

The logo for the Council of Supply Chain Management Professionals (CSCMP) is located in the top left corner. It consists of the letters 'CSCMP' in a white, sans-serif font, positioned below a stylized graphic of three white lines that converge towards the top left, resembling a compass rose or a network node.

COUNCIL OF SUPPLY CHAIN MANAGEMENT PROFESSIONALS

# THE DEFINITIVE GUIDE TO INTEGRATED SUPPLY CHAIN MANAGEMENT

Optimize the Interaction between  
Supply Chain Processes, Tools,  
and Technologies

Council of Supply Chain Management Professionals and

**Brian J. Gibson** ▪ **Joe B. Hanna**  
**C. Clifford Defee** ▪ **Haozhe Chen**

**THE DEFINITIVE GUIDE TO  
INTEGRATED SUPPLY CHAIN  
MANAGEMENT**

*This page intentionally left blank*

# **THE DEFINITIVE GUIDE TO INTEGRATED SUPPLY CHAIN MANAGEMENT**

**OPTIMIZE THE INTERACTION  
BETWEEN SUPPLY CHAIN  
PROCESSES, TOOLS, AND  
TECHNOLOGIES**

Council of Supply Chain Management Professionals

Brian J. Gibson

Joe B. Hanna

C. Clifford Defee

Haozhe Chen

Vice President, Publisher: Tim Moore  
Associate Publisher and Director of Marketing: Amy Neidlinger  
Executive Editor: Jeanne Glasser Levine  
Consulting Editor: Chad Autry  
Operations Specialist: Jodi Kemper  
Cover Designer: Chuti Prasertsith  
Managing Editor: Kristy Hart  
Project Editor: Deadline Driven Publishing  
Copy Editor: Deadline Driven Publishing  
Proofreader: Deadline Driven Publishing  
Indexer: Angie Martin  
Compositor: Bronkella Publishing  
Manufacturing Buyer: Dan Uhrig

© 2014 by Council of Supply Chain Management Professionals  
Published by Pearson Education  
Upper Saddle River, New Jersey 07458

For information about buying this title in bulk quantities, or for special sales opportunities (which may include electronic versions; custom cover designs; and content particular to your business, training goals, marketing focus, or branding interests), please contact our corporate sales department at [corpsales@pearsoned.com](mailto:corpsales@pearsoned.com) or (800) 382-3419.

For government sales inquiries, please contact [governmentsales@pearsoned.com](mailto:governmentsales@pearsoned.com).

For questions about sales outside the U.S., please contact [international@pearsoned.com](mailto:international@pearsoned.com).

Company and product names mentioned herein are the trademarks or registered trademarks of their respective owners.

All rights reserved. No part of this book may be reproduced, in any form or by any means, without permission in writing from the publisher.

Printed in the United States of America

First Printing December 2013

ISBN-10: 0-13-345392-8

ISBN-13: 978-0-13-345392-8

Pearson Education LTD.

Pearson Education Australia PTY, Limited.

Pearson Education Singapore, Pte. Ltd.

Pearson Education Asia, Ltd.

Pearson Education Canada, Ltd.

Pearson Educación de Mexico, S.A. de C.V.

Pearson Education—Japan

Pearson Education Malaysia, Pte. Ltd.

Library of Congress Control Number 2013952810

*The authors would like to dedicate this book to our families. We greatly appreciate the encouragement, patience, and support that they have provided throughout our careers and this endeavor. Brian Gibson would like to thank his wife Marcia and son Andy. Joe Hanna would like to thank his wife Amy and children Mark and Sara. Cliff Defee would like to thank his wife Joi and kids Mason, Collin, Jesse, Casey, Drew, and Scott. Haozhe Chen would like to thank his wife Jing and daughter Connie.*

*This page intentionally left blank*

---

# CONTENTS

---

Foreword.....	xi
1 Defining the Supply Chain.....	1
2 Supply Chain Structure, Processes, and Trade-Offs.....	29
3 Key Strategic Principles.....	71
4 Supply Chain Information and Technology.....	111
5 Managing the Global Chain.....	147
6 World Class Supply Chain Performance.....	177
7 The Supply Chain of the Future.....	205
Index.....	221

*This page intentionally left blank*

# ABOUT THE AUTHORS

---

**Brian J. Gibson**, Ph.D., holds the Wilson Family Professorship in Supply Chain Management at Auburn University. Drawing upon his experiences as a logistics manager, Dr. Gibson is recognized as an innovative educator who brings a practical perspective to the classroom. He is coauthor of more than 100 academic and practitioner-focused articles, the annual State of the Retail Supply Chain Report, the Supply Chain Essentials video series, and two market-leading textbooks. Dr. Gibson is active in the SCM community, serving on the CSCMP Professional Certification Committee, the NASSTRAC Education Committee, the RILA Logistics Steering Committee, and the Accenture Academy SCM content development team.

**Joe B. Hanna**, Ph.D., serves as Associate Dean and Regions Bank Professor of Supply Chain Management at Auburn University. Dr. Hanna has published over sixty articles and is active in Auburn's undergraduate, graduate, and executive education programs. Joe has also performed education and/or consulting for several firms including Pratt Whitney, Hyundai, Menlo Logistics, Pacer International, Transplace, Fortna Supply Chain Consulting, SMC<sup>3</sup>, Kane is Able, and others. Prior to entering academia, Dr. Hanna gained practical experience with Phillips Petroleum (now ConocoPhillips), Phillips 66 Chemical Company (now ChevronPhillips Chemical Company), and Coopers and Lybrand (now Pricewaterhouse Coppers).

**Cliff Defee**, Ph.D., is the EBSCO Associate Professor of Supply Chain Management at Auburn University. Dr. Defee's work has been nationally recognized, most recently as coauthor of articles that received best paper of the year distinctions in *Journal of Business Logistics* (2009) and *Transportation Journal* (2010). He is coauthor of the annual State of the Retail Supply Chain Report. Dr. Defee co-founded outsourced services provider PFSweb and he served as Chief Operating Officer for six years following a 13-year career with Accenture.

**Haozhe Chen**, Ph.D., is an Associate Professor of Marketing and Supply Chain Management in the College of Business at East Carolina University. He has published more than 20 articles in leading logistics and supply chain management journals, and his current research interests include reverse logistics, supply chain integration, supply chain relationships, and international logistics. He is especially interested in China-related logistics topics and issues. He has eight years' industry experience in international trade business in China, and he is an active member of ASTL, CSCMP, ISM, RLA, and RLSC.

# ACKNOWLEDGMENTS

---

The authors would like to acknowledge the contributions of our mentors and colleagues for helping us develop the knowledge and skills needed to author this book. We would also like to recognize the team of dedicated supply chain management professionals who recognized the critical need for the SCPro Certification program. Rick Blasgen, Kathleen Hedland, Ann Neumann, Kathy McInerney, Heather Morys, and everyone at CSCMP. We thank Dr. Ted Stank (University of Tennessee), Dr. Chris Moberg (Ohio University), and Dr. Tom Speh (Miami University) who deserve special recognition for leading SCPro from concept to reality (and for allowing Brian Gibson to ride along on the journey). It is also important to acknowledge the essential contributions of Dr. Chad Autry (University of Tennessee) and Jeanne Levine at FT Press for creating the supply chain book series and for being patiently persistent during the development process.

# FOREWORD

---

Supply chain and supply chain management have become household phrases supported by newspapers, television, and electronic media advertising of many companies over the last few years. Although it has become a well-known term, I don't think it has a well understood, broadly accepted definition that everyone understands, and it has not penetrated very deeply throughout the general public. One may wonder why that is. Certainly many think they know the definition of well-known business activities such as marketing, sales, and finance. Marketing, for example, while under its present concept started sometime in the eighteenth and nineteenth centuries during the Industrial Revolution. Even so, today marketing has, based on some recent articles, more than 72 different definitions authored by respected organizations and senior business leaders. In addition, most definitions given by the general public of any of the above would just be scratching the surface of each discipline, because of the evolution of supply capabilities and market saturation and evolving technologies, causing the discipline to continue to branch out into many detailed business specialties.

Supply chain management had its origins first within the marketing discipline as distribution. Later, in accumulated activities, it came under logistics, and then into a much more inclusive set of activities that were defined within this program. Supply chain management by its accepted definition includes multiple specialties as well as multiple orders of complexity. At its core, it addresses the attainment of excellence in a number of functional activities historically defined under the discipline of logistics. It then addresses the requirements of additional traditionally separate functions, requiring coordination and collaboration among themselves as well as with the balance of needed functions to operate any company. Finally, it requires proficiency to extend coordination and collaboration of the company with strategic supply chain partner organizations and many of their internal functional groups of key material and service suppliers and customers/consumers, which the company believes necessary to optimize its profit growth and level of service. I will unpack some of what I have just said to hopefully impart why beginning a learning journey using the CSCMP Pro Level program is so critical today.

But first let me state that what you will not find in this program is a cookie cutter design of a supply chain or supply chain management. In my experience, the prerequisite for any supply chain model or supply chain management organization is that it must meet the basic characteristics of the business and industry within which it is operating and follow the strategies intended for that specific business and culture and be guided by the historical disposition of the company. In addition, do not expect to find many companies having the same definition and responsibilities for even a given function within a

supply chain organization. In my 40 years working within the supply chain area, I have lead a number of logistics or supply chain organizations, each of which had very different responsibilities.

Leading the logistics area in one consumer products company meant being responsible regionally for customer service, order management, finished goods distribution centers, finished goods transportation, accounts receivable and collections, information technology and sales services. Sales forecasting, order billing, and systems integration were done centrally by another area.

In another consumer products company, leading the logistics area meant being responsible nationally for sales forecasting, demand planning, order management, production planning, production scheduling, engineering, all distribution centers (finished goods, raw materials, and supplies), all transportation, and procurement.

In a healthcare manufacturing company, I lead a supply chain organization actually running as a separate company division supporting four product divisions. My organization included national sales forecasting, demand planning, production planning, customer service, order management, accounts receivable and collection, all distribution center locations, engineering, all procurement and travel services, quality management, product regulatory oversight, and information technology for the entire U.S. company and as ownership of all U.S finished goods. In addition I was the matrix global supply chain leader having both direct and indirect accountabilities for international operations and supply chain human talent. Acting as division president with an organization this large, I had my own chief financial officer and human resource officer as well.

My final example is a vertically integrated fashion retailer who sourced its designs in thousands of factories throughout the world and directly sold their products under different brands in over 6,500 retail stores and through direct catalog and the Internet mostly, but not only, in the United States. Under the parent corporation, supply chain services were a separate for-profit corporation. The areas of global responsibility included coordination of demand plans; all distribution and assembly center planning and operations; design and construction of all non-store facilities; all nonmerchandise and travel procurement; product regulatory responsibility; legal and company compliance for product technical quality; safety and country compliance for international manufacturing and importing of products for sale in the U.S.; supply chain research and development; engineering and time-definite air, ocean, train, and truck inbound and outbound transportation to 6,500 retail locations; and parcel deliveries to millions of consumers and for all nonmerchandise purchased (that is, at one time, more than 50 percent of the product left factories in Asia by air on Friday, was delivered in the U.S. disassembled, sorted, reassembled, packed, shipped, and delivered to thousands of stores across the U.S. by the following Friday in predetermined two-hour delivery windows). With an organization of this size, I also had my own financial team, human resource team, and information technology, each headed

up by an executive. Finally, this company performed all of or some of these activities/services for outside third-party retail customers (some competitors or spin outs) for profit to defray some of the needed committed capital and size leveraging overall capability and cost structure for our parent corporation.

All are different experiences illustrating the different definitions each of these firms has for logistics or supply chain services. In each of the experiences, the original definition of either logistics or supply chain started out as a narrow set of activities and grew as performance was achieved and an additional break-through was needed by each company or parent company. Each evolved within the boundaries of what the company leadership could accept as a new definition of span of control for supply chain management and their inter-organizational interfaces. In each of the cases, the organizations grew not because I might have wanted them to but rather because they better fit the strategy, purpose, and capability needed for each company to better succeed and because the organization had demonstrated significant positive results against the goals of the firm and broader business skills and capabilities within the areas we managed that could take on larger business processes.

As illustrated, the strategies, business purpose, and business characteristics when I was part of a healthcare company were dramatically different from those required by the fashion retailer later in my career. Both had products to sell, but the business economics—hence the speed, cost and agility of the supply chains—were vastly different, each designed to meet its own strategic and financial purpose and intent. For both companies, the profitable selling of certain products was the ultimate intent with the supply chains enabling those goals. If I had worked for UPS (United Parcel Services) or FedEx (Federal Express), my whole reason for being would have been to be a supply chain product service company as supply chain services are what they are selling. All companies have a defined or de facto business product strategy that must be enabled by a defined or de facto supply chain strategy. As you grow in your learning and experience, you should become the positive catalyst that provides insight to your company's overall strategy.

Supply chain leadership facilitates and sponsors not only the functional and process competencies of its defined areas but also across its organization and key strategic partner organizations. Being a supply chain leader requires you have achieved and maintain expertise in your area of responsibility and a good working understanding and empathy about how your role fits within the bigger picture, organization, and in achieving the overall goals of your business. Expertise is much like leadership and reputation. While it requires learning and proficiency, you are an expert only when others witness and recognize your level of demonstrated results and are willing to depend on you for advice, counsel, and direction.

The learning to be achieved from these courses will provide a framework of knowledge to understand the direct components of supply chain management that exist today in the

traditional organizational models of most companies. The series of studies and certifications will directly cover the planning of business demand; the supply and processing activities needed to produce and support business products and services; the manufacturing, assembly, and/or service activities in creating salable products and services; the managing of transportation for supplies, services, components, and end products to achieve a sale and/or consumption; the activities that determine and manage the amount of resources needed over time to support suppliers; component and final product needed to support demand and service; the activity to plan and operate physical locations that receive, store, and ship supplies; components and end products to satisfy production; assembly and distribution; and finally, the fulfillment of final sale and possible aftermarket service interfacing with customers and/or consumers.

The first order of business for any supply chain associate is to understand each of the business activities individually sufficient to know how your current responsibilities meet the high bar of proficiency while complimenting the other direct supply chain activities and other functions within your company. For any of the previous activities, a valued supply chain associate should know and be able to practice with high proficiency the basic concepts of the activity and the existing role within their organization. I say existing role because supply chain management done competitively is an evolving discipline needed but not necessarily existing in many organizations today. Part of your expected role after completing this certification program is to learn how ideally the roles and collaboration should take place, to test and over time improve the roles in your area and related supply chain areas to a higher level of proficiency, supporting increased profitable growth. Your education within your area of expertise and beyond does not end with these programs. Daily new insight by others with the use of ever evolving technology will require continual reading, discussion, and experimentation if you want to stay the best and grow into more comprehensive roles.

Each of the above activities has underpinnings of key elements and processes that are based on sound principles to improve overall effectiveness and efficiency while demonstrating responsive and environmental sustainability. Each of the above activities, processes, and outcomes due to advancing technology today does, or will in the future, need to be transformed or continually improved in how it functions, in reassessing its purpose, and what can and should be known by each supply chain partner to better anticipate or eliminate unnecessary steps in achieving world class supply chain accomplishments. But to leverage today's technology, you must know each activity's reason for being, how and why we carry it out the way we do today to be able to replace and/or enhance it through the use of new technology to transform and dramatically improve your department or your company's business outcomes. Let me give you a few examples from my past that impacted the companies I worked for, were transformative to traditional skills, and came about because of competent functional team members willing to get out of their respective responsibility boxes and think more broadly to improve business outcomes.

