

 CENGAGE

11e

SUPPLY CHAIN MANAGEMENT

A LOGISTICS PERSPECTIVE



LEY • NOVACK • GIBSON • COYLE

Dedication

The authors of Supply Chain Management: A Global Logistics Perspective would like to dedicate this 11th edition to our current and former students and industry executives who have successfully used the principles of supply chain management to enhance their careers, improve their organizations, and dedicate themselves to improvement of the world in which we live. These individuals well understand that the significance of effective, efficient, and innovative supply chain practices extends far beyond enhancing the abilities of our organizations to work together, and more broadly represents a unifying and coordinating discipline that helps to match supply and demand on a global scale. We thank all of you for what you have accomplished to date, and what we know you will accomplish in the future. As we are clearly in an era of continuous change, we are confident that our supply chain ambitions, practices, and capabilities will rise to unprecedented levels.

A very special note of thanks and appreciation is due to our families who have supported our engagement in the 11th edition update. John Coyle would like to thank his wife Barbara, their children John and Susan, and their grandchildren Lauren, Matthew, Elizabeth Kate, Emily, Ben, Cathryn, and Zachary. John Langley would like to thank his wife Anne, their children Sarah and Mercer, and their grandchildren Bryson, Molly, and Anna. Bob Novack would like to thank his wife Judith, their children Tom, Elizabeth, and Alex, and their grandchildren Mason and Eleanor. Brian Gibson would like to thank his wife Marcia and son Andy.

Last, we would like to acknowledge the help and assistance of the many industry professionals and publishers of academic and trade journals for supporting the task of creating the 11th edition of Supply Chain Management: A Logistics Perspective. Of particular note is Michael A. Levans, Group Editorial Director of Peerless Media's group of publications including Logistics Management, Supply Chain Management Review, and Modern Materials Handling. Mr. Levans was very helpful with allowing the use of a number of articles from the publications with which he is involved.

Contents

Preface xxi

About the Authors xxv

Part I

Chapter 1	Supply Chain Management: An Overview	3
	SUPPLY CHAIN PROFILE: SAB Distribution: The Next Chapter	4
	1-1 Introduction	5
	1-2 Shaping the Supply Chains of the Twenty-First Century: Evolution and Change	6
	1-2a Globalization	7
	1-2b Technology	9
	1-2c Organizational <i>Consolidation and Power Shifts</i>	9
	1-2d The <i>Empowered Consumer</i>	10
	1-2e Government <i>Policy and Regulation</i>	10
	ON THE LINE: Changing Times for Drugs	11
	1-2f Sustainability	12
	1-3 Supply Chains: Development and Shaping for the Twenty-First Century	13
	1-3a Development <i>of the Concept</i>	13
	1-4 Major Supply Chain Issues	18
	1-4a Supply <i>Chain Networks</i>	19
	1-4b Complexity	19
	1-4c Inventory <i>Deployment</i>	19
	1-4d Information	19
	1-4e Cost and <i>Value</i>	20
	1-4f Organizational <i>Relationships</i>	20
	1-4g Performance <i>Measurement</i>	20
	1-4h Technology	21
	1-4i Transportation <i>Management</i>	21
	1-4j Supply <i>Chain Security</i>	21
	1-4k Talent <i>Management</i>	22
	Summary	22
	Study Questions	23
	Case 1.1: <i>Lehigh Valley Transport and Logistics Service (LVTLS)</i>	24
	Case 1.2: <i>Central Transport, Inc.</i>	25

	3-4j Procurement	62
	3-4j Customer Service	62
	3-4k Facility Location	62
	3-4l Other Activities	63
	ON THE LINE: "UPS and Wiley Coyote"	63
	3-5 Logistics in the Economy: A Macro Perspective	64
	3-6 Logistics in the Firm: The Micro Dimension	66
	3-6a Logistics <i>Interfaces with Manufacturing or Operations</i>	67
	3-6b Logistics <i>Interfaces with Marketing</i>	68
	3-6c Logistics <i>Interfaces with Other Areas</i>	69
	3-7 Logistics in the Firm: Factors Affecting the Cost and Importance of Logistics	70
	3-7a Competitive <i>Relationships</i>	70
	3-7b Product <i>Relationships</i>	73
	3-7c Spatial <i>Relationships</i>	76
	3-7d Logistics and Systems Analysis	77
	Summary	77
	Study Questions	78
	Case 3.1: Jordano Food Products	79
	Case 3.2: Senco Electronics Company	81
Appendix 3A	Techniques of Logistics System Analysis	82
	Short-Run/Static Analysis	82
	Long-Run/Dynamic Analysis	83
Appendix 3B	Approaches to Analyzing Logistics Systems	85
	Materials Management versus Physical Distribution	85
	Nodes versus Links	86
	Logistics Channels	87
Chapter 4	Supply Chain and Omni-Channel Network Design	91
	SUPPLY CHAIN PROFILE: Amazon Selects Nashville for New Center of Excellence	92
	4-1 Introduction	92
	4-2 The Need for Long-Range Planning	94
	4-2a The Strategic Importance of Supply Chain Network Design	94
	4-2b Changes to Global Trade Patterns	95
	4-2c Changing Customer Service Requirements	95
	4-2d Shifting Locations of Customer and/or Supply Markets	96
	4-2e Change in Corporate Ownership/Merger and Acquisition Activity	96

