

"Myerson's book should be on every manager's bookshelf for ready reference."
—Robert J. Trent, Ph.D., Supply Chain Management Program Director, Lehigh University

SUPPLY CHAIN AND LOGISTICS MANAGEMENT MADE EASY

A 3D puzzle piece is shown floating in the air above a larger puzzle piece. The puzzle pieces are dark blue and have a metallic sheen. The background is white.

**Methods and Applications for Planning,
Operations, Integration, Control and
Improvement, and Network Design**

PAUL A. MYERSON

Professor of Practice in Supply Chain Management, Lehigh University

Praise for *Supply Chain and Logistics Management Made Easy*

“Paul Myerson’s new book is a refreshing and a welcomed addition to the field, offering the reader a clear and easy-to-understand presentation of the key concepts and methods used in the field of supply chain management. His work is not only easy to understand but also comprehensive in coverage.

“I highly recommend it to university professors who want to incorporate it in their undergraduate and graduate courses in supply chain management. I have become a real fan of *Supply Chain and Logistics Management Made Easy*. Certainly, nothing in life is easy, but Paul Myerson’s new book has made the field more attractive and popular.”

—**Richard A. Lancioni**, Professor of Marketing and Supply Chain Management,
Fox School of Business & Management, Temple University

“Is it possible to take a discipline that involves millions of moving things, people, and processes and make it easy? Paul has taken the complex subject of supply chain and delivered a thorough and easy-to-understand review of all its elements. For the business student, the book provides a comprehensive view of the supply chain and serves as an effective introduction to the discipline and as an effective teaching tool. For the supply chain expert, this book is an excellent tool for reflection on all things supply chain. Each section brings back thoughts of the challenges the accomplished supply chain leader has faced. The book is an excellent resource for anyone in business who is looking to work in or currently works in supply chain management.”

—**Gary MacNew**, Regional Vice President, Supply Chain Optimizers

“This is an excellent read for both students and professionals who are interested in gaining a better understanding of what supply chain and logistics is all about. It is an easy-to-understand handbook for anyone who has a need to better understand supply chain management or is responsible for helping their organization gain an advantage from their supply chain. Myerson’s book should be on every manager’s bookshelf for ready reference.”

—**Robert J. Trent, Ph.D.**, Supply Chain Management Program Director,
Lehigh University

“Paul does a great job compacting supply chain management and logistics into one text. I wish I would have had this book when I was a logistics student 30+ years ago, but it’s a great text and reference for me now, too. The SCM discipline is very wide and diverse now. This book captures all the elements. A complete professional reference. An easy read that teaches.”

—**Andy Gillespie**, Director, Global Logistics, Ansell

“Practical, accessible, up-to-date, and covering today’s best practices, *Supply Chain and Logistics Management Made Easy* is the ideal introduction to modern supply chain management for every manager, professional, and student.”

—**Oliver Yao**, Associate Professor, Lehigh University

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Lehigh University**

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This book is dedicated to the memory of my father, Dr. Albert L. Myerson, the smartest person that I ever knew, who taught me the value of education and research.

I also appreciate the support of my wife, Lynne, and son, Andrew, without whose support and patience, this book would have taken a whole lot longer to write!

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Professor Myerson created and has marketed a Supply Chain Planning software tool for Windows to a variety of companies worldwide since 1998.

He is the author of the books *Lean Supply Chain & Logistics* (McGraw-Hill, Copyright 2012) and *Lean Wholesale and Retail* (McGraw-Hill, Copyright 2014) as well as a Lean Supply Chain and Logistics Management simulation training game and training package (Enna.com, copyright 2012–13).

Professor Myerson also writes a column on Lean Supply Chain for *Inbound Logistics Magazine* and a blog for *Industry Week* magazine.

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Introduction

In the early 1980s, U.S. companies dramatically increased the outsourcing of manufacturing, raw materials, components, and services to foreign countries. Around that time, the term *supply chain* was coined to recognize the increased importance of a variety of business disciplines that were now much more challenging to manage as a result of the new global economy. Prior to that, functions such as purchasing, transportation, warehousing, and so on were isolated and at fairly low levels in organizations.

