can also provide intangible services, as in the case of a law firm. A major input, for example, might be the need for legal advice—hardly something you can put your hands around. The law firm, through the skill and knowledge of its lawyers and other personnel, transforms this input into valuable legal advice, thereby fulfilling the customer's needs. How well the law firm accomplishes this transformation goes a long way in determining its success.

Figure 1.1 makes several other points. First, inputs to operations can come from many places and take many different forms. They can include raw materials, intangible needs, and even information, such as demand forecasts. Also, operations are often highly dependent on the quality and availability of inputs. Consider our chair plant again. If the lumber delivered to it is of poor quality or arrives late, management might have to shut down production. In contrast, a steady stream of good-quality lumber can assure high production levels and superior products. Second, nearly all operations activities require coordination with other business functions, including engineering, marketing, and human resources. We will revisit the importance of cross-functional decision making in operations throughout the book. Third, operations management activities are information and decision intensive. You do not have to be able to assemble a product yourself to be a successful operations manager—but you *do* have to make sure the right people and equipment are available to do the job, the right materials arrive when needed, and the product is shipped on time, at cost, and to specifications!

Operations management
“[T]he planning, scheduling, and control of the activities that transform inputs into finished goods and services.”

Upstream

A term used to describe activities or firms that are positioned *earlier* in the supply chain relative to some other activity or firm of interest. For example, corn harvesting takes place upstream of cereal processing, while cereal processing takes place upstream of cereal packaging.

Downstream

A term used to describe activities or firms that are positioned *later* in the supply chain relative to some other activity or firm of interest. For example, sewing a shirt takes place downstream of weaving the fabric, while weaving the fabric takes place downstream of harvesting the cotton.

Operations management, then, is “the planning, scheduling, and control of the activities that transform inputs into finished goods and services.”¹ Operations management decisions can range from long-term, fundamental decisions about what products or services will be offered and what the transformation process will look like to more immediate issues, such as determining the best way to fill a current customer order. Through sound operations management, organizations hope to provide the best value to their customers while making the best use of resources.

Supply Chain Management

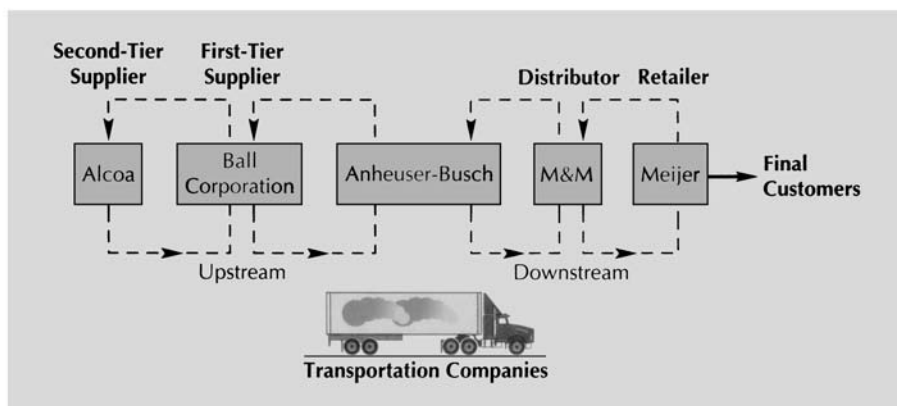
The traditional view of operations management illustrated in Figure 1.1 still puts most of the emphasis on the activities a particular organization must perform when managing its own operations. But, as important as a company's operations function is, it is not enough for a company to focus on doing the right things within its own four walls. Managers must also understand how the company is linked in with the operations of its suppliers, distributors, and customers—what we refer to as the supply chain.

As we noted earlier, organizations in the supply chain are linked together through physical flows, information flows, and monetary flows. These flows go both up and down the chain. Let's extend our discussion and vocabulary using a product many people are familiar with: a six-pack of beer. Figure 1.2 shows a simplified supply chain for Anheuser-Busch. From Anheuser-Busch's perspective, the firms whose inputs feed into its operations are positioned **upstream**, while those firms who take Anheuser-Busch's products and move them along to the final consumer are considered **downstream**.

