

Supply Chain Management

SECOND EDITION

*A Global
Perspective*

NADA R. SANDERS



WILEY

SUPPLY CHAIN MANAGEMENT

SECOND
EDITION

A GLOBAL PERSPECTIVE

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PREFACE

Supply chain management (SCM) is the fastest-growing area of business today and is at the core of success of most leading companies. Knowledge of SCM is necessary to participate in this growing and exciting career field. However, SCM is challenging in scope and complexity. Even today there is a misunderstanding of SCM. Most people assume that SCM is part of logistics and distribution, or purchasing, or perhaps marketing. They do not understand the intricacies and broad reach of this rapidly evolving area of business. This book is designed to provide students with a comprehensive understanding of SCM, key issues involved, and the very latest business thinking. This book is different from other SCM textbooks. It is specifically written as a comprehensive SCM text providing an integrated global and technology focused perspective.

Recent trends have made the study of SCM especially challenging. Today's business environment has forced companies to compete in very different ways than just a few years ago. The following is true of today's organizations:

- In addition to competing on traditional dimensions such as quality, time, cost, and customization, companies must be rapid innovators. They must stay abreast of quickly changing customer demands and have responsive supply chains in place.
- Technological advancements—including big data analytics, autonomous vehicles, 3-D printing, Internet of Things (IoT), and next generation RFID—have transformed supply chains. The “intelligent supply chain” that is technologically driven is becoming the norm for companies.
- Today's organizations operate in a global environment and are affected by global trade. Many companies serve multiple global markets, with products sourced and produced across many continents. They must plan, design, and manage a complex supply chain network.
- Focus on “green” and sustainability has become prominent. Issues of environmental and social responsibility are becoming critical elements of SCM, spanning concerns such as sourcing, packaging, manufacturing, and distribution.
- Unprecedented threats to security are forcing companies to invest in systems to protect products and information throughout every step of the supply chain. Addressing issues of security in supply chain design is a critical aspect of SCM.
- A global recession has created tremendous financial pressures on companies and their supply chains. Companies are being forced to remain competitive and innovative while cutting, or maintaining, costs.

This text addresses SCM within this realistic global and technologically driven business environment, in a complete and comprehensive manner. It is written in an accessible manner enabling students to easily grasp the material, then extend and elevate discussion in the classroom. Each chapter ends with a business case to reinforce the concepts learned. The textbook is intended to provide the foundational concepts for undergraduate and graduate-level classes in SCM, as

well as related areas such as operations management and purchasing. In addition, the book is an excellent resource for executive education and training seminars.

Goals of the Book

1. Provide a Comprehensive Foundation of SCM. This text is written to provide a comprehensive foundation of SCM, from its broad meaning and strategic implications, to operational concepts and techniques. While there are some excellent textbooks that provide foundational concepts of SCM, few present these concepts in a comprehensive and integrated manner that is the hallmark of SCM.

The text begins with an introduction to the holistic and integrated nature of SCM. Supply chain strategy is discussed next, as the driver of SCM, followed by the design of the supply chain network. Participation of organizational functions—including marketing, operations, sourcing, and logistics—are discussed, as well as their linkages to SCM. Next, planning and controlling the supply chain is discussed, from forecasting and materials management, to lean and Six Sigma. Attention is devoted to topics that are of specific interest to SCM, including collaborative forecasting methods such as CPFR and S&OP. Finally, the text looks at issues of managing the supply chain. This includes managing supply chain relationships, from developing alliances to negotiation strategies. Entire chapters are devoted to the most cutting-edge issues in business today: global business, a technologically driven environment, and sustainable supply chain management.

2. Provide Cross-Functional and Integrative Coverage of SCM. This text is written to present SCM with an equal and balanced coverage of key business functions, their interactions, and their integration. SCM is truly boundary spanning and is intertwined with all organizational functions. Also, SCM is cross-functional in its decision-making requirements and needs to be presented as such, rather than as an offshoot of another business function. This text has equal coverage of the relevant business functions, their integration, and their impact on the functionality of SCM.