While employed by a consumer products company, I needed to reduce capital and expenses while improving our service to our customers. At the time, all of our products were shipped to customers under tight, time-definite deliveries from our distribution centers, which were supported by shipments from our manufacturing plants. By bringing together a cross functional team, we were able to create a new customer offering of plant direct shipments for some of our products at better sales prices within the same delivery window requirements while bringing down our cost of storage and transportation. It happened by all the functional areas of order management, distribution supply, production scheduling, and sales being willing to share responsibilities and information and have joint direction and changes incorporated within the information systems. The changes included filtering potential customer orders (50–60 percent of plant-made products) back to our plants for direct shipment at better customer prices. Once changed to direct plant shipments, computer systems would automatically reroute the customer order with required carriers and transit times to meet delivery requirements, adjust original regional distribution center and plant shipment forecast balances by time bucket, by location, and by product, reduce pending distribution center replenishment quantities, and divert inventory requirements to the customer plant direct order or commit time-definite planned production to that plant customer shipment. I don't have to tell you that trying to do any one of these procedural changes individually would have been highly unlikely and singularly having each required system change pushed through as a high priority information technology change would probably be impossible. But, together, the ideas came forward. Together, they were discussed until they became a new and better collaborative plan for the business and together the group got sufficient support to convince leadership of the needed system, process changes and expected results, and approval and implementation.

Another I believe very good example of a cross-functional breakthrough came when I was employed by a healthcare manufacturer. We were selling medical supplies through distributors who then resold them in smaller quantities to hospitals, clinics, group physicians' offices, individual offices. The forecasting process for the business did not perform very well and was a continual challenge to both manufacturing and logistics areas in that the manufacturing process due to high set-up costs required long runs followed by sterilization processes which were either location or capacity bound due to known allowable technologies. Poor forecast results with required service levels in the critical health field required high inventories and costly manufacturing changes. By bringing together a cross-functional team, we found that the company rebate billing systems for the distributors over the years had been modified to require distributor customers to daily electronically remit their shipment information delineated by each of their individual end-user customers. Simply the use of this information could tell us when and how much of each product was being shipped to the final "retail" use location, hospital, clinic, physician, etc. The company in its billing area knew daily what we shipped to each distributor and what each distributor shipped to each end user point. Using this information for supply

chain purposes, we had near full consumption level pipeline visibility of our products as well as the ability to reasonably determine daily inventory balances at all distributors. By using this information for supply chain purposes, the team was able to make a much more accurate short-term demand plan, distribution requirements, and manufacturing plan, which improved the predictability of what products needed to be allocated and shipped to each key customer and when to project our ultimate use of products by or for patients. They made the supply chain process materially better not by better estimates and statistics but by better, more timely, more deeply defined demand data. In today's world, the phrase that best describes this capability would be using *Big Data* in a supply chain planning and execution process. Although the information was not real-time, it measurably provided more comprehensive and timely status of what was actually going on daily with our end-users and our distributors and allowed us to better plan at a lower level of product inventory than ever before while achieving our service goals.

Again, bringing together supply chain-related talent—going back to the primal purpose as to why we do our work and continually rethink what kind of information and/or process change might be available today that could transform our results faster in a more positive manner—requires experts in all fields who are willing to collaborate for a joint and better idea. It is also for every supply chain associate the unconditional requirement to understand your areas of scope or responsibility soundly and those areas you interface with sufficiently to be able to develop new provocative ways to accomplish better solutions and results. All the previous examples reinforce to me and I hope to you how critical taking and completing this program is to your future success.

While learning more about each of the previous direct components of supply chain is important, your learning agenda will not be complete. You will have to add to the knowledge of this program a general understanding of the other business functions that make up any complete company to be able to both appreciate their interactions within any company model and to also help make better decisions by you, your direct reports, and ultimately your company. For example, understanding the specific direct and indirect impact your area's activities have within the financial performance of your company is important. Being able to translate your area actions into known business levers that are better understood by all in the company elevates the critical nature of your or your group's efforts—financial acumen is a basic skill needed for your success. Become knowledgeable in your company's profit and loss statements, balance sheet, and cash flow statements. If you are not familiar where your role is represented in these reports, seek advice from your finance department. If you're unfamiliar with a company's financial relationships, research through Google "DuPont Model" and you will find definitions and explanations to decouple the activity of any company reflected in financial information providing insight into how business assets, expenses, and working capital are levers to describe a company's performance. Drill down deep enough within your company's reports to find out where the assets you use show up, where all your direct expenses supporting your

business activity show up, and where the expenses you manage show up (that is, transportation expenses show up in all physical items of the company from raw materials to finished products, for all promotional material, building, and office materials, or any other physical supply you company uses including paper and pencils).

You should be able to start accessing what proficiency you can bring to any of the previous to improve the business results of your company. You may also find the need to add activity-based cost management for supply chain-related services to properly report the effort and costs to each brand or product line to more accurately charge and show which brands or product lines or their practices are consuming the resources of your supply chain department or organization and absorbing the true respective costs. If you have never done this, it will certainly open a new window of knowledge for you and your team and may open some new profit improvement programs for your company.

Whether you are talking about one or all of the components of supply chain management, or all the activities of your company, you must be able to understand and work within the current culture of your company while creating and maintaining increasing circles of productive relationships. As you learn new and better methods to do your work from a program like this, work with others or see how you and others might need to change your approach to work that effects both of your areas. You will need to think about how to successfully introduce change to your team, to your peers, or to your superiors. One of my early mentors advised me that I should think about my plans to improve things like one thinks about a sailing ship heading for a new destination. He advised that the wind of resistance for the status quo will continually attempt to take my efforts off course and I should be prepared like a good sailing ship to continually tack my effort of change to compensate for the winds of resistance. As I dealt throughout my career with the many times I needed to change the behavior, skill, and culture of an organization I joined, I appreciated his guidance. Supply chain leaders by the very nature of the work managed tend to be more analytical and at times can miss the nuances so important in working with your own and other functions. My recommendation is to find a way to directly “step into the shoes” of the other functions within a company. Experience by mentoring or observing the challenges of selling to a customer or placing calculated bets on the volume of planned business down to the specific product meeting. Continually changing demands on manufacturing sites is an area in which you should try to get some experience or at least observation of management processes. None of the other activities or functions within a company is any easier to manage; they are only different. Not having some knowledge of how and why other company leaders are driven within your company leaves your best proposal at a disadvantage.

Over my lifetime I have enjoyed working for a number of great companies in multiple industries. One of the techniques I chose early in my career was to find a way to get a better understanding of the company I worked for, what its objectives were over time and how it performed against the objectives; how the culture evolved over time; and what

their practiced behaviors were. My unusual first request each time I joined a company was to be able to review the last five years of the company's strategic plans if they existed. If strategic plans were not available, I asked for five years of the company's total budget plans to whatever level was available. Most times, I was able to secure either of these documents I have to say with a very inquisitive look. Close review of either of these documents told me a lot about my new company, new employee associates, what the company planned for annually, and what they were able to achieve and why, what they put great emphasis on and what was left as unsaid or in some cases not related to the overall purpose of the company. Doing this gave me a starting point to understand my role and fit in the company. It many times gave me the understanding and insight to be able to change my role or the role of supply chain management within the company. Later in my career, it gave me the ability to create and present strategic supply chain strategies that dovetailed into the overall purpose and business plan that focused on producing a more competitive and profitable growth for my companies.

As you grow through your career, I believe you will find that to continually excel, you will constantly have to improve your functional skills and human operating skills and then for the people you lead. Your life learning agenda will be supported by programs such as this but also must be added to with a heavy dose of human operating skills. By that, I mean skills that teach you and eventually your team the principles that are fundamental to effective leadership. These principles include how to better understand yourself and your style, how to deal and influence others, how to manage change, how to feel more empowered, and over time, how to better coach individuals, shape a culture, and eventually get more results in less time. For most people (including myself), you come to learn that demonstrating high levels of competency in a position, department, division, or company is only part of what you need to have the recognized skills and accomplishments to succeed in most businesses.

When I first had an opportunity to create a separate free standing supply chain organization for a healthcare firm, it happened first because senior management had developed an increasing awareness of supply chain performance and there was continuing pressure to reduce the total cost of medical supplies. We thought if we could focus on both the company's and the industries supply chain inefficiencies, increase the acceptance of new levels of standards, and increase capabilities identified using enabling technologies, we could materially reduce total cost to the patient and increase our growth profitably. To accomplish this mission, the company needed a new supply chain management capability providing a focal point for all supply chain processes, all product businesses, and all local market customers and channels. The new capability needed to promote supply chain integration, creating economic value throughout the channel by providing higher quality fulfillment processes and service levels, streamlining all internal and external interfaces, and marketing value of these capabilities through basic and advanced offerings.

Changes to supply chain management were only a part of the cultural transformation that was going to take place globally across other key areas including geography, technology, sales, marketing management, and human resources. What the entire organization needed to learn was the skill of change management—the continuous process of aligning an organization with the marketplace and doing it more responsively and effectively than competitors. We needed to know the most contemporary thinking in all functions and processes of supply chain to help define a new and better business solution for the company and introduce progressive thinking and influence to our industry. We needed to acquire new human operating skills that redefined or refocused our organizational and relationship abilities. This included honing our listening skills to understand new potential and possibilities, becoming more comfortable with the new bigger company teams being developed from all business backgrounds, and understanding each of our own personal filters that direct us to our own selective perception and that can create unconscious blind spots. We needed to put in the same effort to understand how each of us was affected by our own thought habits and behavior styles. We all needed to understand what each of us could do more and how every one of us could better support each other all to get better results. All the previous, if done well, will be a positive culture-shaping transformation while better enabling competent functional and/or process leaders to create a better function, department, supply chain organization and company. I mention this experience because it profoundly influenced what I needed to know to be more successful and satisfied both in my professional and personal life.

Two quotes on certificates received by my team and me from the senior management of the healthcare company summarize better what I am suggesting in successfully completing this program and augmenting it with further learning and experience within this discipline and beyond to become a successful supply chain professional:

“For extraordinary work on developing recommendations for transitioning processes, organization alignment and internal relationships from current Corporate, Hub, and Divisional structure to one which includes a new operating service division to achieve service leadership for our company.”

“For recognition to the founding supply chain services operating committee for creating a new one company division that through its leadership transformed the division to a more empowered culture while delivering world class service and financial benefits recognized by our distributors, end-user customers, and product businesses.”

In taking this program, you will develop a broader understanding of supply chain management principles, which will be a great foundation to help you build out a more effective leadership role that will require a lifetime commitment to advancing supply chain and human operating teachings and practices.

Also remember while going through this program that in the beginning, supply chain management as a discipline was burdened by a lack of timely integrated information technology to support it. Functional areas, however, continued to build out their individual expertise and became better skilled in creating and maintaining productive relationships with the logistics-related areas around them and the necessary other business functions they needed to work with to do their responsibilities as best as they could. The result of this effort much improved business outcomes but still had many organizations push their way to a better supply chain and channel outcomes. I believe that most companies, if they had their choice, would want to have a *sense- and response-based* supply chain capable of pulling whatever it needed through its business and its suppliers to meet and achieve the product and service goals it set out for itself. Up until now, that has not been completely possible. But with the capability of information technology today, I believe we could be at the point of crossing the Rubicon, of demonstrating throughout many industries the ability to operate newly designed sense and response supply chains by the use of Big Data that virtually and physically pulls product or service needs through supply chains and channels to achieve service-based or end-user consumption. It is the ability of having, sharing, and properly using ubiquitous status information across and among a complete business supply chain that will be the transformative capability. This will not change the fundamentals you are about to learn, but rather give the profession the ability to use them differently to achieve a high order of results or solutions in less time with less assets or expenses deployed more consistently and profitably. All of the components of this program are building blocks to a foundation of understanding many in most companies do not have, never thought they needed but that will be required to support business transformations in the near future. Building off of this platform makes you a better well-rounded informed employee, which, with demonstrated business solutions and results can be a prime candidate for higher leadership positions in almost any well-run company.

Each time I started a new supply chain organization, I reminded myself and my team that the journey of change management needed to begin with us to achieve supply chain service leadership.

So, to you I say, “The journey to twenty-first century supply chain management begins with you. Learn, explore, execute, excel!”

—Nicholas J. LaHowchic

CEO & President of Diannic, LLC

Coauthor *Start Pulling Your Chain! Leading Responsive Supply Chain Transformations*

Former Executive Vice President of Limited Brands, Inc., former CEO & President of Limited Logistics Services, Inc., and past President of Supply Chain Services, Becton Dickinson

# DEFINING THE SUPPLY CHAIN

---

Supply chain management is a vital, yet often underappreciated facilitator of trade that fosters customer convenience, business success, and societal development. Consumers benefit greatly from supply chain management, yet few people think about the planning, cost, or activities involved in getting fuel to the filling station, fresh foods to the store shelf, or essential medical supplies to the hospital emergency room. People just assume that products will be readily available without worrying about how much their quality of life depends on productive, efficient supply chains.

The same situation exists within many organizations. Despite the ability of supply chain management to facilitate cost-savings and a competitive advantage, relatively few individuals in marketing, finance, or manufacturing pay much attention to it. They primarily think of supply chain management in terms of operational activities that occur behind the scenes to complete a customer transaction. The only time that these individuals focus on the supply chain is when a supply disruption, manufacturing shutdown, or delivery delay occurs. They expect supply chain managers to quickly resolve the issue, return the organization's supply chain to a state of balance, and take steps to prevent future occurrences.

The good news is that savvy organizations such as Amazon.com, McDonald's, and Unilever recognize the importance of supply chain management and make it a strategic priority. They understand that it is impossible to compete effectively in isolation of their suppliers, customers, and other entities in the supply chain (Lummus & Vokura, 1999). This is critical in a complex global economy where your suppliers and customers may be on different continents, omnichannel fulfillment capabilities are needed, and service expectations are rising. Taking the time to develop efficient and agile supply chain capabilities to respond to these dynamic market requirements is the difference between great success and utter chaos.

The first step in the journey to supply chain management success is to understand its foundation concepts. A discussion of what supply chain management is, why it is important, and how it benefits the organization is needed to get everyone on the same page for the pursuit of supply chain excellence. Hence, this chapter provides a level-setting discussion of key terminology and definitions. The focus then turns to the purpose and goals of supply chain management to clarify the essential objectives that supply chain managers must pursue. Next, a review of the evolution of supply chain management and its key participants is provided. The chapter closes with an introduction to the value proposition of supply chain management and its capability to drive organizations toward better, faster, and cheaper demand fulfillment.

## Key Terminology and Concepts

A fundamental challenge in supply chain management is the lack of a common “language” that is used across organizations and industries. Unlike financial accounting and other long-established business fields, there is not yet a universally accepted set of definitions and rules that drive supply chain management. For example, asking a group of business executives to simply define the term *supply chain* would lead to a long and potentially contentious discussion.