When the typical customer goes to the store to buy a six-pack, he probably does not consider all of the steps that must occur beforehand. Take cans, for example. Alcoa extracts the aluminum from the ground and ships it to Ball Corporation, which converts the

¹J. F. Cox and J. H. Blackstone, eds., *APICS Dictionary*, 10th ed. (Falls Church, VA: APICS, 2002).

FIGURE 1.2
A Simplified View of
Anheuser-Busch's Supply
Chain



First-tier supplier

A supplier that provides products or services directly to a particular firm.

Second-tier supplier

A supplier that provides products or services to a firm's first-tier supplier.

Supply chain management

The *active* management of supply chain activities and relationships in order to maximize customer value and achieve a sustainable competitive advantage. It represents a conscious effort by a firm or group of firms to develop and run supply chains in the most effective and efficient ways possible.

aluminum into cans for Anheuser-Busch. In the supply chain lexicon, Ball Corporation is a **first-tier supplier** to Anheuser-Busch because it supplies materials directly to the brewer. By the same logic, Alcoa is a **second-tier supplier**; it provides goods to the first-tier supplier.

The cans from Ball Corporation are combined with other raw materials, such as cartons, grain, hops, yeast, and water, to produce the packaged beverage. Anheuser-Busch then sells the packaged beverage to M&M, a wholesaler which, in turn, distributes the finished good to Meijer, the retailer. Of course, we cannot forget the role of transportation carriers, which carry the inputs and outputs from one place to the next along the supply chain.

As Figure 1.2 suggests, the flow of goods and information goes both ways. For instance, Ball Corporation might place an order (information) with Alcoa, which, in turn, ships aluminum (product) to Ball. Anheuser-Busch might even return empty pallets or containers to its first-tier suppliers, resulting in a flow of physical goods back *up* the supply chain.

Of course, there are many more participants in the supply chain than the ones shown here—Anheuser-Busch has hundreds of suppliers and the number of retailers is even higher. We could also diagram the supply chain from the perspective of Alcoa, M&M, or any of the other participants. The point is that most of the participants in a supply chain are both customers and suppliers. Finally, the supply chain must be very efficient, as the final price of the good must cover all of the costs involved plus a profit for each participant in the chain.

While you were reading through the above example, you might have thought to yourself, “Supply chains aren’t new”—and you’d be right. Yet most organizations historically performed their activities independently of other firms in the chain, which made for disjointed and often inefficient supply chains. In contrast, **supply chain management** is the *active* management of supply chain activities and relationships in order to maximize customer value and achieve a sustainable competitive advantage. It represents a conscious effort by a firm or group of firms to develop and run supply chains in the most effective and efficient ways possible.

One of the earliest proponents of supply chain management was Wal-Mart.² What Wal-Mart was doing in the late 1980s and early 1990s was nothing short of revolutionary. Individual stores sent daily sales information to Wal-Mart’s suppliers via satellite. These suppliers then used the information to plan production and ship orders to Wal-Mart’s warehouses. Wal-Mart used a dedicated fleet of trucks to ship goods from warehouses to stores in less than 48 hours and to replenish store inventories about twice a week. The result was better customer service (because products were nearly always available), lower production and transportation costs (because suppliers made and shipped only what was needed),

²G. Stalk, P. Evans, and L. E. Shulman. “Competing on Capabilities: The New Rules of Corporate Strategy,” *Harvard Business Review* 70, no. 2 (March–April 1992): 57–69.



Wal-Mart was an early proponent of superior supply chain performance. Other companies have now adopted many of the practices Wal-Mart pioneered in the 1980s.

and better use of retail store space (because stores did not have to hold an excessive amount of inventory).

Wal-Mart has continued to succeed through superior purchasing and logistics (two key areas of supply chain management), and many of the practices it helped pioneer have taken root throughout the business world. To illustrate how widespread supply chain management thinking has become, consider the example of Krispy Kreme in the *Supply Chain Connections* feature.