3. Provide Understanding of Business Issues. SCM is intertwined with best business practices. It is at the core of success of leading companies such as Apple, BMW, Wal-Mart, P&G, Amazon, Zara, Starbucks, Tesla motor company and others. These companies have achieved world-class status in large part due to a strong focus on SCM. This text is rich in business examples that illustrate SCM best practices and showcase the complexity of SCM business decisions. These examples show SCM to be an exciting area of study, on the cutting edge of business.

Features

1. Cross-Functional Coverage. SCM is presented as a cross-functional area of business study with equal coverage of functions such as marketing, operations, sourcing, and logistics, and their integration.

2. Global Focus. Today's supply chains traverse the globe. This creates numerous challenges, such as designing a global supply network, dealing with international tariffs and foreign government regulation, differences in transportation and technology, managing cross-cultural work teams, and addressing customer issues that arise from cultural expectations. Each chapter has at least one box labeled “*Global Insights*,” which provides a summary of a global issue that pertains to the topic at hand and an associated business example.

3. Managerial Focus. The text is rich with cutting edge SCM business examples. Each chapter has at least one box labeled ‘*Supply Chain Leaders Box*’ that illustrates the latest business practices of the topic addressed. Each chapter begins with a current business example. In addition,

each chapter ends with a unique case written to address key managerial issues and a strong emphasis on managerial decision making.

4. Strategic Focus. SCM is a strategic function. As a result, the text has a strong strategic focus. Each chapter has at least one box labeled “*Managerial Insights Box*,” which illustrates current business thought, using established and recognized sources (*HBR*, *Business Week*, *The Wall Street Journal*, *Supply Chain Management Review*, etc.).

5. Strong Pedagogy. The text is written in a readable and accessible manner. Each chapter ends with discussion questions, a case with questions designed to promote managerial thinking, and, where appropriate, homework problems and exercises. Icons throughout chapters show focus on cross-functional coverage, global coverage, sustainability, technology, and the service supply chain. Further, the chapters in the text are linked to the overall topic rather than being presented as an assembled compilation of material.

Changes to This Edition

A number of changes have been made to this edition to make the text as current, user-friendly, and relevant as possible. All the chapters have been updated to incorporate the latest available information, with increased emphasis on technology, digitization, and analytics. The business examples have been updated, and a large number of class exercises have been added. The following features have been added to this edition:

Big Data Analytics: All chapters have been updated to include state-of-the-art impact of big data analytics on supply chains. Each chapter now has one ‘*Big Data Analytics Box*’ that showcases an example of how big data analytics is impacting the topic covered in the chapter. This ranges from how retailers such as Target capture customer preferences, to how UPS uses its state-of-the-art navigation system.

Technology Focus: Advancements in technology are changing supply chains. These include 3-D printing, driverless vehicles, next-generation RFID, Internet of Things (IoT), cloud computing, machine learning, and many others. These technologies have enabled the “intelligent supply chain” and are discussed in every chapter.

Classroom Exercises: Each chapter now includes class exercises designed to foster classroom discussion. These exercises are classroom tested and include instructor details on how to conduct the exercise and provide a series of questions with suggested solutions to guide the discussion.

Updated Examples: Throughout the chapters all examples and data have been updated. The focus of the update was to make the revision rich in examples of both large supply chains, as well as those of small and medium firms to highlight key concepts.

Instructor Resources

The instructor’s website offers several resources designed to assist professors in preparing lectures and assignments, including:

Instructor’s Manual Includes a suggested course outline, teaching tips and strategies, answers to all end-of-chapter material, additional in-class exercises, and more.

Test Bank A comprehensive Test Bank comprised of true/false, multiple-choice, short answer, and essay questions is available on the instructor site. The questions are also available as a Computerized Test Bank.

PowerPoint Slides Full color slides highlight key figures from the text as well as many additional lecture outlines, concepts, and diagrams. These provide a versatile opportunity to add high-quality visual support to lectures.

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Introduction to Supply Chain Management

1

LEARNING OBJECTIVES

After completing this chapter, you should be able to:

- Define “supply chain management,” and explain the activities involved.
- Identify the flows through a supply chain, and explain the bullwhip effect.
- Describe the rise of supply chain management and its global implications.
- Describe characteristics of a competitive supply chain.
- Identify and explain key trends that drive today’s supply chains.