Such a situation is not unusual in a relatively new field like supply chain management. Initially, there will be a lack of consensus as to its definition or consistency in its application (Ballou, Gilbert, & Mukerjee, 1999). While this is to be expected, it is not desirable. Consistent definitions are essential for understanding the basic characteristics and scope of supply chain management. They provide clarity regarding what supply chain management is and is not, drive acceptance of its key elements, and facilitate its application (Gibson, Mentzer, & Cook, 2005).

This section reviews the popular definitions of essential supply chain management terms, evaluates their common components, and highlights the scope of the field. Having this solid frame of reference will help you avoid the dangers of defining the field too narrowly or too broadly. A narrow perspective will limit the potential value of supply chain management to your organization. In contrast, an overly broad conceptualization will make it difficult to establish control over the processes, foster collaboration, and control performance.

## Supply Chain Concepts

Before an organization tries to focus on supply chain management, its leaders must determine what the supply chain encompasses. Just as you can't manage what you don't measure, you can't plan and execute what you haven't clearly defined. Hence, it is important



to articulate the overall purpose, scope, and components of a supply chain. Following are useful supply chain definitions that highlight critical aspects of a supply chain.

- **From the Council of Supply Chain Management Professionals (2010)**—The material and informational interchanges in the logistical process, stretching from acquisition of raw materials to delivery of finished products to the end user. All vendors, service providers, and customers are links in the supply chain.
- **From Christopher Martin L. (1992)**—The network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer.
- **From Coyle, Langley, Novak, and Gibson (2013)**—A series of integrated enterprises that must share information and coordinate physical execution to ensure a smooth, integrated flow of goods, services, information, and cash through the pipeline.

One important feature of these definitions is the concept of an integrated network or system. A simplistic depiction of a supply chain, as featured in Figure 1-1, suggests that a supply chain is linear with organizations linked only to their immediate upstream suppliers and downstream customers. It also focuses on only one-way material flow, which fails to consider vital information and financial flows, as well as reverse material flows. Such misconceptions oversimplify reality and fail to reveal the dynamic nature of a supply chain network.

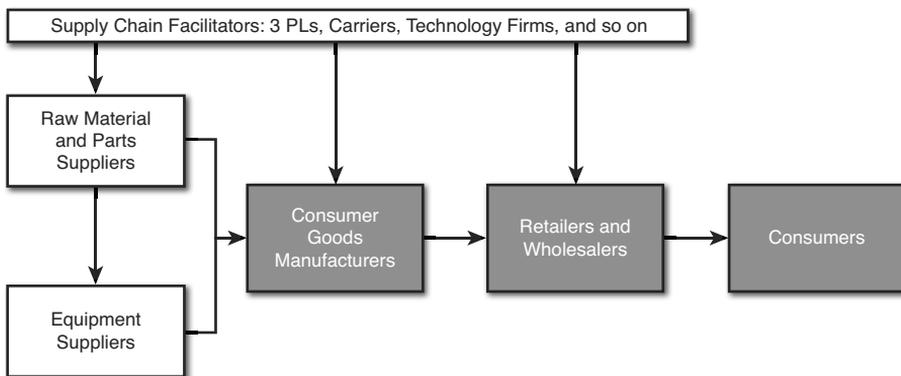


Figure 1-1 Linear representation of a supply line

In truth, supply chains require a multiplicity of relationships and numerous paths through which products and information travel. This is better reflected by the conceptual diagram of a supply chain in Figure 1-2, in which the supply chain is a web or network of participants and resources. To gain maximum benefit from the supply chain, a company must

dynamically draw upon its available internal capabilities and the external resources of its supply chain network to fulfill customer requirements. This network of organizations, their facilities, and transportation linkages facilitate the procurement of materials, transformation of materials into desired products, and distribution of the products to customers.

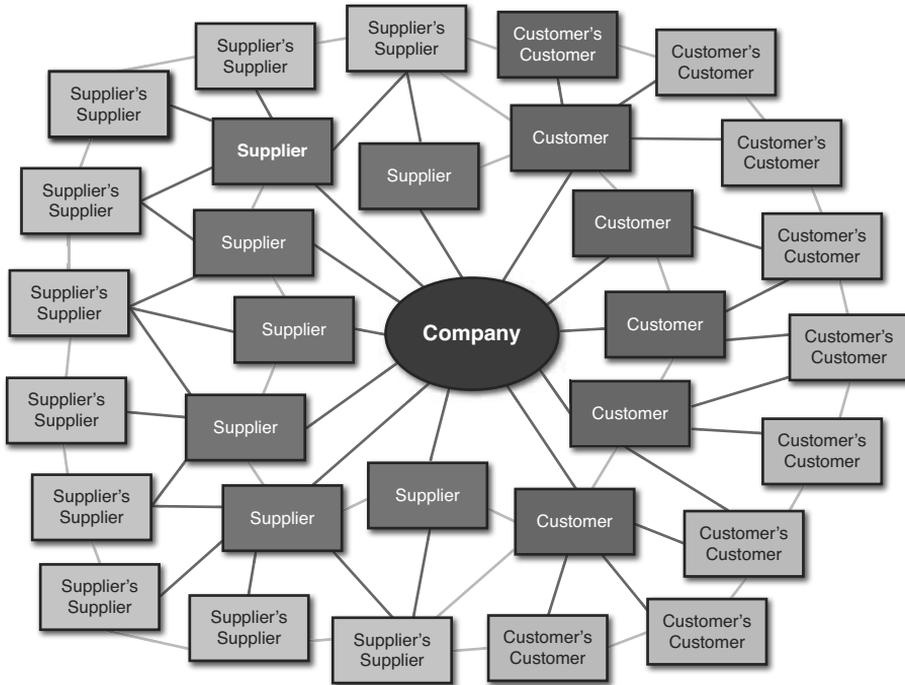


Figure 1-2 Network representation of a supply chain

Simple representations aside, it is critical to understand that no two supply chains are exactly alike. An organization's supply chain structure and relationships will be influenced by its industry, geographic scope of activity, supply base, product variety, fulfillment methods, and demand patterns. Consider, for example, a multinational manufacturer and a local farm-to-table restaurant. Both organizations would benefit from strong and stable supply chains. However, the manufacturer's network is at greater risk of disruption and must integrate geographically diverse suppliers with multiple selling channels.

### ***Supply Chain Management Perspectives***

Introduced in the early 1980s, the term *supply chain management* began to take hold in the mid-1990s and is now part of the everyday business lexicon. Whereas a supply chain is an entity that exists for the fulfillment of customer demand, supply chain management

involves overt managerial efforts by the organizations within the supply chain to achieve results (Mentzer et al., 2001). These efforts can be strategic or operational in nature, though the vast majority of respondents to a Council of Supply Chain Management Professionals survey indicate that the primary role of supply chain management within an organization is a combination of strategy and activity (Gibson, Mentzer, & Cook, 2005).

Defining supply chain management would seem to be a straightforward task, yet it has been a vexing challenge with the introduction of many alternatives. A Google search for “supply chain management definition” quickly yields about 12,000 results. Among this plethora of descriptions, you will find professional associations, consultants, and academicians addressing similar issues but providing their own interpretations and areas of emphasis. Following is a sampling of relevant definitions:

- **From the Council of Supply Chain Management Professionals (2011)**—The planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. More important, it also includes 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.
- **From Gartner (2013b)**—The processes of creating and fulfilling demands for goods and services. It encompasses a trading partner community engaged in the common goal of satisfying end customers.
- **From LaLonde (1997)**—The delivery of enhanced customer and economic value through synchronized management of the flow of physical goods and associated information from sourcing to consumption.
- **From Stock and Boyer (2009)**—The management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing, and related systems that facilitate the forward and reverse flow of materials, services, finances, and information from the original producer to the final customer with the benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction.

Although the definitions vary in length and complexity, they collectively focus on three themes: activities, participants, and benefits (Stock & Boyer, 2009). That is, organizations must plan and coordinate supply chain activities among their network of suppliers and customers to ensure that the end product is available to fulfill demand in a timely, safe, and cost-efficient manner. When this is accomplished, the benefits of enhanced customer satisfaction and retention will be achieved.

## ***Related Terms and Concepts***

Supply chain management encompasses a number of business processes, activities, and goals that are discussed throughout this book. Before moving forward, it is valuable to clarify their meanings and relevance to supply chain management.

### **Logistics Management**

Logistics is a fundamental set of supply chain processes that facilitates fulfillment of demand. The goal is to supply the right product or service, at the right place, at the right time. The Council of Supply Chain Management defines logistics management as “that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirements.” Whether provided internally, by a supplier, by the customer, or by an external logistics services provider, these capabilities are essential for achieving supply chain success.

### **Supply Management**

Supply management focuses on the identification, acquisition, access, positioning, management of resources, and related capabilities the organization needs or potentially needs in the attainment of its strategic objectives (Institute for Supply Management, 2010). For most organizations, logistics controls the distribution of products; whereas supply management controls the strategic sourcing of direct materials, finished goods, services, capital equipment, and indirect materials. Both are needed to ensure optimal performance of the supply chain.

### **Value Chain**

The concept of a value chain was developed as a tool for competitive analysis and strategy. It is composed of primary activities (inbound logistics, operations, outbound logistics, marketing and sales, and service) and support activities (infrastructure, human resource management, technology development, and procurement) that work together to provide value to customers and generate profits for the organization (Porter, 1985). A value chain and a supply chain are complementary views of an extended enterprise, with integrated supply chain processes enabling the flows of products and services in one direction, and the value chain generating demand and cash flows from customers (Ramsey, 2005).

### **Distribution Channel**

Distribution channels support the flow of goods and services from the manufacturer to the final user or consumer (Council of Supply Chain Management Professionals, 2010). An organization can establish direct channels to consumers or rely upon traditional

intermediaries such as wholesalers and retailers to facilitate transactions with final users. The rapid expansion of the Internet as a key selling platform is forcing manufacturers and retailers to develop innovative and flexible “omnichannel” capabilities in their supply chains to fulfill customer demand from stores, distribution centers, and production locations.

## Key Participants

The definitions of supply chain management allude to a wide variety of entities that participate in the two-way flow of materials, information, and money. The participant network varies in size and scope, depending on the products involved, geographic dispersion of supply and demand, and customer service requirements. It is safe to say that no two supply chains are exactly alike, and a participant’s role may vary in each network.

Compare, for example, the supply chains for apples versus Apple iPads. If you purchase a home with a small apple orchard on the property, you could open up a storefront to sell the apples. This simple supply chain has two primary participants: a retailer (you) and consumers. In contrast, Apple relies upon a global network of component suppliers to make key parts for the iPad, a contract manufacturer to assemble the product, transportation and logistics companies to distribute the product to global markets, retailers to sell the products, and end consumers to buy the iPads. Other organizations supplement the network with needed information, packaging, credit, and services. This complex network can be difficult to manage and costly to execute.

A logical segmentation basis for supply chain participants is their ownership stake in the product. Entities that own the goods at various stages of the supply chain are direct stakeholders. This group includes the final consumers or end users of the goods, retailers, distributors, manufacturers, and suppliers. Entities that support the flow of materials, information, and money are supply chain facilitators. They do not typically take title to the goods but play a critical role in the safe, efficient execution of supply chain activities. This facilitator group includes logistics services providers, information technology companies, consultancies, financial institutions, government agencies, equipment providers, and indirect materials suppliers.

### *Direct Stakeholders*

Although every participant can affect supply chain performance, no other direct stakeholder is as important as the end user of the goods. End user demand is the catalyst of all activity in the supply chain, but if no demand exists, there is no need for the supply chain network. That is why so many supply chains focus on end user demand to drive planning and activity. In a consumer product supply chain, the end user is the retail consumer. In

an industrial setting, the end user is a company that buys materials, goods, and services to support its operations. Examples include Lufthansa buying 747 jets and repair parts from Boeing and UPS buying diesel fuel for its fleet.

Retailers play a critical role in the supply chain, acting as intermediary between end consumers and product manufacturers. Retailers accumulate inventory from multiple sources to assemble a wide assortment of products for sale. For example, a Wal-Mart Supercenter has more than 100,000 different items in the store. In addition, retailers provide consumers with convenient one-stop shopping, competitive pricing, and financial transaction services. Retailers provide manufacturers with shelf space for their product and visibility of demand from point-of-sale data.

Wholesalers and distributors are intermediaries that provide value added services to manufacturers and retailers. Wholesalers buy products in bulk from manufacturers and sell the products in smaller quantities to retailers, provide storage facilities to reduce the need for manufacturers and retailers to hold large inventories, and offer delivery services to retailers. Similarly, distributors provide fulfillment efficiency as middlemen between manufacturers and industrial buyers. The distributor buys large quantities of materials or parts from a manufacturer and then creates smaller selling units and fulfills orders to end users in a timely fashion. This allows the manufacturer to focus on production and larger deliveries to distributors rather than managing small quantity orders from a global customer base.

Manufacturers provide the form utility of goods by transforming raw materials, parts, and components into products that are beneficial to end users. The transformation process can be completed in-house or outsourced to a contract manufacturer. The latter group builds products under the brand or label of another firm. For example, Nike product designs and specifications are produced by contract manufacturers in 777 factories in 43 countries around the world (Nike, Inc., 2013). The production processes used by a manufacturer—build to stock, configure to order, and engineer to order—has a significant influence on the design and operation of the supply chain.

Suppliers include a wide array of supply chain participants that provide essential inputs to the production process of a manufacturer. This broad category of organizations includes raw material extractors and processors, parts producers, component assemblers, and similar entities that support the creation of finished goods. Tier 1 suppliers feed critical items directly to the manufacturer; Tier 2 and Tier 3 suppliers support their downstream counterparts with a steady supply of needed materials. Suppliers bring a level of expertise and efficiency to the supply chain that few manufacturers could generate on their own.

## *Facilitators*

The vast majority of supply chains depend upon logistics services providers to plan and execute the flow of goods from origin points to destinations. Their capabilities include inventory management, transportation, storage, order fulfillment, and related functions. Some logistics service providers focus on a single activity such as truckload transportation; others offer an integrated set of logistical capabilities for customers. These organizations invest in the equipment, talent, technology, and facilities needed to provide exceptional service. Customers can leverage these capabilities on an as-needed, variable cost basis.

Technology firms facilitate rapid flows of critical information across the supply chain. Rather than developing software in-house and trying to integrate it with other systems, direct stakeholders rely upon technology companies to provide supply chain planning, execution, and event management tools that generate cross-chain visibility, increase control, and support decision making. Some technology firms focus on specific solutions; others provide integrated suites of supply chain software.

Indirect material suppliers provide goods that support the operation of the supply chain, but are not directly associated with a specific product. These include consumables, tools, and supplies that facilitate the efficient production of goods. Similarly, packaging and material handling supplies are needed to ensure the safe and accurate delivery of goods.

Financial institutions and government agencies also have important roles in the supply chain. Banks and related institutions facilitate trade through working capital management, payment and cash management, and contract execution support. They help to reduce risk in global supply chain transactions and to reduce inventory costs. Government regulatory agencies mandate product standards, labor laws, equipment requirements, and transportation regulations to promote supply chain safety. Other agencies provide import/export support to encourage trade, control borders to ensure supply chain security, and collect fees to support the supply chain infrastructure.