7-5 Forecast Errors	212
7-6 Forecasting Techniques	214
7-6a <i>Simple Moving Average</i>	214
7-6b <i>Weighted Moving Average</i>	216
7-6c <i>Exponential Smoothing</i>	218
ON THE LINE: S&OP Spans Horizons	220
7-7 Sales and Operations Planning	221
7-8 Collaborative Planning, Forecasting, and Replenishment	222
Summary	226
Study Questions	226
Case 7.1: <i>Tires for You, Inc.</i>	227
Case 7.2: <i>Playtime, Inc.</i>	229

Chapter 8	Order Management and Customer Service	231
	SUPPLY CHAIN PROFILE: Rocky Brands Sees the Light	232
	8-1 Introduction	232
	8-2 Influencing the Order—Customer Relationship Management	234
	8-2a Step 1: Segment <i>the Customer Base by Profitability</i>	234
	8-2b Step 2: <i>Identify the Product/Service Package for Each Customer Segment</i>	235
	8-2c Step 3: <i>Develop and Execute the Best Processes</i>	235
	8-2d Step 4: <i>Measure Performance and Continuously Improve</i>	236
	8-2e <i>Activity-Based Costing and Customer Profitability</i>	237
	8-3 Executing the Order—Order Management and Order Fulfillment	243
	8-3a <i>Order-to-Cash (OTC) and Replenishment Cycles</i>	244
	8-3b <i>Length and Variability of the Order-to-Cash Cycle</i>	248
	8-4 E-commerce Order Fulfillment Strategies	250
	8-5 Customer Service	250
	8-5a <i>The Logistics/Marketing Interface</i>	251
	8-5b <i>Defining Customer Service</i>	251
	8-5c <i>Elements of Customer Service</i>	253
	ON THE LINE: FedEx Ground Increases Delivery Schedule to Sox Days a Week	257
	8-5d <i>Performance Measures for Customer Service</i>	257

- 8-6 Expected Cost of Stockouts 259
 - 8-6a Back Orders 260
 - 8-6b Lost Sales 260
 - 8-6c Lost Customer 261
 - 8-6d Determining *the Expected Cost of Stockouts* 261
- 8-7 Order Management Influences on Customer Service 261
 - 8-7a Product Availability 262
 - 8-7b Financial Impact 264
 - 8-7c Order Cycle Time 267
 - 8-7d Logistics Operations Responsiveness 270
 - 8-7e Logistics System Information 273
 - 8-7f Postsale Logistics Support 275
- ON THE LINE: After-Sales Service: The Forgotten Supply Chain 277
- 8-8 Service Recovery 278
- Summary 279
- Study Questions 279
- Case 8.1: Te/co Corporation 281
- Case 8.2: Webers, Inc. 283

Part III

- Chapter 9 Managing Inventory in the Supply Chain 287
 - SUPPLY CHAIN PROFILE: Don't Underestimate the Inventory-to-Sales Ratio 288
 - 9-1 Introduction 289
 - 9-2 Inventory in the U.S. Economy 289
 - 9-3 Inventory in the Firm: Rationale for Inventory 291
 - 9-3a Batching Economies or Cycle Stocks 292
 - 9-3b Uncertainty and Safety Stocks 293
 - 9-3c Time/In-Transit and Work-in-Process Stocks 294
 - 9-3d Seasonal Stocks 296
 - 9-3e Anticipatory Stocks 296
 - 9-3f Summary of Inventory Accumulation 297
 - 9-3g The Importance of Inventory in Other Functional Areas 297
 - 9-4 Inventory Costs 298
 - 9-4a Inventory Carrying Cost 298
 - 9-4b Ordering and Setup Cost 302
 - 9-4c Carrying Cost Versus Ordering Cost 304
 - 9-4d Expected Stockout Cost 306