Since that time, we've seen the creation of the Internet and various business technologies such as enterprise resource planning (ERP) systems, advanced planning systems (APS), and radio frequency ID (RFID), to name a few, which have helped to speed up the flow of information and product lifecycles as well as increasing the need for better communication, collaboration and visibility.

Today, logistics alone accounts for more than 9.5% of U.S. gross domestic product (GDP). Over \$1.3 trillion is spent on transportation, inventory, and related logistics activities. The concept of the supply chain has now risen in importance to the extent that commercials on TV extol the virtues of logistics (for example, UPS "I Love Logistics" commercials) to the point where it is now part of the common lexicon and very mainstream. As a result, most universities now offer supply chain and logistics courses, if not majors, and most organizations have a vice president of supply chain and logistics management (or similar title).

However, beyond supply chain and logistics employees, not many in business or the public fully understand the role and importance that the supply chain plays in gaining and maintaining a competitive advantage in today's world.

We are at the point today where most people are familiar with the terms *supply chain* and *logistics* but don't really know that much about them. In this book, we not only define the supply chain but also offer insight into its various components, tools, and technology to help improve your understanding so that you can use it as a competitive tool in your business.

Because supply chain and logistics costs can range from 50% to 70% of a company's sales (with trillions spent on it worldwide), organizations of all sizes both perform and are interested in

this function. Therefore, understanding and implementing an efficient supply chain strategy can prove critical to both an employee's and a company's success.

Supply Chain Defined

The first thing we need to do is get some definitions out of the way. The terms *supply chain* and *supply chain management* (SCM) should be separately defined because they are sometimes (mistakenly) used interchangeably.

The supply chain itself is a system of organizations, people, activities, information, and resources involved in the planning, moving, or storage of a product or service from supplier to customer (actually more like a “web” than a “chain”). Supply chain activities transform natural resources, raw materials, and components into a finished product that is delivered to the end customer. For example, I once heard a major paper goods manufacturer describe their supply chain for toilet paper as ranging from “stump to rump.”

In contrast, *supply chain management*, as defined by the Council of Supply Chain Management Professionals (CSCMP), “encompasses the planning and management of all activities involved in sourcing, procurement, conversion, and logistics management. It also includes the crucial components of coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers.”

In essence, supply chain management integrates supply and demand management within and across companies and typically “includes all of the logistics management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, finance and information technology” (Council of Supply Chain Management Professionals [CSCMP], 2014).

Some people take a narrower view of supply chain, and in many cases, they think of it as focused more on the supply end (that is, purchasing), and so ignore the logistics side (as defined as the part of the supply chain that plans, implements, and controls the efficient movement and storage of goods, services, and information from the point of use or consumption to meet customer requirements). In other cases, many just assume that logistics is included but don't state it. Still others, while including both areas above, ignore the planning aspects of supply chain. Personally, I tend to refer to the field as *supply chain and logistics management* to make clear what is included.

As you will see in this book, it is important to understand the similarities and differences between more functional areas like logistics, which includes transportation and distribution, versus the broader concept of SCM, which is cross-functional and cross-organizational. This can have a major impact on decision making, structure, and staffing in an organization, so it needs to be understood and examined carefully.

Depending on one's view, some of the functions listed here may be included within the supply chain and logistics organization:

- **Procurement:** The acquisition of goods or services from an outside external source
- **Demand forecasting:** Estimating the quantity of a product or service that customers will purchase
- **Customer service and order management:** Tasks associated with fulfilling an order for goods or services placed by a customer
- **Inventory:** Planning and management
- **Transportation:** For hire and private
- **Warehousing:** Public and private
- **Materials handling and packaging:** Movement, protection, storage, and control of materials and products using manual, semi-automated, and automated equipment
- **Facility network:** Location decision in an organization's supply chain network

Supply chain management is also intertwined with operations management, which consists of activities that create value by transforming inputs (that is, raw materials) into outputs (that is, goods and services). Both activities support the manufacturing process.