Unique supply chains involved in the management of reverse flows, services, projects, events, and other unique scenarios will require the use of additional facilitators and specialists. Consultants, project managers, recycling companies, equipment manufacturers, construction companies, and laboratories are just some of the ancillary participants that support specialized supply chains.

A key to success in supply chain management is to actively engage essential participants in the planning and development of your key requirements. Information sharing about expected demand, timing issues, location, and special needs is essential for all participants. This dialogue with direct stakeholders and facilities will help them marshal the necessary capacity, inventories, and labor needed to pursue perfect fulfillment of demand.

## Purpose and Goals

The definitions of supply chain management indicate that it is a complex undertaking that extends beyond the scope and capabilities of a single organization. Significant effort is needed to build and maintain a supply chain network. This involves a tremendous action list that requires expertise, time, and money—establishing strategies, building relationships and roles, aligning processes, developing people, implementing technology, and investing in capacity.

Given these requirements and challenges, it is logical to wonder whether the pursuit of supply chain management capabilities is worthwhile. The succinct answer is yes because organizations need strong supply chain capabilities to profitably compete in the marketplace. Their key goals for supply chain management should be to achieve efficient fulfillment of demand, drive outstanding customer value, enhance organizational responsiveness, build network resiliency, and facilitate financial success.

### *Goal 1: Achieve Efficient Fulfillment*

On the most basic level, the purpose of supply chain management is to make inventory readily available in customer facing positions to fulfill demand. The fresh produce business adage “you can’t sell from an empty wagon” highlights this fundamental purpose of supply chain management.

Organizations must pursue the goal of matching supply with demand in a timely fashion through the most efficient use of cross-chain resources. Supply chain partners must work together to maximize resource productivity, develop standardized processes, eliminate duplicate efforts, and minimize inventory levels. Such steps will help the organization reduce waste, drive out costs, and achieve efficiencies in the supply chain.

Reduction of supply chain expenses is a popular goal, particularly during times of economic uncertainty when companies desire to conserve capital. Efficiency initiatives can focus on any aspect of supply chain operations, though transportation and inventory are frequent cost control targets. Together, they account for 81 percent or \$1.08 trillion of U.S. business logistics system costs (Council of Supply Chain Management Professionals, 2013).

Ocean Spray, an agricultural cooperative that produces fruit juices and foods, was able to cut freight costs after opening a regional distribution center in Florida. The facility reduced distances to customer locations and was well positioned to leverage empty railroad boxcars traveling from New Jersey to Florida. The shift from truck to rail, along with the reduced outbound mileage, helped Ocean Spray cut freight costs by 40 percent and carbon dioxide emissions by 20 percent (Bradley, 2013).



Kimberly-Clark, a manufacturer of personal care products, has been on a 6-year journey to create a demand-driven supply chain. The company has realigned its distribution center network and streamlined the number of facilities to take inventory and costs out of the system.

To further streamline safety stock inventories and reduce associated costs, the company is using demand planning software with retailer point-of-sale data to understand demand and develop more accurate forecasts. Over an 18-month period, Kimberly-Clark reduced its finished goods inventory by 19 percent (Cooke, 2013).

## ***Goal 2: Drive Customer Value***

Cost efficient fulfillment and inexpensive products are important, but supply chain managers must also focus on value creation for their customers. Customers are the lifeblood of the organization and create the need for a supply chain. Hence, a fundamental objective in supply chain management must be to consistently meet or exceed customer requirements.

The goal of driving customer value begins with a market-driven customer service strategy that is based on clearly understood customer requirements. Supply chain strategies, design, and capabilities should emanate from these requirements (Sweeney, 2011). The result will be higher-quality service, reduced variability, and fewer exceptions to address.

Highly consistent, just-in-time delivery is critical to the restaurants and food service companies supplied by McCain Foods, the world's largest manufacturer of French fries. Rather than focus on low-cost rail transportation, McCain works closely with a long-haul truckload carrier to provide exceptional on-time delivery performance for these time-sensitive supply chains. They preload trailers, secure additional capacity, and expedite deliveries as needed to ensure that French fries are always on the menu (Partridge, 2010).

It is important to note that Goal 1 and Goal 2 are not mutually exclusive. To succeed, organizations must establish supply chains that balance efficiency with effectiveness to optimize overall performance. The annual Supply Chain Top 25 rankings by Gartner, Inc. (2013a) identify companies that accomplish both goals by integrating demand, supply, and product into a network that orchestrates a profitable response to ever-changing customer demands. Table 1-1 highlights the 2013 supply chain leaders based on industry opinions, 3-year weighted return on assets, inventory turns, and 3-year weighted revenue growth.

**Table 1-1 The Gartner Supply Chain Top 25 for 2103**

Rank	Company	Peer Opinion	Gartner Opinion	Return on Assets	Inventory Turns	Revenue Growth	Composite Score
1	Apple	3203	470	22.3%	82.7	52.5%	9.51
2	McDonald's	1197	353	15.8%	147.5	5.9%	5.87
3	Amazon.com	3115	475	1.9%	9.3	33.6%	5.86
4	Unilever	1469	522	10.5%	6.5	9.0%	5.04
5	Intel	756	515	15.6%	4.2	11.4%	4.97
6	P&G	1901	493	8.6%	5.8	3.6%	4.91
7	Cisco Systems	1167	517	8.5%	11.2	7.8%	4.67
8	Samsung Electronics	1264	298	11.6%	18.5	15.7%	4.35
9	Coca Cola Company	1779	278	11.7%	5.5	14.0%	4.33
10	Colgate-Palmolive	794	324	18.9%	5.2	3.6%	4.27
11	Dell	1409	342	6.2%	30.7	-0.6%	4.05
12	Inditex	745	221	18.0%	4.2	13.4%	3.85
13	Wal-Mart	1629	282	8.8%	8.1	4.9%	3.79
14	Nike	955	236	14.1%	4.2	10.6%	3.62
15	Starbucks	808	159	16.5%	4.8	11.5%	3.41
16	PepsiCo	810	314	8.6%	7.8	10.5%	3.41
17	H&M	399	41	28.2%	3.7	6.7%	3.22
18	Caterpillar	714	247	5.8%	2.8	23.4%	2.91
19	3M	999	105	13.3%	4.2	6.9%	2.87
20	Lenovo Group	397	211	2.5%	22.2	29.8%	2.75
21	Nestlé	679	112	13.3%	5.1	-0.6%	2.51
22	Ford Motor	552	231	5.7%	15.1	3.1%	2.51
23	Cummins	74	139	13.3%	5.3	13.5%	2.48
24	Qualcomm	122	45	12.7%	8.5	25.9%	2.37
25	Johnson & Johnson	730	144	9.6%	2.9	3.3%	2.35

Composite Score: (Peer Opinion\*25%) + (Gartner Research Opinion\*25%) + (ROA\*25%) + (Inventory Turns\*15%) + (Revenue Growth\*10%)

### ***Goal 3: Enhance Organizational Responsiveness***

Another important rationale for supply chain management capabilities is responsiveness to change. The current business environment is one of rapid change with multiple forces

shaping how businesses operate and survive. Supply chain management can help organizations adapt to the challenges of globalization, economic upheaval, expanding consumer expectations, and related issues (Coyle et al., 2013)

The unprecedented expansion of global trade increases the intensity of competition from new market entrants. For example, Panasonic, Samsung, and Sharp must battle for retail shelf space and sales with Vizio, Hisense, and other television manufacturers. Also, the cost of global trade is on the rise. As offshore labor costs increase, global sourcing does not guarantee lower overall cost of goods. In both situations, supply chain management expertise and network flexibility are needed to analyze and respond to these issues. At the same time, globalization can present expansion opportunities. Organizations with flexible supply chain networks that can adapt to the requirements of new markets will be well positioned to grow.

Economic crises such as the recent global recession have a tremendous negative impact on consumer demand and production. Weaker organizations that fail to anticipate the changes, adjust capacity, and reduce inventory levels in their supply chains will not survive. Such was the fate of Circuit City Stores, K-B Toys, and other retailers in 2009. To weather these economic downturns with minimal damage, organizations should build adaptive operating models buoyed by flexible supply chain capacity and a variable cost structure. Also, the use of standardized processes and systems will help the organization rapidly scale or shutter operations based on short-notice demand changes (Cudahy, George, Godfrey, & Rollman, 2012).

With information at their fingertips, today's consumers are empowered to make strong demands on the supply chain. They can review product options, compare prices, and check availability in real-time using mobile devices. This leads to increased expectations for greater product variety, customized goods, off-season availability of inventory, and rapid fulfillment at a cost comparable to in-store offerings. To satisfy these consumer expectations, retailers must be able to leverage inventory as a shared resource and use distributed order management technology to fill orders from the optimal node in the supply chain. Such responsive omnichannel supply chain capabilities separate the retail winners from the losers (Baird & Kilcourse, 2011).

In addition, shrinking product life cycles, the emergence of new technologies to facilitate supply chain transformation, and increases in government regulation of supply chain processes like transportation are compelling reasons to remain nimble. A flexible and responsive supply chain will adapt to these changes with negligible disruption.

### ***Goal 4: Build Network Resiliency***

Beyond the business challenges that emerge over time, organizations may also encounter sudden and severe supply chain disruptions. These atypical events—natural disasters, cataclysmic weather, labor strikes, supplier failures, and so on—negatively affect the flow

of goods and make the organization vulnerable to financial, reputational, and relational damages. One study estimates that supply chain glitches are associated with an abnormal decrease in shareholder value of more than 10 percent (Hendricks & Singhal, 2003).

Given the cost of disruptions, it is imperative for organizations to manage these supply chain risks. Common predisruption steps include risk identification, risk assessment, and risk reduction. To reduce vulnerability to disruption risks, Sheffi (2005) recommends that organizations collaborate on security and safety issues, build redundancies into their supply chains, and invest in people through cross-training.

In addition to preventative risk management steps, it is imperative to establish disruption management capabilities. Organizations must develop the capabilities to recognize disruptions, overcome them, and redesign processes to reduce future risk (Blackhurst, Craighead, Elkins, & Handfield, 2005). For known risks, it is important to design resilient supply chains that are flexible enough to bounce back quickly from major incidents (Sheffi, 2005). For risks that are unlikely to occur but are potentially catastrophic, supply chain managers must engage in contingency planning and test the plans.

Well known for its configure-to-order (CTO) computer systems, Dell Inc. has structured its supply chain to mitigate risk and recover rapidly from disruptions. The CTO process allows Dell to overcome component shortages by configuring systems in different ways and by enticing customers to specify configurations with components that are readily available. Dell also builds strong long-term relationships with primary suppliers to ensure its priority customer status in times of supply uncertainty. Finally, Dell preemptively qualifies and reviews secondary suppliers to reduce the risk of inventory shortages. Strategies like these minimized the impact of the 2011 Tohoku, Japan earthquake on Dell (de Souza, Goh, Kumar, & Chong, 2011).

### ***Goal 5: Facilitate Financial Success***

One of the most important roles of supply chain management is to contribute to the financial success of the organization. Traditional initiatives focus on cost efficiency—streamline stock levels to reduce inventory carrying cost, automate fulfillment operations to minimize labor expense, consolidate orders to cut freight spend, and so on. In contrast, leading organizations use the supply chain to enhance differentiation, increase sales, and penetrate new markets. Their goal is to drive competitive advantage and shareholder value (Anderson, Copacino, Lee, & Starr, 2003).

A dual focus on cost control and revenue generation helps C-level executives recognize the organizational value of supply chain management. As they place more strategic emphasis on supply chain management, capabilities must morph from a series of day-to-day functions to a strategic process with supply chain managers who skillfully manage cross-functional and cross-company complexity. They must understand the connections and interdependencies across the organization and conquer the challenges of managing supplier and customer interfaces (Dittmann, 2012).

Further details regarding supply chain management’s role in driving financial success are discussed in the value proposition section.

## Evaluation of Supply Chain Management

Supply chain management does not have a long history relative to other business disciplines such as accounting or economics. The term *supply chain management* was first introduced by Keith Oliver of Booz Allen Hamilton in 1982, but did not gain significant traction until the turn of the 21st century (Heckmann, Dermot, & Engel, 2003). However, concepts that underpin supply chain management have been in existence for many decades. For example, today’s supply chain strategies continue to draw upon the customer focus of early 20th century catalog retailers and the military’s logistics goal of “getting the right people and the appropriate supplies to the right place at the right time and in the proper condition” (U.S. Department of the Army, 1949).

From a business perspective, the origins of supply chain management lie in a wide variety of related but initially fragmented activities. As Figure 1-3 indicates, purchasing, inventory management, warehousing, order processing, transportation, and related functions were conducted independently. Each one had its own budget, processes, priorities, and key performance indicators, but this disaggregated approach was suboptimal and did not lead to lowest total costs.

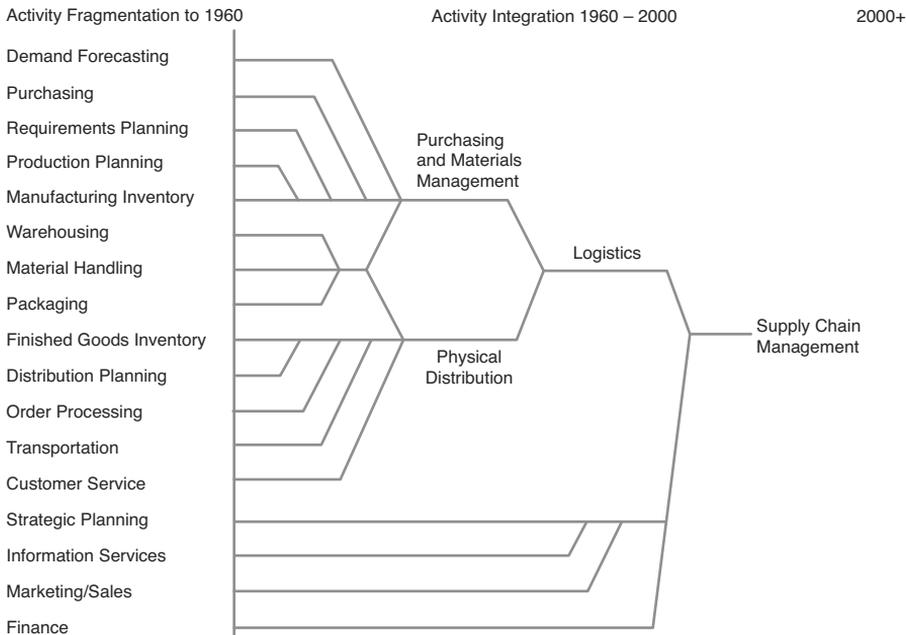


Figure 1-3 The genesis of supply chain management

Eventually, company leaders came to realize the problems of fragmentation and began to integrate related activities. Inbound transportation, purchasing, and production related activities were coordinated in support of manufacturing. Inventory management, order processing, outbound transportation, and related activities comprised the physical distribution function.

Later, these two areas evolved into the logistics function or process that coordinates and integrates the inbound and outbound flows of the organization.