CHAPTER OUTLINE

■ What Is Supply Chain Management (SCM)?

SCM Activities

Managing Flows Through the Supply Chain

The Bullwhip Effect

Customer Focus

The Service Supply Chain

■ The Boundary-Spanning Nature of SCM

Intraorganizational Integration

Cross-Enterprise Integration

SCM Versus Logistics

■ The Rise of SCM

■ Characteristics of a Competitive Supply Chain

Responsiveness

Reliability

Relationship Management

■ Trends in SCM

Globalization

Outsourcing

Information Technology

Big Data Analytics

3-D Printing, Additive Manufacturing, and Robotics

Postponement

The Lean Supply Chain

Managing Supply Chain Disruptions

Supply Chain Security

Sustainability and the “Green” Supply Chain

Innovation

The Financial Supply Chain

■ **Careers in SCM and Professional Organizations**

■ **Chapter Highlights**

■ **Key Terms**

■ **Discussion Questions**

■ **Case Study: McNulty’s Muscular Materials (MMM)**

Most of us have had the experience of sitting at a Starbucks coffee shop enjoying a cup of coffee, a frappuccino, or perhaps a pumpkin spice latte. We have enjoyed the “Starbucks experience,” sipping a beverage, lounging in one of the many chairs, and perhaps reading a newspaper or a good book. We may have briefly noticed that Starbucks’ coffee beans come from all across the globe, including Guatemala, Sumatra, Brazil, Kenya, Mexico, and Ethiopia. However, we have probably not given much thought to the complexity of decisions and coordination required to make sure that we, the customers, receive the beverages we are enjoying as we sit in the café.

In fact, for Starbucks to be able to deliver such a high-quality, consistent, and broad product offering to more than 23,000 store locations worldwide, it must manage an extensive global network of trading partners, from coffee growers to roasting plants to coffee distributors. It must manage relationships, ensure the highest quality, and guarantee product availability at each store location, all the while maintaining efficiency and keeping costs as low as possible. So while we, the customers, sit in the dimly lit and hip café enjoying the “Starbucks experience,” behind the scenes is a company that is managing one of the biggest global supply chains in the world.

Supply chain management (SCM) is the fastest-growing area of business today. In fact, it is at the core of the success of such companies as Amazon, Nike, Toyota, Wal-Mart, P&G, Zara, PepsiCo, BMW, L’Oréal, and McDonalds, as well as Starbucks, and countless others. These companies have achieved world-class status in large part due to a strong focus on SCM.

Most people assume that they have some idea of what SCM is about. They usually think it is part of logistics and distribution, or purchasing, or perhaps marketing. It is likely, however, that you do not yet know the full complexity and broad reach of this rapidly evolving business concept. At a recent conference Paul Mathews, Executive VP of Supply Chain for the Limited, joked that people still think of SCM as “kicking boxes and licking labels.” He wanted to highlight the misunderstanding of SCM many people still have.

The purpose of this book is to help you develop a comprehensive understanding of SCM. This includes understanding the key issues involved and becoming familiar with

the very latest business thinking. This will prepare for you for a successful career in a new and exciting business field.

Today's business environment has forced companies to compete in very different ways from just a few years ago. In addition to competing on traditional dimensions such as quality, time, cost, and customization, companies must be rapid innovators. They must stay abreast of quickly changing customer demands and increasing global competition. Advances in technology, the Internet, big data analytics, and unprecedented threats to security are forcing companies to be flexible and responsive. At the same time, a down economy has created tremendous financial pressures. SCM is the business concept through which companies can achieve this level of competitiveness while maintaining costs, and it is intertwined with today's best business practices. Companies understand that they cannot achieve the needed level of competitiveness in the current global economy without SCM.

Knowledge of SCM will give you the skills needed to help your organization gain a competitive advantage in the marketplace. It will also help you move into one of the fastest-growing career fields today.

What Is Supply Chain Management (SCM)?

Supply chain management (SCM) is the design and management of flows of products, information, and funds throughout the supply chain. It involves the coordination and management of all the activities of a supply chain. As such, SCM may appear deceptively simple. In fact, it is a complex business concept that is far reaching in the nature and type of decisions involved. Before we can begin to look at the full complexity of SCM, it is important to first understand the meaning of the term *supply chain*.