SCOR Model

Another way to view the supply chain is through the SCOR model, which was developed by the Supply Chain Council (SCC) (2014) to teach, understand, and manage supply chains. It is a model to both define and measure the performance of an organization's supply chain.

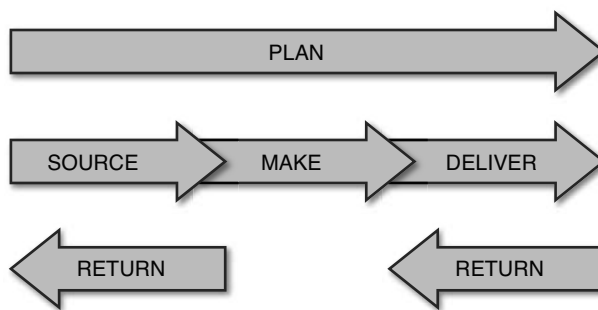


Figure 1.1 SCOR model

The SCOR model is organized around the five major management processes (see Figure 1.1):

- **Plan:** Alignment of resources to demand
- **Make:** Conversion or value-added activities within a supply chain operation
- **Source:** Buying or acquiring materials or services

- **Deliver:** All customer interaction, from receiving order to final delivery and installation
- **Return:** All processes that reverse material or service flows from the customer backward through the supply chain

This provides a broad definition for the supply chain, which highlights its importance to the organization and how it helps create metrics to measure performance.

SCOR Metrics

To this aim, the SCOR model is also a hierarchical framework that combines business activities, metrics, and practices that can be looked at from a high or very detailed level.

The levels, from broadest to narrowest, are defined as follows:

Level 1: Scope: Defines business lines, business strategy and complete supply chains.

Level 2: Configuration: Defines specific planning models such as “make to order” (MTO) or “make to stock” (MTS), which are basically process strategies.

Level 3: Activity: Specifies tasks within the supply chain, describing what people actually do.

Level 4: Workflow: Includes best practices, job details, or workflow of an activity.

Level 5: Transaction: Specific detail transactions to perform a job step.

All SCOR metrics have five key strategic performance attributes. A performance attribute is a group of metrics used to express a strategy. An attribute itself cannot be measured; it is used to set strategic direction.

The five strategic attributes are as follows:

- **Reliability:** The ability to deliver, on time, complete, in the right condition, packaging, and documentation to the right customer
- **Responsiveness:** The speed at which products and services are provided
- **Agility:** The ability to change (the supply chain) to support changing (market) conditions
- **Cost:** The cost associated with operating the supply chain
- **Assets:** The effectiveness in managing assets in support of demand satisfaction

The SCOR model contains more than 150 key indicators, such as inventory days of supply and forecast accuracy, that measure the performance of supply chain operations and are grouped within the previously listed strategic attribute categories.

Once the performance of supply chain operations has been measured and performance gaps identified, they are *benchmarked* against industry best practices to target improvement, as discussed in more detail later in this book.

An Integrated, Value-Added Supply Chain

The goal for today’s supply chain is to achieve integration through collaboration to achieve visibility downstream toward the customer and upstream to suppliers. In a way, many of today’s companies have been able to “substitute information for inventory” to achieve efficiencies. The days of having “islands of automation,” which may optimize your organization’s supply chain at the cost of someone else’s (for example, your supplier), are over.

As you will see throughout this book, the concepts of teamwork and critical thinking aided by technology enable organizations to work with other functions internally and with other members of their supply chain, including customers, suppliers, and partners, to achieve new levels of efficiency and to use their supply chain to achieve a competitive advantage that focuses on adding value to the customer as opposed to just being a cost center within the organization.

The Value Chain

The Value Chain model, originated by Michael Porter, shows the value-creating activities of an organization, which as you can see in Figure 1.2 relies heavily on supply chain functions.