	ON THE LINE: Martignetti Reduces Daily Average Inventory, Maintains In-stock Performance, Helps Buyers Make Better Decisions	309
	9-4e In-Transit <i>Inventory Carrying Cost</i>	310
	9-5 Fundamental Approaches to Managing Inventory	311
	9-5a <i>Key Differences Among Approaches to Managing Inventory</i>	312
	9-5b <i>Principal Approaches and Techniques for Inventory Management</i>	314
	9-5c <i>Fixed Order Quantity Approach (Condition of Certainty)</i>	314
	9-5d <i>Fixed Order Quantity Approach (Condition of Uncertainty)</i>	323
	9-5e <i>Fixed Order Interval Approach</i>	330
	9-5f <i>Summary and Evaluation of EOQ Approaches to Inventory Management</i>	331
	9-6 Additional Approaches to Inventory Management	332
	9-6a <i>Just-in-Time Approach</i>	332
	Supply Chain Technology: Dropping the Security Blanket	333
	9-6b <i>Materials Requirements Planning</i>	336
	9-6c <i>Distribution Requirements Planning</i>	341
	9-6d <i>Vendor-Managed Inventory</i>	343
	9-7 Classifying Inventory	345
	9-7a <i>ABC Analysis</i>	345
	9-7b <i>Quadrant Model</i>	348
	9-7c <i>Inventory at Multiple Locations — The Square-Root Rule</i>	349
	Summary	351
	Study Questions	352
	Case 9.1: <i>MAQ Corporation</i>	353
	Case 9.2: <i>Baseball Card Emporium</i>	354
Appendix 9A	Special Applications of the EOQ Approach	355
	Adjusting the Simple EOQ Model for Modal Choice Decisions—The Cost of Inventory in Transit	355
	Adjusting the Simple EOQ Model for Volume Transportation Rates	358
	Adjusting the Simple EOQ Model for Private Carriage	361
	Adjusting the Simple EOQ Model for the Establishment and Application of In-Excess Rates	362
	Summary	365
Chapter 10	Distribution—Managing Fulfillment Operations	367
	SUPPLY CHAIN PROFILE: The Changing Face of Distribution	368
	10-1 Introduction	369

11-4	Transportation Planning and Strategy	431
11-4a	Functional <i>Control of Transportation</i>	431
11-4b	<i>Terms of Sale</i>	432
11-4c	<i>Decision to Outsource Transportation</i>	434
11-4d	<i>Modal Selection</i>	435
11-4e	<i>Carrier Selection</i>	439
ON THE LINE:	Clearing the Path to Shipper of Choice	440
11-4f	<i>Rate Negotiations</i>	441
11-5	Transportation Execution and Control	441
11-5a	<i>Shipment Preparation and Tendering</i>	441
11-5b	<i>Freight Documentation</i>	442
11-5c	<i>Maintain In-Transit Visibility</i>	444
11-5d	<i>Transportation Metrics</i>	445
11-5e	<i>Monitor Service Quality</i>	446
11-6	Transportation Technology	447
11-6a	<i>Transportation Management Systems</i>	448
ON THE LINE:	Analytics-Driven Delivery Freight Visibility Solutions	450
	Summary	450
	Study Questions	451
	Case 11.1: <i>Vibrant Video</i>	453
	Case 11.2: <i>Bob's Custom BBQs</i>	455
Appendix 11A	Federal Regulation of the Transportation Industry	457
	Economic Regulation	459
	Safety Regulation	460
	Summary	462
Appendix 11B	Basis of Transportation Rates	463
	Cost of Service	463
	Value of Service	464
	Distance	464
	Weight of Shipment	466
	Commodity Characteristics	466
	Level of Service	467
	Summary	468

Part IV

Chapter 12	Aligning Supply Chains	471
	SUPPLY CHAIN PROFILE: Why Is Strategic Alignment So Challenging?	472
12-1	Introduction	472
12-1a	<i>Scope and Intensity of Involvement</i>	473
12-1b	<i>Model for Developing and Implementing Successful Supply Chain Relationships</i>	475

Chapter 14	Supply Chain Technology—Managing Information Flows	539
	SUPPLY CHAIN PROFILE: Blockchain Technology Promises Safer Food	540
	14-1 Introduction	541
	14-2 Information Requirements	541
	14-2a <i>Meet Quality Standards</i>	<i>542</i>
	14-2b <i>Support Multidirectional Flows</i>	<i>544</i>
	14-2c <i>Provide Decision Support</i>	<i>544</i>
	14-3 Systems Capabilities	545
	14-3a <i>Enable Process Excellence</i>	<i>546</i>
	14-3b <i>Link Network Elements</i>	<i>547</i>
	14-3c <i>Mitigate Known Risks</i>	<i>548</i>
	14-4 SCM Software	550
	14-4a Planning	550
	ON THE LINE: Planning Software Drives Forecast Accuracy	551
	14-4b Execution	552
	14-4c <i>Event Management</i>	<i>553</i>
	14-4d <i>Business Analytics and Business Intelligence</i>	<i>553</i>
	14-4e <i>Facilitating Tools</i>	<i>554</i>
	ON THE LINE: RFID Drives Visibility, Security, and Sales	556
	14-5 SCM Technology Implementation	557
	14-5a <i>Needs Assessment</i>	<i>557</i>
	14-5b <i>Software Selection</i>	<i>557</i>
	14-5c <i>Implementation Issues</i>	<i>559</i>
	14-6 Supply Chain Technology Innovations	561
	Summary	563
	Study Questions	563
	Case 14.1: <i>Inflate-a-Dome Innovations</i>	<i>565</i>
	Case 14.2: <i>Vintage Shoes Inc.</i>	<i>567</i>
Chapter 15	Strategic Challenges and Change for Supply Chains	569
	SUPPLY CHAIN PROFILE: Keeping the Supply Chain Alive and Nimble	570
	15-1 Introduction	570
	15-2 Principles of Supply Chain Management	571
	15-2a <i>Principle 1: Segment Customers Based on Service Needs</i>	<i>571</i>
	15-2b <i>Principle 2: Customize the Logistics Network</i>	<i>572</i>
	15-2c <i>Principle 3: Listen to Signals of Market Demand and Plan Accordingly</i>	<i>573</i>
	15-2d <i>Principle 4: Differentiate Products Closer to the Customer</i>	<i>573</i>
	15-2e <i>Principle 5: Source Strategically</i>	<i>574</i>