A **supply chain** is the network of all entities involved in producing and delivering a finished product to the final customer. This includes sourcing raw materials and parts; manufacturing, producing, and assembling the products; storing goods in warehouses; order entry and tracking; distribution; and delivery to the final customer. A simple supply chain is illustrated in Figure 1.1.

The flows through the supply chain begin with suppliers who supply and transport raw materials and components to producers or manufacturers. Manufacturers transform these

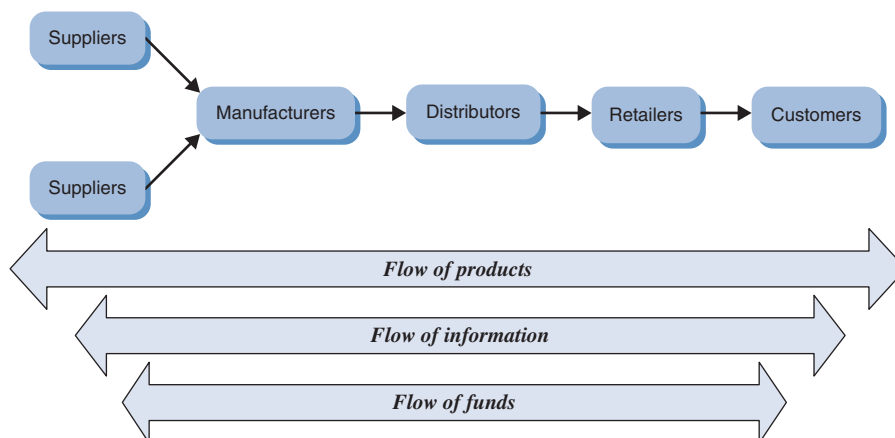


FIGURE 1.1 A simple supply chain.

materials into finished products that are then shipped either to the manufacturers' own distribution centers or to wholesalers. Next, the products are shipped to retailers who sell the product to final customers. Consider the Starbucks supply chain we just discussed. At the beginning of the supply chain are coffee farmers at various locations across the globe that grow the coffee beans. The coffee beans are picked, packaged in burlap bags, and transported to coffee roasters, entities that roast the beans. The roasted beans are then sent to coffee distributors, who then sort, package, and move the beans to retailer outlets such as Starbucks cafés, to be purchased by the consumer.

A typical supply chain may involve many different trading partners, called stages. These supply chain stages may include the following:

- Suppliers
- Producers
- Wholesalers/Distributors
- Retailers
- Customers

Note that every supply chain is different and that these stages are a generic representation of a supply chain. In fact, each stage may not be present in every supply chain. The number of stages that are part of a supply chain and its appropriate design will depend on both the customer's needs, the roles of the stages involved, and the value each stage provides.

Supply chains are under increasing financial pressure, and stages that do not add value to the supply chain are quickly bypassed or eliminated. For this reason, a supply chain is often called a **value chain** or a **value network**. Today's concept of the supply chain comes from the concept of a "value chain" that was introduced by a Harvard Business School professor, Michael Porter, in the 1980s. Michael Porter explained that a company's competitive advantage cannot be understood by looking at a firm as a whole. Rather, its competitive advantage comes from the many discrete activities that a firm performs and that each of these activities contributes to the firm's total cost position. This concept of each activity contributing to the total value has now been extended to the entire supply chain. In fact, it has been often said that it is not companies that compete. Rather, it is their supply chains that compete.

As we look at a supply chain it is important to point out some common terminology used to describe the relationships of supply chain stages to one another. Each company in a supply chain has its suppliers and customers. The stages of the supply chain that comprise the inbound direction toward the company, or the "focal firm," are called the "upstream" part of the supply chain.

The stages of the supply chain away from the "focal firm" are termed "downstream." This is shown in Figure 1.2. For example, if the focal firm was a manufacturer, all inbound suppliers would be considered "upstream," whereas distributors/wholesalers and retailers/customers would comprise the "downstream" part of the supply chain. Being able to refer to parts of the supply chain as either "upstream" or "downstream" provides a convenient point of reference. Similarly, suppliers that directly supply goods or services to a company are termed "first-tier suppliers." Suppliers that supply to a company's "first-tier suppliers" are termed "second-tier suppliers," and so on moving up the chain. This provides a common terminology for companies to understand which suppliers are being referenced.