A true supply chain emerges when multiple organizations synchronize their respective processes and adopt a more holistic supply chain management philosophy that includes strategic consideration of related areas. This includes finance, marketing, planning, and technology.

Although the field of supply chain management has rapidly evolved over the last 30 years, many organizations are in the early stages of their supply chain development, and few have fully achieved their desired state of supply chain maturity. This developmental journey is highlighted in Figure 1-4.

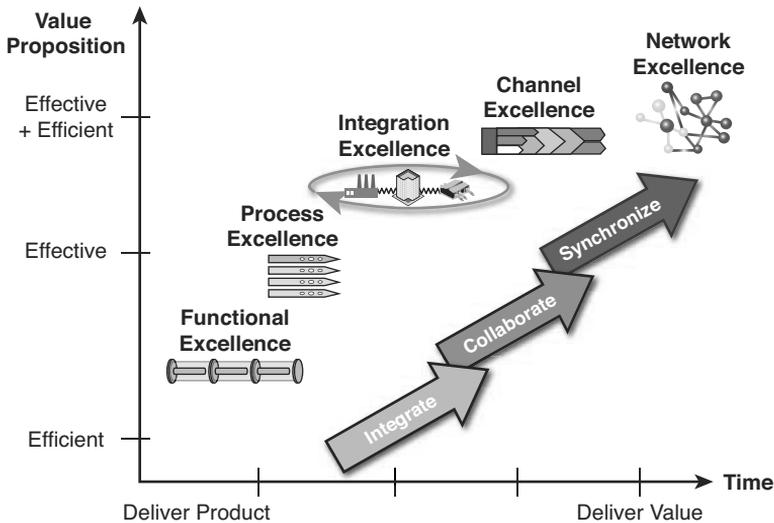


Figure 1-4 The journey to supply chain management

Late adopters of supply chain management must deliberately replace functional silos and cost goals with aligned internal processes. This is often the most challenging aspect of evolving to supply chain management. LaLonde (1999) noted: *“The obstacles to supply chain integration encountered within the organization are far more difficult to overcome than the external challenges.”*

After an organization integrates its internal processes and adopts unified cost and service performance targets, focus shifts toward building external relationships and extending

the enterprise. Collaboration with key suppliers and customers, robust capabilities, and advanced technologies help the organization drive cross-channel value.

The final step in the maturation process is the development of true network capabilities. A truly dynamic supply chain is needed to support the organizational responsiveness and network resiliency goals discussed earlier. Table 1-2 summarizes the strategic fit and executional capabilities of an organization at each stage of its supply chain development.

**Table 1-2 Evolutionary Capabilities**

		<b>Functional Excellence</b>	<b>Integrated SCM</b>	<b>Extended Enterprise</b>	<b>Dynamic SCM</b>
		← 1980s →	← 1990s →	← 2000s →	Onward→
Fit with business strategy	Role of supply chain	Meet internal commitments	Meet a customer commitment	Design and fulfill	Design, fulfill, and drive profit
	Extent of influence	Departmental boundaries	Company boundaries	Selected partners	“Ecosystem”/ networks
	Financial focus	Cost	Cost and service	Drive value	Dynamically optimize trade-offs
	Operational focus	Compliance	Interdependence	Collaboration	Agility
	Order management philosophy	First come, first served	Available to promise	Capable to promise	Profitable to promise
	Partner integration	Arm’s length	Tight integration	Rationalization (less is more)	Interchangeable
Ability to execute	Supply/ demand balancing approach	Produce to a schedule	Fulfill aggregate demand	Forecasting and differentiated fulfillment	Sense, shape, and respond
	Decisioning	Siloed	Team-based	Rapidly address the urgent	Rapidly address the important
	Risk factoring	Afterthought	Buffers in the system	Contingencies and redundancies	Predictive and responsive
	Event horizons	Months	Weeks	Days	Near real-time
	Technology	Standalone applications	MRP/DRP	ERP and bolt-ons (“can plan”)	Adaptive layer

		Functional Excellence	Integrated SCM	Extended Enterprise	Dynamic SCM
		← 1980s →	← 1990s →	← 2000s →	Onward→
	Talent	Job functional specialists	Multitasking: Expert in several areas	Career: SCM as a broad profession	Leadership: SCM as a business to be run

Source: Cudahy, G. C., George, M. O., Godfrey, G. R., & Rollman, M. J. 2012. Preparing for the unpredictable. *Outlook: The Online Journal of High-Performance Business*. Retrieved August 8, 2013, from <http://www.accenture.com/us-en/outlook/Pages/outlook-journal-2012-preparing-for-unpredictable.aspx>.

## Value Proposition

The promise of supply chain management is highlighted throughout this introductory chapter. Collectively, the discussion provided in the definition, goals, and evolution sections indicate that supply chain management provides utility to customers, achieves fulfillment goals, and generates shareholder value. Each of these value propositions is discussed in the following sections.

### *Customer Utility*

A review of marketing principles indicates that there are four utilities provided by a business. These five types of usefulness or benefits include form utility, possession utility, place utility, time utility, and quantity utility (Coyle et al., 2013). Form utility—changing the physical characteristics and value of components and parts by assembling them into useful finished goods—is the focus of manufacturing processes. Possession utility is the responsibility of the marketing process. It focuses on facilitating the sale and transfer of ownership of the goods. Generating place, time, and quantity utilities for goods is the mission of supply chain management.

Supply chains generate place utility by moving goods from production points to market locations where demand exists. By having goods readily available in locations that are accessible to interested customers, economic value is added to the goods. For example, moving flu vaccines from the factory to pharmacies and physician’s offices in regions where the risk of illness is high, patients get vaccinated and avoid contracting the virus.

Time utility is created by having products available when customers demand them. Supply chain managers must coordinate the movement of inventory from production and storage locations to demand locations as needed. Just-in-time deliveries of transmissions, engines, and other key components are essential for producing cars as scheduled. Similarly, backpacks, pencil sharpeners, and markers must be on-shelf when retailers launch back-to-school advertisements.

Quantity utility ensures that the right amount of product is available to satisfy demand. Supply chain managers must use a combination of forecasting, scheduling, and inventory to achieve quantity utility. Having too much stock increases cost; having too little results in stockouts. When Ford schedules the assembly of 500 Mustang convertibles, Goodyear must deliver 2,000 tires to the factory to support the production schedule.

Place, time, and quantity utilities work hand-in-hand to create value for customers. A great example is the capability of Disney World to temporarily set up refreshment carts along a parade route on a hot day. These dynamically supply chains provide an adequate supply of cold beverages where and when demand exists. Thirsty customers are satisfied, and Disney generates additional sales.

In addition, the issues of product variety, condition, and price are also required to achieve the supply chain value proposition. Thus, to satisfy and retain customers, supply chains must deliver upon the Seven Rights of Fulfillment: *providing the right product, to the right customer, at the right time, at the right place, in the right condition, in the right quantity, at the right cost.*

### ***Fulfillment Success***

Achieving the Seven Rights of Fulfillment is possible only if an organization establishes the supply chain capabilities to serve demand better, faster, and cheaper than its competition. Not only is it imperative to focus on effective satisfaction of customer requirements but it is also critical to fulfill demand as efficiently as possible. That is, the organization must minimize supply chain costs subject to its customer service policy to ensure that all parties derive value from the transaction.

Being better than the competition requires an organization to understand customer requirements and develop the supply chain capabilities to support them. Customers purchase goods on the basis of price, quality, delivery, and value-added services. Supply chain management facilitates these purchases by fulfilling demand at optimal performance levels. Thus, an organization must have the right product available in the supply chain with the capability to deliver the goods on time and in full. For example, the Amazon Prime program works only because the company understands demand and positions needed inventory at locations within a 2-day service area of consumers in the program.

Being faster than the competition depends upon the capability to quickly fill and deliver orders. Speed to market is a competitive differentiator for organizations that consistently meet the desired delivery windows of customers. Supply chain managers must also establish the capability and capacity to adjust that speed depending on the situation. A flexible supply chain that supports both premium service requirements (next day or second day fulfillment and delivery) and standard service requirements supports customer needs and creates opportunities for additional business.

Being cheaper than the competition depends on an organization's capability to generate operational efficiencies. Improvement of day-to-day processes through redesign for greater productivity, better asset utilization, and reduction of waste are needed to achieve efficiency. Leveraging the existing resources and expertise of logistics service providers and other capable supply chain partners can also drive efficiency. The imperative is to generate a lower landed cost and lower total cost of ownership than customers receive from the competition.

The capability to concurrently accomplish these better, faster, and cheaper fulfillment goals is not an easy proposition. Conventional wisdom holds that a supply chain can readily provide two of the three desired outcomes. For example, a supply chain can be designed to provide 100 percent in-stock availability and next day delivery, but the cost of achieving this level of service could be crippling. However, leading manufacturers and retailers are working diligently to reach their fulfillment goals in all three areas.

Fulfillment success across all three better, faster, and cheaper goals requires that an organization improve internal processes and strengthen its cross-chain links. Internally, the organization must eliminate unnecessary steps and touch points in the fulfillment process to rationalize product flows. The supply chain managers must also develop collaborative, trusting relationships with suppliers and customers to improve communication, inventory visibility, product flows, and capacity utilization. Both internal and cross-chain cost control initiatives are needed to eliminate excess inventory and waste in the supply chain.

The value proposition and potential payoff for achieving the better, faster, cheaper trifecta of fulfillment goals is significant. The organization with the strongest supply chain in its industry will build a sustainable competitive advantage in the marketplace and generate a higher return on its supply chain investment. These are outcomes worth pursuing for the organization, its supply chain partners, and its shareholders.

## *Shareholder Value*

From a value creation perspective, many organizations limit their financial focus to efficiency in the form of tighter cost control. Given the amount of money spent on logistics and order fulfillment in the supply chain, this is an important goal. However, a pure cost reduction focus misses multiple opportunities to positively affect the income statement. Over the last decade, multiple studies have shown that well-executed supply chain strategies can enhance revenues, improve fixed-capital efficiency, control working capital, and limit tax burdens.

Given the links between supply chain decisions and organizational financial performance of the organization, it is imperative that supply chain managers understand how their actions and resource utilization affect financial statements, profitability, and shareholder value (Wisner, 2011). A concise way to evaluate financial performance is via the Strategic Profit Model highlighted in Figure 1-5.

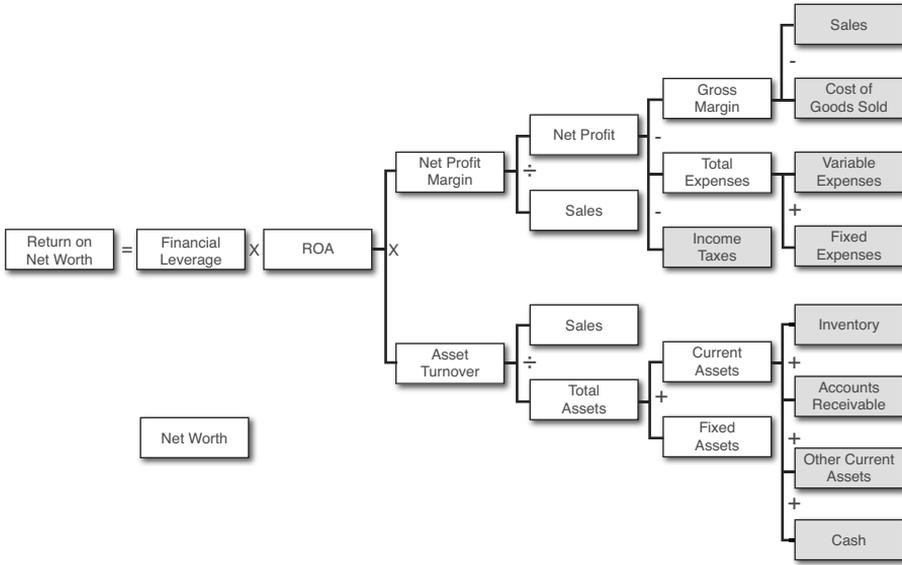


Figure 1-5 The Strategic Profit Model

The model shows how return on net worth is a function of three controllable factors: net profit, asset turnover, and financial leverage. Return on Net Worth is a measure of a company's profitability that reveals how much profit a company generates with the money that the equity shareholders have invested. Of the items identified in the Strategic Profit Model, supply chain strategies typically focus on increasing sales, reducing cost of goods sold, decreasing variable expenses, reducing inventories, and reducing accounts receivables (Stapleton, Hanna, Yagla, Johnson, & Markussen, 2002).

Figure 1.6 takes the general model a step further, linking logical supply chain strategies to their effects on the financial statements of the organization. For example, if a major retailer such as H&M successfully initiates an inventory rationalization strategy, positive outcomes can be achieved. As long as revenues do not decline, the reduced inventory levels in the H&M system will result in lower inventory carrying costs and a positive impact on profits. Likewise, the reduced inventory levels will produce higher inventory turns and produce lower working capital investment. These higher profits and lower investments generate higher return on net worth.

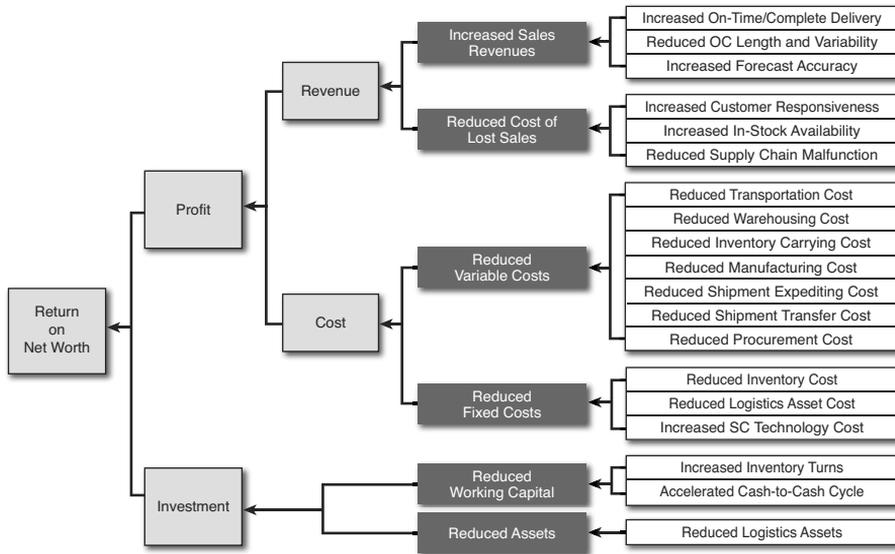


Figure 1-6 Supply chain strategy—Financial performance linkage

To drive shareholder value, supply chain managers must think in terms of Figure 1-6. It is essential to connect the dots between their decisions, the immediate supply chain benefits, and the ultimate effect on organizational financial goals. Doing so will ensure that the supply chain team is making decisions that contribute to the success of the organization and its shareholders.

## Structure of the Book

Supply chain management is a complex and increasingly important contributor to organizational success. The foundation descriptions, objectives, and participants discussed in this chapter are essential, but they provide only part of the story. To fully appreciate the opportunities presented via supply chain management, you must understand the plan-buy-make-move-return processes, strategies, technologies, global considerations, and performance tools. The balance of the book covers these essential topics.