Preface

The preparation of the 11th edition of *Supply Chain Management: A Logistics Perspective* has focused intensively on addressing the enormity of change that has been impacting our global businesses and supply chains. The authors of the **11th** edition feel that the past several years have elevated the utility of the term "disruptive innovation" to disruptive levels. Whether this refers to advances in information technology (e.g., cloud capabilities; software-as-a-service; Internet of Things; mobile capabilities; additive manufacturing; blockchain), operational innovations (e.g., drones, robots, autonomous vehicles) global economic and environmental factors, or new and more effective business and management strategies, the supply chain world is finding it necessary to develop new responses to issues like these on an almost daily basis. Also, the growing presence and impacts of the "Amazon effect" have challenged many types of organizations to go back to the drawing board to re-think and to re-conceptualize the purposes, structure, and functioning of their supply chains. These realities have significantly elevated the need for the effective execution of change management in businesses and their supply chains. Global organizations have learned that lean, fast, agile, and flexible supply chains are a requirement of the twenty-first century where economic swings are typically quicker and of shorter duration than in the past. Adaptability and readiness are also ingredients for continuing growth and profitability.

Through it all, logistics and supply chain management played an increasingly important role to improve organizational efficiency, effectiveness, and competitiveness. Additionally, and in an increasing number of organizations, supply chains have gained recognition at the board level, and supply chain and logistics capabilities have become recognized as prerequisites for overall organizational success. Supply chain executive responsibilities now extend well beyond cost management and customer service, and they have significant linkages into finance, marketing, and manufacturing/operations strategies. Through the provision of capable and innovative logistics services, supply chains have become enriched to help create and deliver value to customers, shareholders and stakeholders, and the organization itself. In short, many supply chains are now regarded as being key ingredients of overall organizational success.

This 11th edition of *Supply Chain Management: A Logistics Perspective* is designed to introduce the fundamentals of supply chain management, and also to focus on how supply chains can drive internal value for organizations. Also, a key element of success will be the ability of organizations to align their supply chain strategies and operations with those of supplier and customer organizations. Similar to the phenomenon it takes to win in any team sport, a requirement for success will be a focus on end-to-end supply chain management. While every supply chain organization has unique skills and capabilities, the ultimate viability of the supply chain will depend on its ability to identify and achieve more pervasive goals relating to delivering value to the end user customer, consumer, warfighter, etc.

Part I—Supply Chain Foundations

This section of the text provides a framework for an appreciation and understanding of supply chain management as it has developed and expanded to meet the challenges of the last 30 years. Chapter I provides an overview of the role and importance of supply chain management in the twenty-first century. Considering the accelerating number of