The term *supply chain* implies a linear chain of participants from suppliers to final customers. A true supply chain is actually more like a complex network, as shown in Figure 1.3. A producer may receive materials from multiple suppliers. Many distributors and wholesalers receive inventory from many manufacturers, and most retailers receive products from many different distributors. For this reason a supply chain is often referred to as a supply chain network or supply web, to more accurately describe the nature of these relationships. In fact, many companies are part of multiple supply chains.

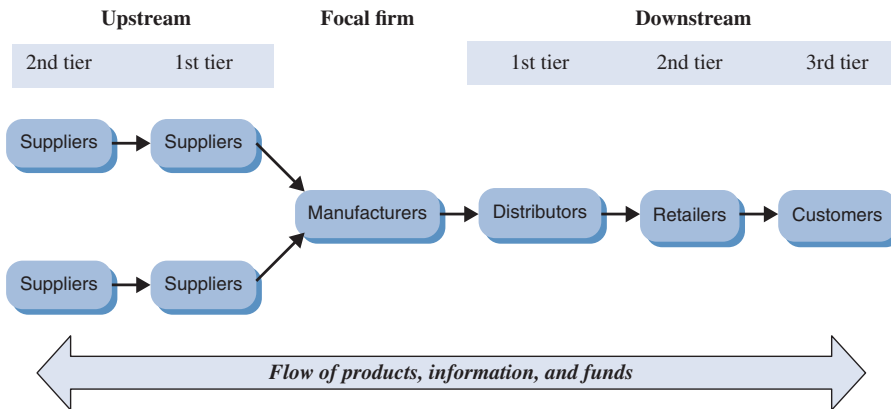


FIGURE 1.2 Stages of the supply chain.

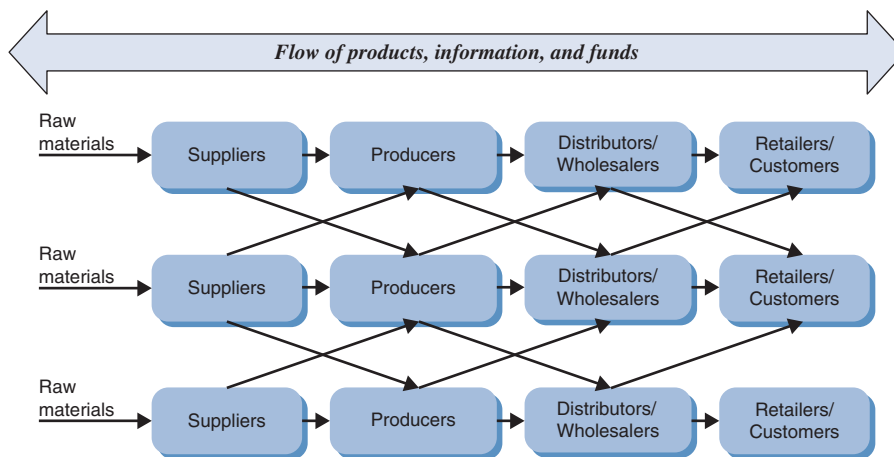


FIGURE 1.3 The supply chain network.

The supply chain network can actually take on many different shapes. Some are linear, as shown in Figure 1.3. Others take on the form of hub-and-spoke or a web. Often the type of network can be related to the number of suppliers, their locations, and the type of product being produced. For example, Dell Computer Corporation became famous for mandating that all its first-tier suppliers must be within a 15-minute radius anywhere around its Austin, Texas, manufacturing facility. This is an example of a hub-and-spoke supply network, with the focal firm in the center of the design, and a model that has been followed by many other manufacturers.

SCM Activities

Now that we understand what constitutes a supply chain or supply network, we can look at the issues involved in managing it. Recall that SCM involves the coordination and management of *all* the activities of a supply chain. It is responsible for managing the system of flows between the different entities of a supply chain to satisfy the final customer and maximize total supply chain profitability. SCM is a dynamic and ever-changing process that requires coordinating all activities among members of the supply chain.