### *Chapter 2: Supply Chain Structure, Processes, and Trade-Offs*

The supply chain is made up of essential processes that facilitate the fulfillment of customer demand. Chapter 2 discusses these processes in the context of multidirectional flows of product, information, and money through these supply chain processes, as well as the channels through which demand is served. Each of the plan-buy-make-move-return processes is explained in detail, along with the supply chain trade-off decisions that managers make among these processes.

### ***Chapter 3: Key Strategic Principles***

Successful supply chain management depends on integrated planning and development of strategies that promote efficient, effective fulfillment. Chapter 3 begins with an analysis of the guiding principles that supply chain managers must embrace. Next, the strategies for improving supply chain functionality within the organization and coordination across organizations are discussed. The chapter concludes with coverage of barriers to supply chain management success—those potential challenges and pitfalls that can negatively affect performance.

### ***Chapter 4: Supply Chain Information and Technology***

Information about customer demand and visibility of inventory are often considered as important as the inventory itself. Chapter 4 addresses the technological capabilities needed to provide cross-chain visibility and support decision making. The chapter begins with a discussion of the role of technology in supply chain planning and execution, including information requirements and capabilities. Also, supply chain software and automatic identification tools are presented. The chapter wraps up with a review of emerging technologies and innovations.

### ***Chapter 5: Managing the Global Chain***

The movement of product, information, and funds between countries can be a very challenging proposition. Chapter 5 introduces the global supply chain management activities that support international trade. The chapter covers the challenges, requirements, and external factors that must be considered by supply chain managers. Next, the activities involved in exporting, transporting, and importing goods are discussed. A discussion of key cost considerations wraps up the global supply chain discussion.

### ***Chapter 6: World Class Supply Chain Performance***

Supply chain managers must measure performance to evaluate the success of their strategies and operations. Chapter 6 focuses on the use of metrics and related measurement frameworks to ensure compliance with customer requirements and internal goals. Important topics of discussion include the role of measurement, types of measures, trade-off analysis, and measurement systems. The chapter concludes with a discussion of the relationship between supply chain performance and financial outcomes.

### ***Chapter 7: The Supply Chain of the Future***

Supply chains are dynamic, evolving entities that must be managed in a forward-thinking fashion. Chapter 7 highlights the emerging issues that will create challenges for supply chain managers and potentially drive change in their processes. Shifting global supply

networks, talent shortages, sustainability requirements, omnichannel developments, and rising customer expectations are among the game changers that will shape supply chain strategy in the coming years.

## Chapter Summary

A supply chain is more than a simplistic set of links along a linear path from raw material extraction to end consumer use. Instead, this chapter has demonstrated that a supply chain is a very complex network through which materials, information, and money flow between key participants. Highly integrated supply chains dynamically draw upon the capabilities and resources of multiple organizations to ensure the timely and efficient fulfillment of customer requirements.

Integration and synchronization of a supply chain do not occur by happenstance. An organization must make supply chain management a strategic priority, assemble the right talent, build key relationships, and invest in essential technological capabilities. These efforts support the development and coordination of interdependent processes in planning, procurement, conversion, and logistics. All are needed to achieve supply chain excellence.

As this chapter has highlighted, supply chain management is not strictly an in-house function. Even the largest global manufacturers rely on the expertise of external entities to provide essential resources and capacity. These key participants include retailers, distributors, manufacturers, and suppliers who have a financial interest in the products flowing through the supply chain. Also needed are facilitators—logistics services providers, technology companies, indirect materials and equipment suppliers, and so on—who enable the key flows and facilitate the safe, efficient execution of supply chain activities.

The payoffs for investing in supply chain processes and cross-chain relationships are many. As companies move from a functional excellence focus toward integration, collaboration, and synchronization, the supply chain becomes more dynamic and capable of achieving fundamental organizational goals. That is, as its supply chain capabilities mature, the organization can achieve efficient fulfillment, meet customer requirements, respond more effectively to change, become more resilient to disruptions, and improve financial performance. Ultimately, these capabilities translate to greater customer utility, performance versus goals, and shareholder value. These trifold benefits fuel the growing interest in supply chain management among CEOs and corporate boards.

## References

- Anderson, D. L., Copacino, W. C., Lee, H. L., & Starr, C. E. (2003). *Creating and Sustaining the High-Performance Business: Research and Insights on the Role of Supply Chain Mastery*. Retrieved August 8, 2013, from <http://supplychainventure.info/PDF/AccentureSupplyChainMasteryWhitePaper.pdf>.
- Baird, N., & Kilcourse, B. (2011). *Omni-Channel Fulfillment and the Future of the Retail Supply Chain*. Retrieved August 7, 2013, from [http://www.scdigest.com/assets/rep/ Omni\\_Channel\\_Fulfillment.pdf](http://www.scdigest.com/assets/rep/ Omni_Channel_Fulfillment.pdf).
- Ballou, R. H., Gilbert, S. M., & Mukerjee, A. (1999) Managing in the new era of multi-enterprise supply chains. *Proceedings of the Twenty-Eighth Annual Transportation and Logistics Educators Conference*. Eds. Bernard J. LaLonde & Terrance L. Pohlen. Toronto: Council of Logistics Management, 23–37.
- Blackhurst, J., Craighead, C. W., Elkins, D., & Handfield, R. B. (2005) An empirically derived agenda of critical research issues for managing supply-chain disruptions. *International Journal of Production Research*, 43(9), 4067–4081.
- Bradley, P. (2013) Collaboration bears fruit. *CSCMP's Supply Chain Quarterly*, 7(2), 34–36.
- Christopher, M. L. (1992) *Logistics and Supply Chain Management*. London: Pitman Publishing.
- Cooke, J. A. (2013) Kimberly-Clark connects its supply chain to the store shelf. *DC Velocity*, 11(5): 53–55.
- Council of Supply Chain Management Professionals. (2010) *Supply Chain Management Terms and Glossary*. Retrieved August 2, 2013, from [http://cscmp.org/sites/default/files/user\\_uploads/resources/downloads/glossary.pdf](http://cscmp.org/sites/default/files/user_uploads/resources/downloads/glossary.pdf).
- Council of Supply Chain Management Professionals. (2011) “Supply Chain Management Definition.” Retrieved August 2, 2013, from <http://www.careersinsupplychain.org/what-is-scm/definition.asp>.
- Council of Supply Chain Management Professionals. (2013) *24th Annual State of Logistics Report: Is This the New Normal?* Oak Brook, IL: Council of Supply Chain Management Professionals.
- Coyle, J. J., Langley, C. J., Novack, R. A., & Gibson, B. J. (2013) *Supply Chain Management: A Logistics Perspective*. Mason, OH: South-Western Cengage Learning.
- Cudahy, G. C., George, M. O., Godfrey, G. R., & Rollman, M. J. (2012) Preparing for the unpredictable. *Outlook: The Online Journal of High-Performance Business*. Retrieved August 8, 2013, from <http://www.accenture.com/us-en/outlook/Pages/outlook-journal-2012-preparing-for-unpredictable.aspx>.

- de Souza, R., Goh, M., Kumar, M., & Chong, J. (2011). *Combating Supply Chain Disruptions: Lessons Learned from Japan 2011*. Retrieved August 8, 2013, from [http://www.go2uti.com/c/document\\_library/get\\_file?uuid=cb104971-5409-4a3e-8ded-de271d19ad2e&groupId=31941](http://www.go2uti.com/c/document_library/get_file?uuid=cb104971-5409-4a3e-8ded-de271d19ad2e&groupId=31941).
- Dittmann, J. P. (2012) Start with the customer! *CSCMP's Supply Chain Quarterly*. Retrieved August 8, 2013, from <http://www.supplychainquarterly.com/topics/Strategy/20121217-start-with-the-customer/>.
- Gartner. (2013a) *Gartner Announces Rankings of its 2013 Supply Chain Top 25*. Retrieved August 8, 2013, from <http://www.gartner.com/newsroom/id/2494115>.
- Gartner. (2013b) *IT Glossary*. Retrieved August 2, 2013, from <http://www.gartner.com/it-glossary/supply-chain-management-scm/>.
- Gibson, B. J., Mentzer, J. T., & Cook, R. L. (2005) Supply chain management: The pursuit of a consensus definition. *Journal of Business Logistics*, 26(2), 17–25.
- Heckmann, P., Dermot, S., & Engel, H. (2003) *Supply Chain Management at 21: The Hard Road to Adulthood*. Retrieved August 8, 2013, from <http://www.boozallen.com/media/file/supply-chain-management-at-21.pdf>.
- Hendricks, K. B., & Singhal, V. R. (2003) The effect of supply chain glitches on shareholder wealth. *Journal of Operations Management* 21(5), 501–522.
- Institute for Supply Management. (2010) *Supply Management Defined*. Retrieved August 2, 2013, from <http://www.ism.ws/tools/content.cfm?ItemNumber=5558>.
- LaLonde, B. J. (1997) Supply chain management: Myth or reality? *Supply Chain Management Review*, 1(Spring), 6–7.
- LaLonde, B. J. (1999) The quest for supply chain integration? *Supply Chain Management Review*, 2(4), 7–10.
- Lummus, R. R., & Vokura, R. J. (1999) Defining supply chain management: A historical perspective and practical guidelines. *Industrial Management & Data Systems*, 99(1), 11–17.
- Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001) Defining supply chain management. *Journal of Business Logistics*, 22(2), 1–26.
- Nike, Inc. (2013) Global Manufacturing. Retrieved August 9, 2013, from <http://manufacturingmap.nikeinc.com/>.
- Partridge, A. R. (2010) Managing a customer-driven supply chain. *Inbound Logistics*. Retrieved August, 8, 2013, from <http://www.inboundlogistics.com/cms/article/managing-a-customer-driven-supply-chain/>.

- Porter, M. E. (1985) *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. New York: The Free Press.
- Ramsey, J. G. (2005) The real meaning of value in trading relationships. *International Journal of Operations & Production Management*, 25(2), 549–565.
- Sheffi, Y. (2005) *The Resilient Enterprise*. Cambridge, MA: The MIT Press, 269–285.
- Stapleton, D., Hanna, J. B., Yagla, S., Johnson, J., & Markussen, D. (2002) Measuring logistics performance using the strategic profit model. *International Journal of Logistics Management*, 13(1), 89–107.
- Stock, J., & Boyer, S. (2009) Developing a consensus definition of supply chain management: A qualitative study. *International Journal of Physical Distribution & Logistics Management*, 39(8), 690–711.
- Sweeney, E. (2011) Towards a unified definition of supply chain management. *International Journal of Applied Logistics*, 2(3), 30–48.
- U.S. Department of the Army. (1949) *FM 100-5, Field Service Regulations-Operations*. Retrieved August 7, 2013, from [http://www.cgsc.edu/CARL/docrepository/FM100\\_5\\_1949.pdf](http://www.cgsc.edu/CARL/docrepository/FM100_5_1949.pdf).
- Wisner, P. (2011) Linking supply chain performance to a firm's financial performance. *Supply Chain Management Review*. Retrieved August 20, 2013, from [http://www.scmr.com/article/linking\\_supply\\_chain\\_performance\\_to\\_a\\_firms\\_financial\\_performance](http://www.scmr.com/article/linking_supply_chain_performance_to_a_firms_financial_performance).

*This page intentionally left blank*

# Index

---

## Symbols

3PLs (third-party logistics service providers), 33

## A

ABC segmentation analysis, 75, 88-89

accessibility

freight transportation modes, 163  
information, 115

accumulation function (warehousing), 54

accuracy, information, 115

acquisition tradeoffs, 65

activity-based costing (performance measure), 197-199

adaptability

global supply chains, 149  
performance measures, 182  
strategy, 86-87  
technology, 119

adaptable structures, tempering volatility, 206

advancement process, talent management, 209

agility, 80

managing volatility, 206  
technology, 118

allocation function (warehousing), 54

Apple, outsourcing utilization, 90

arms-length relationships, 65

assembly process, global supply chain networks, 159-161

assets

management performance metrics, 192-193  
turnover, 193

assortment function (warehousing), 54

auto-ID (automatic identification), 138

automatic identification (auto-ID), 138

automation, as driving force of change, 211-212

## B

balanced scorecards (performance measure), 195-197

barriers to success, 97

bullwhip effect, 104  
disparate goals, 102-103  
external pressures, 98-99  
functional silos, 103-104  
limited visibility, 105  
network complexity, 98  
process disconnects, 100  
talent gaps, 99-100  
technology deficiencies, 101  
transactional focus, 101-102

batch production, 49

benchmarking performance, 92

Benetton, postponement principle, 77

BI (business intelligence) tools, 135-136

big data, as driving force of change, 214-215

billing systems, 134

bills of lading documents, 170

- binary outcomes (performance measures), 179
- BTO (build-to-order) production method, 48
- build-to-order (BTO) production method, 48
- bullwhip effect, as barrier to success, 104
- business
  - analytics, 140
  - channels, global supply chain management, 152
    - communication channels, 153-155*
    - distribution channels, 155*
    - interactions, 155*
    - transaction channels, 153*
  - utilities, 18-19
- business intelligence (BI) tools, 135-136
- buying situations, 43
- C**
- capabilities, information technology, 117
  - adaptability, 119
  - agility, 118
  - collaboration, 118
  - cross-chain visibility, 118
  - differentiation, 119
  - optimization, 118
  - risk management, 119
  - speed to market, 118
- capacity factors, freight transportation modes, 163
- capacity planning, 47
- Carriage and Insurance Paid (CIP), 168
- Carriage Paid To (CPT), 168
- carrier selection, global supply chain networks, 166-167
- cash conversion cycle, 31
- cash-to-cash cycle, 31
- cause-and-effect forecasting, 37
- certificate of end use document, 170
- certificate of inspection document, 171
- certificate of origin document, 170
- CFR (Cost and FReight), 169
- challenges, information technology, 120-121
- change
  - driving forces of
    - automation, 211-212*
    - big data, 214-215*
    - C-level engagement, 207-208*
    - government oversight, 215-216*
    - network design, 213-214*
    - omnichannel customers, 209-210*
    - permanent volatility, 206-207*
    - supply shifting, 210-211*
    - sustainability, 212-213*
    - talent management, 208-209*
  - enhancing business response to, 12-13
- channels, global supply chain management, 152
  - communication channels, 153-155
  - distribution channels, 155
  - interactions, 155
  - transaction channels, 153
- channel-spanning performance strategy, 92
- characteristics
  - good performance measures, 183-187
  - information, 115
    - accessibility, 115*
    - accuracy, 115*
    - relevance, 115*
    - reliability, 116*
    - shared view, 116*
    - timeliness, 115*
    - transferability, 116*
    - usability, 116*
    - value, 116*
- CIF (Cost Insurance and Freight), 169
- CIP (Carriage and Insurance Paid), 168
- C-level engagement, as driving force of change, 207-208
- cloud computing emergence, 138-139
- collaboration
  - cross-chain collaboration strategy, 93-94
  - technology, 118
- collaborative forecasting, 87
- Collaborative Planning, Forecasting, and Replenishment (CPFR) model, 40-41, 73