- capacity planning, 184
- capacity requirements planning (CRP), 185
- capital costs, 298–299
- ⌘ production challenge, 177–178
- capital goods, 141
- cargo ships, 426
- carload (CL), 466
- carousels, 409, 410
- carrier liability, 444
- carrier selection, 439–441
- carrying cost. *See also* inventory carrying cost
- calculating, 300
 - nature of, 302
 - ordering cost vs., 304, 305
- cash cycle, 536
- cash flow. *See* financial flow
- cash flow statement, 536
- CBP. *See* U.S. Customs and Border Protection (CBP) Agency
- centralized inventory, 378
- centralized production facilities, 175
- Central Transport, Inc., 25
- channel partner, relationship decision, 476
- channels of distribution, 119–121, 121
- channel-spanning performance measures, 575–576
- charter services, 425
- China, 30
- sustainability issues, 589
 - transportation infrastructure, 103
- Civil Aeronautics Act (1938), 457
- classification, trains, 422
- CLGN Book Distributors.com (CLGN), 498–500
- clicks-and-mortar, 121
- cloud computing, 9, 559, 577–578
- cognitive analytics, 582–583
- collaboration
- concept, 479
 - full, 480
 - horizontal, 479–480
 - imperative for, 478–481
 - technology and, 9
 - tools, 156
 - types of, 480
 - vertical, 479
- collaborative distribution, 481–482
- collaborative planning, forecasting, and replenishment (CPFR), 222–225, 224–225, 293–294
- collaborative process improvement, 151
- collaborative relationships, 478–481
- College-Industry Council of Material Handling Education, 405
- combination carriers, 424
- commercial zones, 117
- commodities, 143–144
- characteristics, 466–467
- commodity markets, 165
- common costs, 464
- communication, customer service, 256
- communication technology, 577
- company preferences, 106
- comparative advantage, theory of, 29
- competition, logistics and relationships, 70–73
- competitive capabilities, 97
- competitive pressure, as production challenge, 177
- complexity, supply chain issues, 19
- complex logistics channel, 87, 89
- Compliance, Safety, Accountability (CSA), 417, 458, 461
- construction industry, seasonality of, 296
- consumer packaged goods (CPG) firms, 291
- containerized freight, 430
- container-on-flatcar (COFC) service, 429
- containerships, 426
- continuous improvement, distribution facility, 384
- continuous process facilities, 191
- contract logistics, 482
- contract management, 156
- contractual agreement, 151
- contract warehousing, 380
- convenience, customer service, 256–257
- conveyors, 407
- corporate organizational change, 97
- corporate ownership change, 96
- corporate subsidiaries, 485
- correct orders, 255
- cost(s). *See also specific cost*
- basic input, 166
 - common, 464
 - of goods sold, 536
 - joint, 464
 - of lost sales, 71, 72, 73, 379, 536
 - performance measure metrics, 506, 507
 - pressures, 96–97
 - service failures, 525
 - as supply chain issue, 20
- cost centers, 85
- cost, factors affecting logistics and, 70–77
- inventory, 71, 72
 - order cycle, 70–71
 - substitutability, 71
 - transportation, 71, 72, 73
- cost of service, 463–464
- costs manufacturing metrics, 196
- cost-to-serve (CTS) model, 234
- cost tradeoffs, distribution facilities, 379, 379
- Council of Supply Chain Management Professionals, 54
- Coyote Logistics, 63–64
- cranes, 407
- criticals, 144
- cross-chain systems integration, 549
- cross-chain visibility, information systems and, 546
- cross-cultural communication, 42
- cross-docking, 377, 377
- CRP. *See* capacity requirements planning (CRP)
- crude oil transportation, 427. *See also* pipelines
- CSA. *See* Compliance, Safety, Accountability (CSA)
- C-TPAT. *See* Customs Trade Partnership Against Terrorism (C-TPAT)
- CTS. *See* cost-to-serve (CTS) model
- cube criterion, distribution facility, 384
- current assets, 536
- current liabilities, 536
- current ratio, 536
- customer(s)
- empowered, 10
 - proximity to, locational determinants, 103
 - shifting locations, 96
- customer fulfillment models, 121–127, 122
- dedicated fulfillment, 123, 123–124
 - direct store delivery, 125–126, 126
 - integrated fulfillment, 121–123, 122
 - pool distribution, 124–125, 125
- customer profitability, 234
- customer relationship management (CRM), 234–243
- software, 555
- customer segmentation, 234, 571–572
- customer service, 234
- competition and, 70–73
 - defining, 251–252
 - dimensions of, 62
 - elements of, 253–259
 - global markets and strategy, 41–43
 - logistical requirements change, 95
 - logistics in, 62
 - logistics/marketing interface, 251, 252

- order management influences, 261–277
- performance measures for, 257–259
- return on investment (ROI) and, 253
- service recovery, 278
- stockout cost, 259–261
- substitutability and, 71
- customer service representatives, 278
- customers focus, transportation KPI, 445
- customer wait time (CWT), 268, 268
- customized packaging, 191
- Customs Brokers, 435
- Customs Trade Partnership Against
 Terrorism (C-TPAT), 44, 418
- cycle stocks, 292–293
- cycle time, 254

- D**
- data, 580. *See also* big data
- data capture technologies, 555
- data-driven visibility, 579
- data management and analytics, 156
- data standardization, 559–560
- debt-to-equity ratio, 536
- decentralized inventory strategy, 378
- decision making, 544–545
- dedicated fulfillment, 123, 123–124
- delayed differentiation, 188
- demand
 - dependent, 186, 211, 313
 - factors affecting, 211–212
 - fluctuations, 211–212
 - independent, 186, 211, 313
 - uncertainty, 293
- demand-driven strategies, 178
- demand-driven supply, 43
- demand flow, 18
- demand forecasting, 61
- demand management, 207–210
 - balancing supply and demand, 210–211
 - CPFR, 222–225
 - forecasting (*See* forecasting)
 - sales and operations planning (S&OP),
 221–222
 - supporting business strategy, 209
- demographics, global, 30–34
- density of product, 74, 74–75
- Department of Transportation Act
 (1966), 458
- dependability, customer services, 254
- dependent demand, 186, 211, 313
- descriptive analytics, 581–582
- digitization, game-changing technology
 - additive manufacturing/3D Printing,
 578
 - artificial intelligence, 577
 - augmented reality, 578
 - cloud computing, 577–578
- direct debt service costs, 299
- direct forklift delivery, 168
- direct service providers, 440
- direct shipping operations, 376–377
- direct store delivery, 125–126, 126
- direct to consumer (D2C) business
 - model. *See also* omni-channel
 network design
- direct transaction costs, 166–167
- disruptive innovation, 593
- distance, 464–465
- dislunctives, 144
- distribution
 - challenges, 374–375
 - changing face of, 368
 - cost tradeoffs, 379, 379
 - execution, 386–390
 - facility considerations, 382–385
 - metrics, 390–392
 - network design issues, 378–381
 - overview, 369
 - planning and strategy, 376–385
 - strategic decisions, 376
 - technology, 392–396
 - tradeoffs, 372–374
 - value-adding roles of, 372
- distribution centers
 - automatic identification (auto-ID),
 395–396
 - automation, 375
 - efficient and environmentally friendly,
 385
 - fulfillment model, 124
 - grid technique application, 134–136
 - key performance indicators (KPIs),
 390–392
 - mixing capability, 371
 - product-handling functions.
 386–389
 - support functions. 389–390
 - WMS, 393–395
- distribution cost efficiency, 391
- distribution facility
 - accumulation function, 370
 - allocation, 371
 - assortment, 371–372
 - considerations, 382–385
 - functionality, 370–372
 - layout, 383, 383
 - sortation, 371
- distribution requirements planning
 (DRP), 341–343
- "division of labor," 29
- documentation-based freight delays and
 disruptions, 444
- documentation, freight, 442–444
- dollar value of product, 73, 73–74
- domestic water carriers, 425
- DOT. *See* U.S. Department of
 Transportation (DOT)
- double-stack container services, 429
- double-stack service, 429
- drivers, relationship, 476
- drones, 57–58
- due diligence for location and site
 selection, 107
- durability, 439
- dynamic analysis, logistics systems,
 83–84, 84