SCM activities include the following:

- **Coordination:** SCM involves coordinating the movement of goods and services through the supply chain, from suppliers to manufacturers to distributors to final customers; it also includes

movement of goods back up the supply chain, as products may be returned. Coordination also involves the movement of funds through the supply chain as products are purchased and sold. This includes various financial arrangements and terms of purchase between buyers and suppliers.

- **Information Sharing:** SCM requires sharing relevant information among members of the supply chain. This includes sharing demand and sales forecasts, point-of-sale data, promotional campaigns planned, and inventory levels. Consider that a manufacturer must know if a retailer is planning an advertising campaign to ensure that enough of the product is being produced. Otherwise, the retailer may run out of stock. Similarly, the manufacturer's suppliers must be aware of increased production plans to provide sufficient component parts. Sharing this information enables the entire chain to work in unison.
- **Collaboration:** SCM requires collaboration between supply chain members so that they jointly plan, operate, and execute business decisions as one entity. This is important for decisions that range from product design and process improvement to implementing business initiatives or following a particular business strategy. For example, this may include collaborating on ways to cut costs or improve quality standards throughout the entire supply chain.

Managing Flows Through the Supply Chain

Recall that many flows move through a supply chain network. The first is the flow of **products** through the supply chain, from the beginning of the chain through various stages of production, to the final customer. However, goods also flow back through the chain. This is in the form of returned products that are unacceptable to customers for a variety of reasons, such as damaged or obsolete goods. This is an area of SCM called *reverse logistics* because the direction of product flow is reversed. The increased focus on customer accommodation has resulted in an increase in the amount of goods returned from customers.

The second important flow through the supply chain is that of **information** that is shared between members of the supply chain. Many simplified supply chains view the product flowing from suppliers to customers and information flowing in the opposite direction, from point-of-sale back to suppliers. In this simplified case, the primary information is demand or sales data, which is used to trigger replenishment and serves as the basis for forecasting. In a more realistic case, sales information is shared on a real-time basis, which leads to less uncertainty and less safety stock. The sharing of real-time information serves to compress or shorten the supply chain from a time standpoint. The result of this more timely and accurate information is a reduction in the amount of inventory carried throughout the supply chain.

The third important flow through the supply chain is that of **funds**. In a simplified supply chain, financial flow is often viewed as one directional, flowing backward in the supply chain as payment for products and services received. However, as products flow in both directions so does the transfer of funds. A major impact on fund transfer and the financials of companies has been supply chain compression. A shorter order cycle time means that customers receive their orders faster. It means that they are billed sooner and that companies receive payment sooner. This speeding up of the money collection process has had a huge impact on the profitability of certain firms. Consider Dell Computer Corporation, a company that has gained much from the compressed supply chain. Dell turns over its inventory roughly every four days. However, they often receive payment a week in advance, well before Dell pays its suppliers, providing a large financial benefit to Dell.

The key to successful SCM is the management of these flows through the chain. SCM is a dynamic process and provides many opportunities to reduce the cost of doing business and improve customer service. At the same time, the challenges of SCM are often underestimated. In fact the reason for the failure of many online businesses is due to their inability to manage

supply chain flows effectively. Many have excellent business concepts and marketing strategies, but are unable to make products available to customers in a cost-effective manner. For example, Webvan, an online grocery delivery company, was unable to bring the cost of grocery picking and delivery to a competitive level and went out of business. The success of Internet retailers such as Amazon.com has been primarily driven by the improvements in their supply chains.

The Bullwhip Effect

A supply chain is composed of many different companies, or stages, each with their own objectives. For a supply chain to be highly competitive, it is critical that its members engage in the activities of coordination, information sharing, and collaboration. Otherwise, each stage of the supply chain will have differing and possibly conflicting objectives and may focus on simply maximizing their own profits. Similarly, if information is not shared between stages, but is delayed or distorted, each stage may have a distorted view of final customer demand. As a result, they will likely not produce the right quantities of items needed, resulting in either shortages or excess inventory. Both situations result in lowered profitability of the entire supply chain.