S U P P L Y C H A I N C O N N E C T I O N S

LINKING WAREHOUSES TO STORES AT KRISPY KREME³

If you want to know how pervasive supply chain management has become, the next time you go to a Krispy Kreme store, look no further than the doughnut and coffee in front of you. Krispy Kreme needs an efficient supply chain not only because it needs to meet consumer demand for its trademark hot doughnuts, but also because selling supplies out of its corporate warehouses to its franchisees is an important part of its business. “They want to be like Coca-Cola, selling the syrup to its bottlers,” says financial analyst Andrew Wolf of BB&T Capital Markets in Richmond, Virginia. “Franchisees have to buy their mix, and they charge a lot for it.”

To improve the flow of information and products between the warehouses and stores, the Winston-Salem, North Carolina, firm added important technology tools,

including a computer-based warehouse management system and an online ordering application that allows store managers to order supplies electronically from Krispy Kreme’s automated warehouses. Replacing a system in which store orders were faxed in, the new technology also lets store managers order at their convenience instead of restricting them to business hours, when they have customers to serve.

The warehouse management information system, which uses radio-frequency tag technology to track the location of inventory inside the warehouse, was rolled out in 2000 and quickly paid for itself by increasing the accuracy of picking and packing orders. “There are virtually no errors now as far as correct orders coming to us,” says Martin Hendrix, general manager of a Krispy Kreme in Fayetteville, North Carolina. “Before there were probably three or four mistakes a week—it could be off by as much as ten or fifteen bags of mix, usually not enough of it instead of too much.”

³Adapted from E. Kone, “Krispy Kreme’s Essential Ingredient,” *Baseline*, November 2002, 79–81.

Supply chain management efforts can range from an individual firm taking steps to improve the flow of information between itself and its supply chain partners to a large trade organization looking for ways to standardize transportation and billing practices. In the case of Wal-Mart, a single, very powerful firm took primary responsibility for improving performance across its own supply chain. As an alternative, companies within an industry often form councils or groups to identify and adopt supply chain practices that will benefit all firms in the industry. One such group is the Automotive Industry Action Group (AIAG, <http://www.aiag.org>), whose mission is, in part, to “provide an open forum where members cooperate in developing and promoting solutions that enhance the prosperity of the automotive industry.”⁴ The Grocery Manufacturers of America (GMA, www.gmabrands.com) serves a similar function. Organizations such as the Supply-Chain Council (SCC, www.supply-chain.org) seek to improve supply chain performance across many industries.

1.2 IMPORTANT TRENDS

As we shall see, operations management and supply chain management are as much philosophical approaches to business as they are bodies of tools and techniques, and thus they require a great deal of interaction and trust between companies. For right now, however, let’s talk about three major developments that have brought operations and supply chain management to the forefront of managers’ attention:

- Electronic commerce
- Increasing competition and globalization
- Relationship management

Electronic Commerce

In the 1980s, a mainframe computer filled an entire room. Today a laptop computer exceeds the storage and computing capacities of mainframe computers made only 15 years ago. With the emergence of the personal computer, fiber-optic networks, and the Internet, the cost and availability of information resources allow easy linkages and eliminate information-related time delays in any supply chain network.

Electronic commerce (or e-commerce, for short) refers to the use of information technology (IT) solutions to automate business transactions. Electronic commerce promises to improve the speed, quality, and cost of business communication. The late 1990s and early 2000s, for example, saw the emergence of Internet-based “trading communities” that put hundreds of buyers and sellers in touch with one another.⁵ Now, instead of looking through a catalog, filling out a paper order form, and faxing it a supplier, buyers in many companies can search for what they need via their computer and, with a couple of clicks, place an order. Many paper transactions are becoming increasingly obsolete. At the same time, the proliferation of new telecommunications and computer technology has made instantaneous communications a reality. Such information systems—for example, Wal-Mart’s satellite network—can link together suppliers, manufacturers, distributors, retail outlets, and, ultimately, customers, regardless of location.

Electronic commerce

Also called *e-commerce*. The use of information technology (IT) solutions to automate business transactions. Electronic commerce promises to improve the speed, quality, and cost of business communication.

⁴Available at www.aiag.org/about (accessed December 15, 2003).

⁵For an example, read about SciQuest at www.sciquest.com.