- E**
- earnings before interest and taxes (EBIT),
 517, 536
- earnings per share, 536
- EBIT. *See* earnings before interest and
 taxes (EBIT)
- e-commerce models, 159–160
- e-commerce order fulfillment strategies,
 250
- economic growth and the birth rate, 35
- economic order quantity (EOQ)
 - fixed order interval vs., 331
 - mathematical formulation, 317–321
 - simple model, 316–317
 - special applications of, 355–365
 - summary and evaluation of, 331–332
- economic regulation, of transportation
 industry, 459–460
- economic sustainability, 588
- economies of scope, 175
- efficiency manufacturing metrics, 195
- 80–20 Rule, 346
- electronic data interchange (EDI), 155
- electronic filing of cargo information, 43
- electronic funds transfer (ETF), 157
- electronic marketplace, 159–160
- Elkins Act (1903), 457
- Emergency Transportation Act (1933),
 457
- employees, *See also* talent management
 training and empowerment, 278
- empowered consumer, 10
- engineer-to-order (ETO), 186, 188, 189
- enterprise resource planning (ERP)
 systems, 554–555
- environmental sustainability, 418, 588

- e-procurement, 155–156, 156
 equipment vs. people, distribution tradeoffs, 373
 ergonomics, 384
 ERP. *See* enterprise resource planning (ERP) systems
 e-sourcing, 155–156, 156
 ETO. *See* engineer-to-order (ETO)
 European Union (EU), 36, 37, 40
 event logistics, 55
 event management software, 553
 execution applications, 552, 552–553. *See* also software
 executive dashboard, 505
 exponential smoothing, 218–220
 export-trade flows, 36, 37
 extended enterprise, 16
 extensible markup language (XML), 560
 external metrics, 263
- F**
- FAA. *See* Federal Aviation Administration (FAA)
 FAA Reauthorization Act (1994), 458
 facilitators, 476
 facility considerations, distribution, 382–385
 facility layout, 189
 facility location, 62
 analysis, 100–101
 Factor Endowment Theory, 29
 Factors of Production, 29
 Federal Aviation Administration (FAA), 461
 Federal Highway Administration (FHWA), 460
 Federal Motor Carrier Safety Administration (FMCSA), 417, 460–461
 Federal Railroad Administration's (FRA), 461
 federal regulation, transportation, 457–458, 457–461
 FedEx, 257
 feedback, 174–175
 FHWA. *See* Federal Highway Administration (FHWA)
 finance
 inventory and, 297–298
 objectives of, 298
 financial-based 3PL providers, 485
 financial condition, suppliers, 150
 financial flow, 17
 financial statements, 517–519
 five-party logistics (5PL), 483
 fixed order interval approach, 330–331
 fixed order quantity approach (condition of certainty), 314–323
 fixed order quantity approach (condition of uncertainty), 323–330
 fixed period approach. *See* fixed order interval approach
 fixed review period approach. *See* fixed order interval approach
 flexibility
 distribution facility, 383
 machine, 181
 performance measure, 507
 routing, 181
 flexibility and innovation production metrics, 196
 flexible manufacturing, 181
 flow-through fulfillment, 127, 127
 fluctuations, demand, 211–212
 FMCSA. *See* Federal Motor Carrier Safety Administration (FMCSA)
 forecast errors, 212–214
 forecasting, 61, 293
 distribution facility, 382
 techniques, 214–220
 traditional, 211–212
 for-hire carriers, 434
 of/liquid products, 427
 forklifts, 406, 406
 form utility, 56, 173
 fourth-party logistics (4PL), 483, 484
 FRA. *See* Federal Railroad Administration's (FRA)
 fracking, 34
 fragile products, 439
 Free and Secure Trade (FAST), 418
 free on board (FOB) terms, 432–433
 Free Trade Zone, 105
 freight bill, 443
 freight bill auditing, TMS, 449
 freight claims, 443–444
 freight claims form, 443
 freight documentation, 442–444
 Freight Forwarder Act (1942), 457
 freight forwarding, 485
 freight services. *See also* transportation intermodal transportation, 430
 freight visibility solutions, 450
 frugal innovation, 593
 fulfillment flexibility, WMS, 393
 full collaboration, 480
 functional control of transportation, 431–432
- G**
- game-changing technologies
 automation, 578–579
 digitization, 577–578
 mobility, 577
 gathering lines, 427
 GATT. *See* General Agreement on Tariffs and Trade (GATT)
 General Agreement on Tariffs and Trade (GATT), 39, 40
 general cargo ships, 426
 generics, 143
 Germany, birth rate in, 35
 Girl Scouts, 52
 global demographics, 30–34
 global interdependence, 39
 globalization, 7–9
 driving forces for, 30–36
 supply chains in, 39–41
 global markets and strategy, 41–43
 Global Shippers Forum (GSF), 506
 global supply chain flows, 36–39
 export-trade flows, 36, 37
 import-trade flows, 37, 38
 trade patterns, 39
 global trade
 patterns, changes to, 95
 rationale for, 29–30
 government policy and regulation, 10–12
 grid technique, 112–116
 advantages, 114–115
 application to distribution center, 134–136
 limitations, 115–116
 manufacturing plant location, 114, 115
 grocery industry, 119
 gross domestic product (GDP), 64–65, 290, 290
 gross margin, 517, 536
- H**
- Hepburn Act (1906), 457
 heuristic models, 111–116
 Home Depot's supply chain transformation, 131
 Homeland Security Act (2002), 458
 horizontal collaboration, 479–480
 hosted application management, 559
 Hours of Service Regulations (2012), 458
 Hudson Guitars, 201
 hurdle rate, 299