- commodities, 43
  - communications, global supply chain management, 151-155
  - complexity reduction strategy, 93
  - configure-to-order (CTO) computer systems (Dell), 14
  - congestion, intermodal transportation, 172
  - contingency planning, 95-96
  - continuous production, 46, 49
  - contract purchasing, 65
  - control
    - procurement, 45
    - transportation, 59-60
  - Cost and Freight (CFR), 169
  - cost factors, freight transportation modes, 164
  - Cost Insurance and Freight (CIF), 169
  - cost performance metrics, 187-189
  - cost reporting, 188
  - cost-to-serve (CTS) model, 62
  - Council of Supply Chain Management Professionals, 3-5
  - CPFR (Collaborative Planning, Forecasting, and Replenishment) model, 40-41, 73
  - CPT (Carriage Paid To), 168
  - criticals, 43
  - CRM (customer relationship management), 62-63, 137
  - cross-chain
    - collaboration strategy, 93-94
    - metrics, 67
    - resources, 10
    - visibility, technology, 118
  - CTS (cost-to-serve) model, 62
  - cultural factors, global supply chain management, 150-151
  - currencies, global business challenges, 149
  - customers
    - customer benefits perspective (balanced scorecards), 196
    - customer-facing measures (warehouses), 55
    - customer relationship management (CRM), 62-63, 137
    - customer service performance metrics, 193-194
  - deliver process, 51
    - transportation*, 56-60
    - warehousing*, 52-55
  - demand planning, 38
  - driving customer value, 11-12
  - global supply chain management, 147
    - business channels*, 152-155
    - cultural and communication factors*, 150-151
    - financial and investment related factors*, 149-150
    - legal, political, and environmental factors*, 151-152
  - omnichannel, as driving force of change, 209-210
  - post-sale support, 63
  - utility, 18-19
  - customization principle, 75-76
  - cycle time (orders) measure, 194
- ## D
- damage measurement, 191
  - DAP (Delivered At Place), 168
  - data
    - big data, 214-215
    - POS (point-of-sale), 73
  - DAT (Delivered At Terminal), 168
  - days-of-supply metric, 193
  - DDP (Delivered Duty Paid), 168
  - deficiencies in technology, as barrier to success, 101
  - Delivered At Place (DAP), 168
  - Delivered At Terminal (DAT), 168
  - Delivered Duty Paid (DDP), 168
  - deliver process, 51
    - order management, 60-62
    - transportation, 56-60
    - warehousing, 52-55

## Dell

- configure-to-order (CTO) computer systems, 14
- individual customization, 90
- segmentation, 89

## demand

- demand driven process, 72-73
- dependent demands, 35
- derived demands, 35
- disconnect from supply chains, 100
- global supply chain management, 147
  - business channels, 152-155*
  - cultural and communication factors, 150-151*
  - financial and investment related factors, 149-150*
  - legal, political, and environmental factors, 151-152*
- matching supply with, 10
- planning, 35
  - connecting with supply chain activities, 40*
  - customer requirements, 38*
  - forecasting, 36-37*
  - interfacing between marketplace and manufacturing, 39*
  - marketing and sales plans, 37-38*
  - software, 11, 128*
- sensing, 86-87

## dependent demands, 35

## derived demands, 35

## dialects, global trade

challenges, 151

## differentiation, technology, 119

## direct stakeholders, 7-8

## disparate goals, as barrier to success, 102-103

## disruption management capabilities, 14

## Distributed Order Management (DOM), 133-134, 210

## distribution

- channels, 6, 155
- global supply chain networks, 161-166
- planning software, 129

## distributors, 8

## DMAIC (Define, Measure, Analyze, Improve, Control), 199-200

## DOM (Distributed Order Management), 133-134, 210

## driving customer value, 11-12

## dyadic metrics, 194

## E

## EDI (electronic data interchange), 60

## effectiveness

- performance measures, 181-182
- strategic profit model, 201

## efficiency

- performance measures, 181
- strategic profit model, 200

## efficiency principle, 81-82

## efficiency transportation metric, 60

## electronic data interchange (EDI), 60

## elements, order management, 60-62

## emerging issues, 23

## engineer-to-order (ETO) production method, 48

## Enterprise Resource Planning (ERP) systems, 101, 136-137

## environmental factors, global supply chain management, 151-152

## ERP (Enterprise Resource Planning) systems, 101, 136-137

## ETO (engineer-to-order) production method, 48

## evaluation principle, 78-79

## event management software, 134-135

## evolution, supply chain management, 15-18

## execution

- applications (supply chain software), 129-134
  - DOM (Distributed Order Management), 133-134*
  - GTM (Global Trade Management), 133*

- MES (Manufacturing Execution System)*, 132-133
- TMS (Transportation Management Systems)*, 131-132
- WMS (Warehouse Management Systems)*, 131
- procurement, 45
- production process, 47-50
- service process, 50-51
- transportation, 59-60
- executive S&OP meetings, 38
- export documents, global trading terms, 169
- export licenses, 169
- Extended Product Responsibility laws, 213
- external pressures, as barrier to success, 98-99
- EXW (EX Works), 168
- EX Works (EXW), 168
- F**
- fabrication shops, 49
- facilitating tools (supply chain software), 136-137
- facilitators, 9
- FAS (Free Alongside Ship), 169
- FCA (Free Carrier), 168
- fill rate metric, 193
- financial
- benefits perspective (balanced scorecards), 197
  - factors, global supply chain management, 149-150
  - institutions, 9
  - outcomes, performance measures, 200-201
  - success, facilitating with SCM, 14-15
  - tradeoffs, 64
  - transactions, 31-32
- fixed assets**, 192
- flow production**, 49
- flows**, 30
- information, 31, 113-114
  - monetary, 31-32
  - product and related service, 31
- FOB (Free On Board), 169
- forecasting, 36-37, 87
- form utility, 18
- forward information flows, 31
- framework, supply chain software, 122
- BI (business intelligence) tools, 135-136
  - execution applications, 129-134
  - facilitating tools, 136-137
  - future outlook, 138-140
  - planning applications, 125-129
  - SCEM applications, 134-135
  - SRM software, 137-138
- Free Alongside Ship (FAS)**, 169
- Free Carrier (FCA)**, 168
- Free On Board (FOB)**, 169
- freight**
- documentation, 59
  - manifest documents, 170
  - modal capabilities, 161
    - accessibility factors*, 163
    - capacity factors*, 163
    - cost factors*, 164
    - reliability factors*, 164
    - safety factors*, 164
    - transit times factors*, 163
  - rates, 58
- fulfillment**
- order fulfillment, 209-210
  - Seven Rights of Fulfillment, 19-20
  - tradeoffs, 65
- functional areas, global supply chain networks**, 156
- carrier selection, 166-167
  - distribution/logistics functions, 161-166
  - manufacturing/assembly processes, 159-161
  - supply management/purchasing, 156-159
- functional silo syndrome, as barrier to success**, 103-104
- future of SCM, driving forces**
- automation, 211-212
  - big data, 214-215
  - C-level engagement, 207-208

government oversight, 215-216  
network design, 213-214  
omnichannel customers, 209-210  
permanent volatility, 206-207  
supply shifting, 210-211  
sustainability, 212-213  
talent management, 208-209

## G

generics, 42  
geographic scope, network design, 66  
global optimization strategy, 87-88  
global supply chain management, 23, 147  
business channels, 152  
*communication channels, 153-155*  
*distribution channels, 155*  
*interactions, 155*  
*transaction channels, 153*  
cultural and communication factors, 150-151  
financial and investment related factors, 149-150  
legal, political, and environmental factors, 151-152  
logistics service providers, 172-173  
network functions, 156  
*carrier selection, 166-167*  
*distribution/logistics functions, 161-166*

*manufacturing/assembly processes, 159-161*  
*supply management/purchasing, 156-159*  
response to customer demand, 147-149  
route planning, 171-172  
trading terms, 167

*any transportation mode, 168*

*export documents, 169*  
*import documents, 170*  
*maritime, 169*  
*transportation documents, 170*

global trade management (GTM) systems, 133, 154

## goals

supply chain management, 10  
*building network resiliency, 13-14*  
*drive customer value, 11-12*  
*efficient fulfillment of demands, 10*  
*enhancing responsiveness to change, 12-13*  
*facilitating financial success, 14-15*

tradeoff management, 64

## goods and services, procurement, 41

execution and control, 45  
objectives and organization, 42-43  
supplier evaluation, 46

supplier selection and negotiation, 43-45  
government agencies, 9  
government oversight, as driving force of change, 215, 216  
GTM (global trade management) systems, 133, 154

## H

Hewlett Packard, postponement principle, 77  
history, supply chain management, 15-18  
holistic performance measures, 194-195

## I

import documents, global trading, 170  
INCOTERMS (INternational COMmercial TERMS), 167-169  
independent demands, 35  
indirect material suppliers, 9  
information flows, 31  
information technology, 91, 111  
capabilities, 117  
*adaptability, 119*  
*agility, 118*  
*collaboration, 118*  
*cross-chain visibility, 118*  
*differentiation, 119*  
*optimization, 118*  
*risk management, 119*  
*speed to market, 118*  
challenges, 120-121

- characteristics, 115
  - accessibility*, 115
  - accuracy*, 115
  - relevance*, 115
  - reliability*, 116
  - shared view*, 116
  - timeliness*, 115
  - transferability*, 116
  - usability*, 116
  - value*, 116
- flows, 113-114
- framework, 122-123
- needs, 112-113
- supply chain software, 123
  - BI (business intelligence) tools*, 135-136
  - execution applications*, 129-134
  - facilitating tools*, 136-137
  - future outlook*, 138-140
  - planning applications*, 125-129
  - SCEM applications*, 134-135
  - SRM software*, 137-138
- innovation and learning perspective (balanced scorecards), 196
- innovation (supply chain), managing volatility, 207
- integrated networks, 3
- integration principle, 81
- intermodal transportation, 56, 165, 171
- internal measures, warehouses, 55
- I**nternational COMMERcial TERMS (INCOTERMS), 167-169
- in-transit visibility, transportation execution, 59
- inventory
  - management, 159
  - procurement investment, 46
  - turnover, 192
- investment factors, global supply chain management, 149-150
- J**
- JIT (Just-In-Time) support, 53
- jobbing, 49
- job production, 49
- job shops, 49
- just-in-time delivery, 11
- Just-In-Time (JIT) support, 53
- K**
- key participants, 7
  - direct stakeholders, 7-8
  - facilitators, 9
- key performance indicators (KPIs), 55, 79
- Kimberly-Clark, creating demand-driven supply chain, 11
- KPIs (key performance indicators), 55, 79
- L**
- labor
  - automation, 211-212
  - management systems, 134
  - productivity, 190
  - strikes, 13
- land bridge transportation, 172
- languages, global trade challenges, 151
- lead times, order fulfillment, 51
- lean logistics strategy, 94-95
- lean supply chains, 158
- legal factors, global supply chain management, 151-152
- limited visibility, as barrier to success, 105
- linear representation (supply lines), 3
- logistics
  - global supply chain networks, 161-166
  - LSPs (logistics service providers), 172-173
  - management, 6
- M**
- machine shops, 49
- maintenance, repair, and operating (MRO) items, 42-43
- make process (manufacturing), 46
  - capacity planning and scheduling, 47
  - production process execution, 47-50
  - role of service operations, 46
  - service process execution, 50-51

- make-to-order (MTO)
    - production method, 48
  - make-to-stock (MTS)
    - production method, 48
  - manufacturers, 8, 39
  - manufacturing cells, 50
  - manufacturing execution system (MES), 132-133
  - manufacturing process, 46
    - capacity planning and scheduling, 47
    - global supply chain networks, 159-161
    - production process execution, 47-50
    - role of service operations, 46
    - service process execution, 50-51
  - maritime, global trading, 169
  - marketplace, interfacing with manufacturers, 39
  - market planning, 37-38
  - mass customization strategy, 90-91
  - Master Model of Supply Chain Excellence, 122
  - master planning applications (supply chain software), 127
  - materials planning, 47
  - McCain Foods, just-in-time delivery, 11
  - measurement (performance), 177
    - activity-based costing, 197-199
  - balanced scorecard, 195-197
  - characteristics of good measures, 183-187
  - financial outcomes, 200-201
  - qualitative measures, 178
  - quantitative measures, 178, 180, 184
  - role of, 177-178
  - scope, 194-195
  - Six Sigma DMAIC, 199-200
  - trade-off analysis, 180
    - focusing the supply chain, 180-182*
    - understanding the trade-offs, 182-183*
  - types of metrics, 187
    - asset management performance, 192-193*
    - cost performance, 187-189*
    - customer service performance, 193-194*
    - productivity, 189-190*
    - quality performance, 191-192*
  - MES (manufacturing execution system), 132-133
  - metrics, 187
    - asset management performance, 192-193
    - cost performance, 187-189
    - customer service performance, 193-194
    - productivity, 189-190
    - quality performance, 191-192
  - minimum inventory
    - investment, procurement, 46
  - mobility solutions, 139
  - modal capabilities, freight transportation, 161
    - accessibility factors, 163
    - capacity factors, 163
    - cost factors, 164
    - reliability factors, 164
    - safety factors, 164
    - transit times factors, 163
  - modeling software, networks, 213
  - monetary flows, 31-32
  - monitoring service quality, transportation execution, 59
  - MRO (maintenance, repair, and operating) items, 42-43
  - MTS (make-to-stock)
    - production method, 48
- ## N
- natural disasters, 13
  - nearshoring, 93, 210
  - negotiation process, supplier selection, 45
  - network complexity, as barrier to success, 98
  - network design
    - as driving force of change, 213-214
    - software, 127

## networks

- global supply chain management, 156
  - carrier selection*, 166-167
  - distribution/logistics functions*, 161-166
  - manufacturing/assembly processes*, 159-161
  - supply management/purchasing*, 156-159
- resiliency, 13-14
- structure tradeoffs, 65
- supply chain representation, 3

## O

- objectives, procurement, 42-43
- Ocean Spray, cutting costs and emissions, 10
- offshore manufacturing, network complexity, 98
- Oliver, Keith, 15
- omnichannel customers, as driving force of change, 209-210
- one-off production, 49
- onshoring, 210
- operations planning, 46
  - production process execution, 47-50
  - service process execution, 50-51
- optimization, technology, 118
- order cycle time measure, 194
- order fill rate, 193

## order fulfillment

- deliver process, 51
  - order management*, 60-62
  - transportation*, 56-60
  - warehousing*, 52-55
- key elements, 60-62
- omnichannel customers, 209-210