It has been observed that fluctuation and distortion of information increases as it moves up the supply chain, from retailers, to manufacturers, and to suppliers. This is called the **bullwhip effect**, as inaccurate and distorted information travels up the chain like a bullwhip uncoiling. In response, each stage of the chain carries progressively more inventory to compensate for the lack of information. The bullwhip effect has been well documented in many industries and is costly for all supply chain members.

One of the best-known examples of the bullwhip effect was observed by Proctor & Gamble (P&G) in the supply chain of its Pampers diapers. The company discovered that even when demand for diapers was stable at the retail store level, orders for diapers from P&G fluctuated significantly. Even greater fluctuation was observed in orders for raw materials from suppliers over time. Although consumption of the final product was stable, orders for raw materials were highly variable.

A similar example was observed at Hewlett Packard (HP). HP observed that fluctuations of orders increased significantly as they moved from the resellers up the supply chain to the printer division to the integrated circuit division. Like P&G, HP observed that although final product demand was fairly stable, orders placed at every stage up the supply chain significantly increased in variability. Both P&G and HP found that the result of the bullwhip effect was an increase in cost and difficulty in filling orders on time.

The longer the supply chain, the greater the opportunity for the bullwhip effect, as manufacturers and suppliers are further away from final customer demand. If there is no coordination or sharing of information, these stages do not know final customer demand or when a replenishment order might arrive. As a result of this higher uncertainty, they stockpile inventory. The way to combat the bullwhip effect is to share point-of-sale information, available from most cash registers, with all members of the supply chain. This allows all stages of the supply chain to make replenishment decisions from the same information source. In addition to information sharing, coordination and collaboration will enable stages of the supply chain to work toward the same goals.

Customer Focus

The final customer is the driving force of the supply chain. In fact, the primary purpose for the existence of a supply chain is to respond to customer demands and generate profits for companies that are members of the chain. Therefore, meeting customer demands is the primary objective. The process is driven by a customer having a particular product need. The retailer tries to satisfy the customer by ensuring that the product is available. As customers continue to purchase

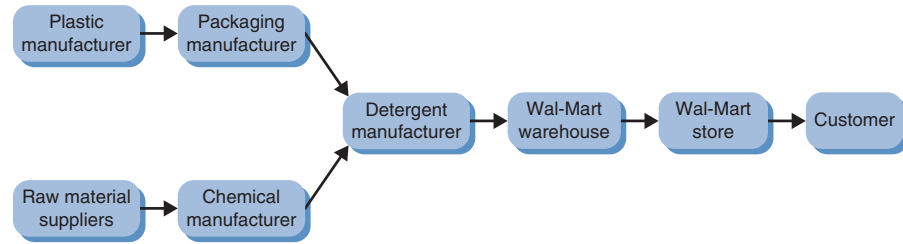


FIGURE 1.4 Products are “pulled” through the supply chain.

products, the retailer requests additional products from its suppliers to replenish those sold. These suppliers then purchase materials from their suppliers, and the process “pulls” raw materials through the rest of the chain needed to produce more quantities of the product.

Consider a customer walking into a Wal-Mart store to buy laundry detergent, as shown in Figure 1.4. The process that drives the supply chain starts with the need of the customer to buy detergent. The customer visiting Wal-Mart takes detergent off the shelf that Wal-Mart stocked from inventory supplied from its finished-goods warehouse or by a distributor. Sales of the detergent trigger the warehouse or distribution center to replenish the sold items. The items “pulled” out of the warehouse or distribution center trigger the manufacturer, such as Proctor & Gamble (P&G), to produce more and fill the warehouse with more items. To produce more items, in turn, P&G has to request more raw materials from their suppliers, such as those that supply packaging and chemical components. As P&G requests more raw materials from their suppliers, their first-tier suppliers request more material from lower-tier suppliers. In this manner products are moved through the supply chain.