- ICC Termination Act of 1995, 458, 459
- identification and control equipment,
materials handling, 410
- IFE. *See* International Freight Forwarders (IFF)
- imperatives, supply chain talent management, 585–587
- import–trade flows, 37, 38
- inaccurate or incomplete costs, 116
- inaccurate or incomplete data, 116
- in bond shipment, 420
- inbound logistics, 55. *See also* logistics
- inbound-to-operations logistics systems, 207
- inbound transportation delivery, 168
- income statement, 517, 536
- Incoterms, 433, 434
- independent demand, 186, 211, 313
- index, defined, 501
- India, 30
sustainability issues, 589
- industrial development incentives, 104–105
- industrial packaging, 60
- industrial trucks, 406
- Inflate-a-Dome Innovations (IDI), 565
- influencing the order, 233
- information, 580
key characteristics, 542–544
multidirectional flows, 544
strategic decision making, 544–545
supply chain issues, 19–20
- information flow, 16–17
- information-related 3PL providers, 485
- information systems. *See also* software
enabling process excellence, 546–547
linking network elements, 547–548, 548
mitigating known risks, 548–549
providing decision support, 544–545
supporting multidirectional flows, 544
- information technology, 36
- Infosys, 152
- infrastructure, locational determinants, 103
- input–transformation–output principle, 175
- insurance and taxes, inventory and, 299–300
- integrated carriers, 424
- integrated fulfillment, 121–123, 122
- integrated logistics management, 13
- intelligent robotics, 578–579
- interest cost, 298. *See also* capital costs
- intermodal trains, 422
- intermodal transportation service, 428–431
- internal metrics, 263
- International Chamber of Commerce, 433
- International Freight Forwarders (IFF), 435
- Internet, 9, 36
software purchase, 559
virtual mode of transportation, 431
- Internet of Things (IoT), 579
- in-transit freight visibility, 444
- in-transit inventory, 294–295, 294–296
carrying cost, 310–311
- inventory
classifying, 345–351
rationale for, 291–298
reducing, 289
return on investment (ROI), 289
in the U.S. economy, 289–291
and U.S. gross domestic product, 290, 290
valuation method, 299
- inventory accumulation, summary of, 296
- inventory carrying cost, 536
calculating, 300
capital cost, 298–299
defined, 298
insurance and taxes, 299–300
in-transit inventory, 310–311
storage space cost, 299
- inventory carrying cost rate, 536
- inventory carrying costs, 293
- inventory control, 61
- inventory costs, 290, 380
ordering costs, 302–304
reasons being important, 298
setup costs, 302–304
stockout cost (*See* stockout)
tradeoff analysis, 293
- inventory cycles, 315–316
- inventory deployment, 19
- inventory effect, 71, 72
- inventory management
additional approaches to, 332–345
fundamental approaches to, 311–332
- inventory metrics production metrics, 195
- inventory positioning, 378
- inventory positioning strategy, 378
- inventory risk cost, 300
- inventory service cost, 299–300
- inventory status file (IS), 337
- inventory-to-sales ratio, 288–289
- inventory turns, 536
- IoT. *See* Internet of Things (IoT)
- ISO 9000, 149
- item-level, transportation KPI!, 446
- items and services purchased, 142–145
commodities, 143–144
criticals, 144
distinctives, 144
generics, 143
- IT infrastructure, locational determinants, 105–106
- Japan, aging populations in, 32
- joint costs, 464
- Jordano Foods, 79–80
- just-in-time (JIT) approach, 332–336
- K
- Kanban system, 333
- key performance indicators (KPI), 502
distribution, 390–392
transportation, 445–446
- knowledge management, 156, 156
- KPI!. *See* key performance indicators (KPI!)
- L
- labor climate, in determining location, 102
- labor management, WMS, 393
- labor productivity
as production challenge, 177
transportation KPI, 446
- labor, specialization of, 29
- land and resources, 34–35
- land costs and utilities, 105
- landed costs, 167–168
- large production facilities, 175
- layout
distribution facility, 383, 383
production process, 189–191
- lean production, 179–180
- legacy systems, 395
- Lehigh Valley Transport and Logistics Service (LVTLS), 24
- less-than-carload (LCL), 466
- less-than-truckload (LTL) carriers, 420, 466
- level of service, 467
- linearity of transportation costs, 117