In a value chain, each of a firm’s internal activities listed after the figure adds incremental value to the final product or service by transforming inputs to outputs.

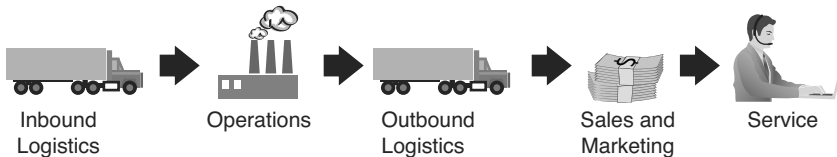


Figure 1.2 The value chain

- **Inbound logistics:** Receiving, warehousing, and inventory control of input materials
- **Operations:** Transforming inputs into the final product or service to create value
- **Outbound logistics:** Actions that get the final product to the customer, including warehousing and order fulfillment

- **Marketing and sales:** Activities related to buyers purchasing the product, including advertising, pricing, distribution channel selection, and the like
- **Service:** Activities that maintain and improve a product's value, including customer support, repair, warranty service, and the like

Support activities identified by Porter can also add value to an organization:

- **Procurement:** Purchasing raw materials and other inputs that are used in value-creating activities
- **Technology development:** Research and development, process automation, and similar activities that support value chain activities
- **Human resource management:** Recruiting, training, development, and compensation of employees
- **Firm infrastructure:** Finance, legal, quality control, and so on

Porter recommended value chain analysis to investigate areas that represent potential strengths that can be used to achieve a competitive advantage. As you can see, the supply chain adds value in a variety of ways, so it should be a critical area of focus (Porter, 1985).

We investigate ways to identify value-added and non-value-added activities (which should be reduced or eliminated) in a supply chain later in this book using a Lean methodology and tools.

Leveraging the Supply Chain

Because supply chain costs represent a significant portion of a company's sales, it isn't difficult to see why there is such a focus on it. This results in a "leveraging" effect, as any dollar saved on supply chain contributes as the same to the bottom line as a much larger and often unattainable increase in sales (will vary based on an individual company's profit margin).

Table 1.1 illustrates this through an example of a business that is evaluating two strategic options: 1) reduce its supply chain costs by approximately 6.5% through more effective negotiations with a vendor, or 2) increase sales by 25% (which will most assuredly also add to sales and marketing costs). You can see the leveraging effect of the supply chain as the relatively small cost decrease contributes as much to the bottom line as the 25% sales increase (which is pretty difficult to accomplish in any economy).

Table 1.1 Supply Chain Leveraging Effect

	Current	Supply Chain Improvement Option	Sales Increase Option
Sales	\$1,000,000	\$1,000,000	\$1,250,000
Cost of material	\$650,000 (65%)	\$600,000 (60%)	\$812,500 (65%)
Production costs	\$150,000 (15%)	\$150,000 (15%)	\$187,500 (15%)
Fixed costs	\$100,000 (10%)	\$100,000 (15%)	\$100,000 (8%)
Profit	\$100,000 (10%)	\$150,000 (15%)	\$150,000 (15%)

The supply chain cost reduction in this example has impressive results, but you have to keep in mind that “you can’t get blood from a stone.” That is where Lean techniques, which are discussed later, can have a significant impact. Through Lean, a team-based form of continuous improvement that focuses on the identification and elimination of waste, we can create a “paradigm shift” that can make process (and cost) improvements that were previously thought impossible.

Supply Chain Strategy for a Competitive Advantage

Historically, supply chain and logistics functions were viewed primarily as cost centers to be controlled. It is only in the past 20 years or so that it has become clear that it can be used for a competitive advantage as well.

To accomplish this, an organization should establish competitive priorities that their supply chain must have to satisfy internal and external customers. They should then link the selected competitive priorities to their supply chain and logistics processes.