SCM is a dynamic process and involves the constant flow of information, products, and funds between different entities of the supply chain. To see how this works, once again consider the example of Wal-Mart. Wal-Mart provided the product (detergent in this case) to the customer, and the customer transferred their funds to Wal-Mart. Using point-of-sales data, Wal-Mart then conveyed the need to replenish orders to the warehouse or distributor, who transferred the replenishment order via trucks back to the store. After the replenishment was made, Wal-Mart transferred funds to the distributor. Wal-Mart, the distributor, and the manufacturer shared pricing information, delivery schedules, and forecasts of future sales. This type of flow of information, products, and funds takes place across the entire supply chain.

This example illustrates that to provide timely product availability, all the participants in the chain need to coordinate their plans and respond to the same information. Also, notice that there are many flows moving through the supply chain. The process is driven by a customer order and ends when a customer has paid for their purchase. SCM is the coordination and orchestration of all the activities necessary for this process to occur in the most efficient, cost-effective, and timely manner.

The Service Supply Chain

SCM is just as relevant to companies in the service industry, ranging from healthcare to real estate to banking, as it is to manufacturing companies that produce tangible products. However, service supply chains differ from manufacturing in the role of the customer and the direction of flow of the delivery process. Unlike manufacturing supply chains that focus on the production and delivery of a tangible product, service supply chains tend to focus more on the interaction between the customer and provider. For this reason, the role of the customer is even greater in driving the service supply chain than it is in manufacturing. In service organizations the customer

is also a supplier of inputs and information, which can change the service delivery. Consider the legal environment, where the course of legal action greatly depends on information provided by the client to the attorney. Similarly, a university student may have the option to conduct an independent study under the supervision of a faculty member, changing the set course of study.

Service supply chains tend to be considerably shorter than manufacturing supply chains. The provider typically interacts directly with customers, without the buffer of retailers and distributors, enabling easier sharing of information. Service supply chains also tend to look more like hubs than chains. One of the disadvantages is that they do not have the buffers of inventory as seen in manufacturing. This means that they need to have other organizational mechanisms that give them flexibility when handling the variation of customer-supplied inputs and demands. This also makes information sharing with customers much more critical.

Even service companies that provide pure content to customers, such as those in the entertainment industry, rely heavily on their supply chains to deliver customer value and remain competitive. This includes industries such as film, computer games, and sports and includes companies such as Disney, Warner Bros., and Ticketmaster. These companies are increasingly relying on SCM process and technology improvements to ensure coordination of information and maintain competitiveness.

Supply Chain Leader's Box

■ AMAZON.COM

The largest Internet-based retailer in the world, Amazon .com, has sought to make itself a customer-centric company from its beginning in July 1995. Amazon.com is a service company that is a leading merchandiser of everything from gourmet food to apparel to electronics, in addition to books and music. From the very beginning, Amazon understood that its focus must be on satisfying the customer by providing the highest levels of service. Rather than focusing on marketing or advertising, Amazon placed its focus on having a superior supply chain that provides uncompromised delivery to customers. In addition, Amazon conducts business on an international scale, shipping to more than 200 countries. Coordinating and orchestrating this range of product offerings to so many global locations with perfect deliveries is a daunting task. To achieve this, Amazon has built an

impressive logistics network that includes its own fleet of jets, automated warehouses, robots, drones, and a digitally driven supply chain. For Amazon, logistics, shipping, and a super SCM have combined to give the company its stellar reputation.

Part of Amazon's supply chain proficiency is based on its strict operations philosophy, which focuses on lean systems, quality, and efficiency. It is more reminiscent of industrial manufacturing than traditional retail practices. For instance, Amazon takes a Six Sigma¹ approach to its distribution operations and applies lean manufacturing and total quality management (TQM) methodologies to its processes. Amazon's online proficiency is such that many brick-and-mortar retailers such as Target and Toys "R" Us use the Amazon website for their e-commerce efforts.

Adapted from: Leonard, David, "Will Amazon Kill FedEx?" *Bloomberg Business Week*, August 31, 2016.

The Boundary-Spanning Nature of SCM

To orchestrate and optimize all flows from source to consumption, SCM must take a total systems viewpoint. SCM must ensure that the needs of final customers are satisfied through the coordination of materials and information flows that extend from the marketplace, through the firm and its operations to all its suppliers.

¹Six Sigma performance is characterized by 3.4 defects per million, or 99.99966% perfect. We will discuss this in detail later in the text.