## order-to-cash (OTC)

- cycle concept, 60-61

## organization, procurement, 42-43

## origins, supply chain management, 15

## OTC (order-to-cash) cycle concept, 60-61

## outsourcing strategy, 89-90

## P

## packaging, global trade, 161

## packing lists, 170

## participant networks, 7 - direct stakeholders, 7-8 - facilitators, 9

## payments, monetary flows, 31-32

## perfect order metric, 92

## performance measurement, 23, 177

- activity-based costing, 197-199

- balanced scorecard, 195-197

- channel-spanning performance, 92

- characteristics of good measures, 183-187

## financial outcomes, 200-201

## qualitative measures, 178

## quantitative measures, 178, 180, 184

## role of, 177-178

## scope, 194-195

## Six Sigma DMAIC, 199-200

## supplier sustainability audits, 96-97

## trade-off analysis, 180

## *focusing the supply chain*, 180-182

## *understanding the trade-offs*, 182-183

## types of metrics, 187

## *asset management performance*, 192-193

## *cost performance*, 187-189

## *customer service*, 193-194

## *productivity*, 189-190

## *quality performance*, 191-192

## permanent volatility, as driving force of change, 206-207

## perspectives, SCM, 4-5

## place utility, 18

## plan process, 35

## applications (supply chain software), 125-129

## *demand planning*, 128

## *distribution planning*, 129

## *master planning*, 127

## *network design*, 127

- procurement planning*, 128
- production planning*, 128
- S&OP (sales and operations planning)*, 127
- demand planning, 35
  - connecting with supply chain activities*, 40
  - customer requirements*, 38
  - forecasting*, 36, 37
  - interfacing between marketplace and manufacturing*, 39
  - marketing and sales plans*, 37-38
- point-of-sale (POS) data, 11, 73
- political factors, global supply chain management, 151-152
- POS (point-of-sale) data, 11, 73
- possession utility, 18
- postponement principle, 76-77
- post-sale support, 63
- predisruption steps, 14
- premium service requirements, 19
- pre-S&OP meetings, 38
- price, supplier selection, 44
- primary processes. *See* processes
- principles, 71
  - agility, 80
  - customization, 75-76
  - defined, 72
- demand driven process, 72-73
- efficiency, 81-82
- evaluation, 78-79
- integration, 81
- postponement, 76-77
- resiliency, 83
- segmentation, 74-75
- sustainability, 84-85
- total cost focus, 73-74
- tradeoff management, 66-67
- visibility, 77-78
- processes, 22, 29, 34
  - deliver, 51
    - order management*, 60-62
    - transportation*, 56-60
    - warehousing*, 52-55
  - disconnects, as barrier to success, 100
  - make, 46
    - capacity planning and scheduling*, 47
    - manufacturing and service operations*, 46
    - production process execution*, 47-50
    - service process execution*, 50-51
  - plan, demand planning, 35-40
  - return, 62
    - CRM (customer relationship management)*, 62-63
    - post-sale support*, 63
  - source, procurement, 41-46
- processing speed, technology integration, 91
- process standardization, 148
- procurement, 41
  - execution and control, 45
  - objectives and organization, 42-43
  - planning software, 128
  - supplier evaluation, 46
  - supplier selection and negotiation, 43-45
- product and related service flows, 31
- product customization, 148
- product-handling functions, warehousing, 55
- production planning software, 128
- production processes, 47-50
- productivity metrics, 189-190
- product safety, global trade transportation, 172
- project layouts, 49
- project manufacturing, 48
- pull model, inventory management, 159
- purchased items, 42-43
- purchasing function, global supply chain networks, 156-159
- push model, inventory management, 159

## Q

**qualitative forecasting methods**, 36  
**qualitative performance measures**, 178  
**quality**  
  improvement, procurement, 46  
  performance metrics, 191-192  
  service, transportation execution, 59  
  suppliers, 43  
**quantitative forecasting methods**, 37  
**quantitative performance measures**, 178, 180, 184  
**quantity purchase discounts**, 53  
**quantity utility**, 19

## R

**range forecasts**, 87  
**rebuis**, 43  
**reliability**  
  freight transportation modes, 164  
  information, 116  
  suppliers, 44  
**reporting costs**, 188  
**resiliency principle**, 83  
**responsive strategy**, 86-87  
**retailer point-of-sale data**, 11  
**retailers**, 8  
**return process**, 62  
  CRM (customer relationship management), 62-63  
  post-sale support, 63

**reverse information flow**, 31  
**risk**  
  assessment, 14  
  identification, 14  
  management, 95-96, 119  
  reduction, 14  
**route planning, global trades**, 171-172  
**routine decision making**, 113

## S

**safety factors, freight transportation modes**, 164  
**sales and operations planning (S&OP)**, 37-38, 127  
**SCEM (supply chain event management) applications (software)**, 134-135  
**SCM (supply chain management)**  
  concepts, 2-6  
    *distribution channels*, 6  
    *logistics management*, 6  
    *supply management*, 6  
    *value chain*, 6  
  emerging issues, 23  
  evolution, 15-18  
  flows, 30  
    *information*, 31  
    *monetary*, 31-32  
    *product and related service*, 31

goals perspective (balanced scorecards), 196  
global supply chain management, 23, 147  
  *business channels*, 152-155  
  *cultural and communication factors*, 150-151  
  *financial and investment related factors*, 149-150  
  *legal, political, and environmental factors*, 151-152  
  *logistics service providers*, 172-173  
  *network functions*, 156-167  
  *response to customer demand*, 147-149  
  *route planning*, 171-172  
  *trading terms*, 167-170  
information technology, 111  
  *capabilities*, 117-119  
  *challenges*, 120-121  
  *characteristics*, 115-117  
  *flows*, 113-114  
  *framework*, 122-123  
  *needs*, 112-113  
  *supply chain software*, 123-140  
key participants, 7  
  *direct stakeholders*, 7-8  
  *facilitators*, 9

- performance assessment, 23
- perspectives, 4-5
- processes, 22, 29, 34
  - deliver*, 51-62
  - make*, 46-51
  - plan*, 35-40
  - return*, 62-63
  - source*, 41-46
- purpose and goals, 10
  - building network resiliency*, 13-14
  - drive customer value*, 11-12
  - efficient fulfillment of demands*, 10
  - enhancing responsiveness to change*, 12-13
  - facilitating financial success*, 14-15
- role of technology, 23
- strategic principles, 71
  - agility*, 80
  - customization*, 75-76
  - defined*, 72
  - demand driven process*, 72-73
  - efficiency*, 81-82
  - evaluation*, 78-79
  - integration*, 81
  - postponement*, 76-77
  - resiliency*, 83
  - segmentation*, 74-75
  - sustainability*, 84-85
  - total cost focus*, 73-74
  - visibility*, 77-78
- strategies, 23, 85
  - ABC segmentation analysis*, 88-89
  - barriers*, 97-105
  - channel-spanning performance*, 92
  - complexity reduction*, 93
  - cross-chain collaboration*, 93-94
  - demand sensing*, 86-87
  - global optimization*, 87-88
  - lean logistics*, 94-95
  - mass customization*, 90-91
  - outsourcing*, 89-90
  - responsive*, 86-87
  - risk management and contingency planning*, 95-96
  - supplier sustainability audits*, 96-97
  - technology integration*, 91-92
- supply chain structure, 32-33
- tradeoff management, 64
  - acquisition tradeoffs*, 65
  - financial tradeoffs*, 64
  - fulfillment tradeoffs*, 65
  - goals*, 64
  - network structure tradeoffs*, 65
  - principles*, 66-67
- value propositions, 18
  - customer utility*, 18-19
  - Seven Rights of Fulfillment*, 19-20
  - shareholder value*, 20-22
- scope, supply chain performance, 194-195
- scorecards, 186
  - balanced scorecard measure*, 195-197
  - suppliers*, 92
- SCOR (Supply Chain Operations Reference) Model, 34
- segmentation principle, 74-75, 88-89
- self-owned facilities, 66
- service operations, 46
  - capacity planning and scheduling*, 47
  - production process execution*, 47-50
  - service process execution*, 50-51
- service quality, 59
- Seven Rights of Fulfillment, 19-20
- shared view, information, 116
- shareholder value, 20-22
- shipment preparation, transportation execution, 59
- shippers export declaration document, 170
- shippers letter of instruction, 170
- silos, as barrier to success, 103-104
- Six Sigma DMAIC (performance measure), 199-200
- slotting software tools, 134
- soft performance measures, 178

- software**
  - network modeling, 213
  - supply chain, 123
    - BI (business intelligence) tools, 135-136*
    - execution applications, 129-134*
    - facilitating tools, 136-137*
    - future outlook, 138-140*
    - planning applications, 125-129*
    - SCEM applications, 134-135*
    - SRM software, 137-138*
- S&OP (sales and operations planning), 37-38, 127**
- sortation function (warehousing), 54**
- source plan, procurement, 41**
  - execution and control, 45
  - objectives and organization, 42-43
  - supplier evaluation, 46
  - supplier selection and negotiation, 43-45
- speed to market, technology, 118**
- spot market purchases, 65**
- SRM (supplier relationship management) software, 137-138**
- stakeholders, 7-8**
- standard service requirements, 19**
- stockouts, 73**
- strategic decision making, 112**
- strategic principles, 71**
  - agility, 80
  - customization, 75-76
  - defined, 72
  - demand driven process, 72-73
  - efficiency, 81-82
  - evaluation, 78-79
  - integration, 81
  - postponement, 76-77
  - resiliency, 83
  - segmentation, 74-75
  - sustainability, 84-85
  - total cost focus, 73-74
  - visibility, 77-78
- Strategic Profit Model, 20-22, 200-201**
- strategies, 23, 85**
  - ABC segmentation analysis, 88-89
  - barriers, 97
    - bullwhip effect, 104*
    - disparate goals, 102-103*
    - external pressures, 98-99*
    - functional silos, 103-104*
    - limited visibility, 105*
    - network complexity, 98*
    - process disconnects, 100*
    - talent gaps, 99-100*
    - technology deficiencies, 101*
    - transactional focus, 101-102*
  - channel-spanning performance, 92
  - complexity reduction, 93
  - cross-chain collaboration, 93-94
  - demand sensing, 86-87
  - global optimization, 87-88
  - lean logistics, 94-95
  - mass customization, 90-91
  - outsourcing, 89-90
  - responsive, 86-87
  - risk management and contingency planning, 95-96
  - supplier sustainability audits, 96-97
  - technology integration, 91-92
- structure (supply chains), 32-33**
- supplier-facing metrics, 92**
- supplier relationship management (SRM) software, 137-138**
- suppliers, 8**
  - consolidation, 93
  - procurement evaluation, 46
  - scorecards, 92
  - selection and negotiation, 43-45
  - sustainability audits, 96-97
- supply chain event management (SCEM) applications (software), 134-135**
- supply chain management. See SCM**
- Supply Chain Operations Reference (SCOR) Model, 34**

## supply chains

- connecting with demand management, 40
  - disconnect from demand, 100
  - information characteristics, 115
    - accessibility*, 115
    - accuracy*, 115
    - relevance*, 115
    - reliability*, 116
    - shared view*, 116
    - timeliness*, 115
    - transferability*, 116
    - usability*, 116
    - value*, 116
  - information flows, 113-114
  - information needs, 112-113
  - structure, 32-33
- ### Supply Chain Top 25 rankings (Gartner, Inc.), 11
- supply shifting, as driving force of change, 210-211
  - support functions, warehousing, 55
  - sustainability, 84-85
    - as driving force of change, 212-213
    - supplier sustainability audits, 96-97

## T

- tactical planning, 113
- talent gaps, as barrier to success, 99-100
- talent management, as driving force of change, 208-209

## TCO (Total Cost of Ownership), 44, 88

- technology**, 23, 111-112
  - capabilities, 117
    - adaptability*, 119
    - agility*, 118
    - collaboration*, 118
    - cross-chain visibility*, 118
    - differentiation*, 119
    - optimization*, 118
    - risk management*, 119
    - speed to market*, 118
  - challenges, 120-121
  - deficiencies, as barrier to success, 101
  - framework, 122-123
  - information characteristics, 115
    - accessibility*, 115
    - accuracy*, 115
    - relevance*, 115
    - reliability*, 116
    - shared view*, 116
    - timeliness*, 115
    - transferability*, 116
    - usability*, 116
    - value*, 116
  - information flows, 113-114
  - information needs, 112-113
  - role in supply chain tradeoff, 66
  - supply chain software, 123
    - BI (business intelligence) tools*, 135-136
    - execution applications*, 129-134

*facilitating tools*, 136-137

*future outlook*, 138-140

*planning applications*, 125-129

*SCEM applications*, 134-135

*SRM software*, 137-138

## technology integration strategy, 91-92

## terminology, 2

- distribution channels, 6
- global trading, 167
  - any transportation mode*, 168
  - export documents*, 169
  - import documents*, 170
  - maritime*, 169
  - transportation documents*, 170
- logistics, 6
- supply management, 6
- value chain, 6
- third-party logistics service provider (3PL), 33
- Tier 1 suppliers, 8
- Tier 2 suppliers, 8
- Tier 3 suppliers, 8
- time-series forecasting, 37
- time utility, 18
- TLC (Total Landed Cost) comparative analysis, 88
- TMS (Transportation Management Systems), 131-132
- total cost focus, 73-74
- Total Cost of Ownership (TCO), 44, 88

**Total Landed Cost (TLC)**  
comparative analysis, 88

**trade-offs**

analysis, performance  
measures, 180

*focusing the supply  
chain, 180-182*

*understanding the  
trade-offs, 182-183*

management, 64

*acquisition tradeoffs,*  
65

*financial tradeoffs, 64*

*fulfillment tradeoffs,*  
65

*goals, 64*

*network structure  
tradeoffs, 65*

*principles, 66-67*

**trading terms, global sup-  
ply chain management,**  
167

any transportation  
mode, 168

export documents, 169

import documents, 170

maritime, 169

transportation docu-  
ments, 170

**transactional focus, as  
barrier to success,**  
101-102

**transaction channels,  
global supply chain  
management, 153**

**transaction processing,**  
113

**transferability, informa-  
tion, 116**

**transfer of ownership,  
global trade, 153**

**transformation process,  
global trade, 156**

**transit times factors,  
freight transportation  
modes, 163**

**transportation**

deliver process, 56-60

documents, global trad-  
ing, 170

freight modal capabili-  
ties, 161

*accessibility factors,*  
163

*capacity factors, 163*

*cost factors, 164*

*intermodal transpor-  
tation, 165*

*reliability factors, 164*

*safety factors, 164*

*transit times factors,*  
163

**Transportation Manage-  
ment Systems (TMS),**  
131-132

**U**

**upstream metrics, 92**

**usability, information,**  
116

**utilities, 18-19**

**V**

**value**

chain, 6

information, 116

propositions, 18

*customer utility, 18-19*

*Seven Rights of Fulfill-  
ment, 19-20*

*shareholder value,*  
20-22

**Vendor Managed Inven-  
tory (VMI), 73**

**VICS (Voluntary Inter-  
industry Commerce  
Standards Committee),**  
40

**visibility**

limitations, as barrier to  
success, 105

principle, 77-78

technology integration,  
91

**VMI (Vendor Managed  
Inventory), 73**

**volatility, as driving force  
of change, 206-207**

**Voluntary Inter-industry  
Commerce Standards  
Committee (VICS), 40**

**W**

**Wal-Mart, sustainability  
strategy, 97**

**Warehouse Management  
Systems (WMS), 131**

**warehousing, 52-55**

product-handling func-  
tions, 55

support functions, 55

**weather disasters, 13**

**Whirlpool, agility, 80**

**wholesalers, 8**

**WMS (Warehouse Man-  
agement Systems), 131**

**workcenters, 50**

**working capital, 192**

**X-Z**

**yard management sys-  
tems, 134**