Krajewski, Ritzman, and Malhotra (2013) suggest breaking an organization’s competitive priorities into cost, quality, time, and flexibility capability groups:

- **Cost strategy:** Focuses on delivering a product or service to the customer at the lowest possible cost without sacrificing quality. Walmart has been the low-cost leader in retail by operating an efficient supply chain.
- **Time strategy:** This strategy can be in terms of speed of delivery, response time, or even product development time. Dell has been a prime example of a manufacturer that has excelled at response time by assembling, testing, and shipping computers in as little as a few days. FedEx is known for fast, on-time deliveries of small packages.
- **Quality strategy:** Consistent, high-quality goods or services require a reliable, safe supply chain to deliver on this promise. If Sony had an inferior supply chain with high damage levels, it wouldn’t matter to the customer that their electronics are of the highest quality.

- **Flexibility strategy:** Can come in various forms such as volume, variety, and customization. Many of today’s e-commerce businesses, such as Amazon, offer a great deal of flexibility in many of these categories.

In many cases, an organization may focus on more than one of these strategies, and even when focusing on one, it doesn’t mean that they will offer subpar performance on the others (just not “best in class” perhaps).

Segmenting the Supply Chain

Today’s use of “omni-channel marketing,” which is an integrated approach of selling to consumers through multiple distribution channels (that is, brick-and-mortar, mobile Internet devices, computers, television, radio, direct mail, catalog, and so on) has created the need to handle multiple channels with separate warehouse picking operations, often replenished from a common inventory in a single facility.

This can lead many companies such as Dell Computer to segment their entire supply chains, whereby different channels and products are served through different supply chain processes. The ultimate goal is to determine the best supply chain processes and policies for individual customers and products that also maximize customer service and company profitability.

The rationale for this, according to an Ernst & Young white paper titled “Supply Chain Segmentation,” (2014) is that the “business environment is getting increasingly complex, especially for technology companies dealing with rapid innovation, globalization, and a growing number of business partners, business models, and differences in expectations from different markets and customers.”

E&Y suggest five ways to consider segmentation:

- Product complexity based
- Supply chain risk based
- Manufacturing process and technology based
- Customer service needs based
- Market driven

The idea is that a “one size fits all” strategy will not usually work in today’s environment.

They suggest that while senior sponsorship is required for successful supply chain segmentation, you also need cross-functional support from multiple organizational disciplines. The team must provide supporting policies, segment-level processes, and IT infrastructure to both automate the processes and provide metrics.

In Dell’s case, over the past few years, they have expanded beyond their direct to customer model to a “multichannel, segmented model, with different policies for serving consumers,

corporate customers, distributors, and retailers. Through this transformation, Dell has saved US \$1.5 billion in operational costs” (Thomas, 2012).

The Global Supply Chain and Technology

Suffice it to say, the concept of “global” supply chain management (GSCM) is primarily a result of the globalization of business in general. As businesses search globally for sources of lower-cost materials and labor, someone has to manage these complex and intricate operations.

The combination of globalization and emerging technologies is continuously changing the supply chain. Products that were once made domestically, such as apparel and computers, are now designed, assembled, and marketed worldwide by a conglomeration of organizations.

As a result, there are many risks (disruptions, natural disasters, domestic job loss, and so on) and challenges (short product lifecycles, erratic demand, and so on) that are inherent to the process. To this end, a roundtable at a Dartmouth University Roundtable identified five major issues and challenges ahead (Johnson, 2006):

- **Globalization and outsourcing:** Including the impact of China and India on supply chain structure and coordination
- **New information technologies:** Such as radio frequency identification (RFID; a data collection technology that uses electronic tags for storing data) and tools that enable enterprise integration and collaboration
- **Economic forces:** Within and between supply chains, from consumer pricing to supplier contract negotiation
- **Risk management:** Includes risks rising from supply chain complexity and from security threats
- **Product lifecycle management:** Including post-sale service and product recovery

We discuss the impact of global operations and various forms of technology used today in supply chain management later in this book.

For now, we will look back to get a little historical perspective on the topic of supply chain and logistics management.

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