- linear programming (LP), 109–110
- linehaul freight carriers, 422
- liner services, 425
- links *vs.* nodes, 86–87, 87
- liquidity ratio, 536
- liquid products, for-hire carriers of, 427
- load planning, TMS, 448
- load tendering, TMS, 449
- locational determinants, 101–107
 - company preferences, 106
 - industrial development incentives, 104–105
 - IT infrastructure, 105–106
 - key factors, 102–106
 - labor climate, 102
 - land costs and utilities, 105
 - proximity to markets and customers, 103
 - quality of life, 103
 - taxes, 104–105
 - transportation services and infrastructure, 103
 - trends governing site selection, 106–107
- location analysis, simulation models, 111
- logistics
 - activities, 59–64
 - business-related literature, 54
 - business sector approach, 55
 - cost and importance of, 70–77
 - defined, 54–56, 55
 - macro perspective, 64–66
 - micro dimension, 66–70
 - military definition of, 54
 - overview, 52–54
 - subdivisions, 55
 - systems analysis, 77
 - value-added roles of, 56–59
- logistics channel
 - complex, 87, 89
 - multi-echelon, 87, 88
 - omni-channel network, 119–121, 121
 - simple, 87, 88
 - supply chain network, 87, 89
- logistics costs, operations, 168–169
- logistics management, defined, 54
- Logistics Management survey, 395
- logistics networks, 572–573
- logistics operations responsiveness (LOR), 270–273
 - financial impact, 271–272, 271–273
 - metrics, 270–271
- logistics service providers, 544
- logistics system information (LSI), 273–274
 - financial impact, 274
 - metrics, 273–274
- logistics systems analysis, 82–89
 - approaches to, 85–88
 - dynamic analysis, 83–84, 84
 - static analysis, 82–83, 83
 - techniques of, 82–84
- long-range planning, 94–97
- long-range plans, 184
- lot-size costs, 168
- M**
- machine flexibility, 181
- machine-to-machine (M2M)
 - communication, 579
- maintenance manufacturing metrics, 195
- maintenance, repair, and operating items (MRO) items, 143, 145
- make-ready costs, 168
- make-to-order (MTO), 186
- make-to-stock (MTS) operations, 175, 176, 179, 186, 188
- Managing Strategic Sourcing Process (MSSP), 145, 145–146
- manifest trains, 422
- Mann-Elkins Act (1910), 457
- manufacturing
 - inventory and, 297
 - logistics interfaces with, 67
- manufacturing cell, 191
- manufacturing execution systems (MES), 197, 198
- manufacturing resource planning, 341
- MAQ Corporation, 353
- MARAD. *See* Maritime Administration (MARAD)
- Maritime Administration (MARAD), 461
- Maritime Security Act (1996), 458
- market(s)
 - proximity to, locational determinants, 103
 - shifting locations, 96
- market demand, 573
- marketing, 59
 - inventory and, 297
 - logistics interfaces with, 68–69
- marketing channel, 119, 120
- Martignetti Companies, 309–310
- master production schedule (MPS), 185, 336
- materials handling, 60–61
 - dimensions of, 403–404
 - equipment of, 405–410
 - objective of, 403–405
 - principles of, 405
- materials management *vs.* physical distribution, 85
- materials, packaging, 192–193
- materials planning, 184
- materials requirements planning (MRP), 186, 336–341
- maturity model, for supply chain
 - analytics, 581–583, 582
- measure, defined, 501
- medium-range plans, 184
- Megacities, 33
- mergers/acquisitions, 96
- MES. *See* manufacturing execution systems (MES)
- metric, defined, 501
- mezzanine, 408, 409
- MFN. *See* most favored nation (MFN) status
- MHJ Industry Report, 581
- migration, 32, 33
- military logistics, 55
- min-max inventory management
 - approach, 322
- mobile internet (MI), 577
- modeling approaches, supply chain
 - network design, 107–117
- most favored nation (MFN) status, 45
- Motor Carrier Act (1935), 457
- Motor Carrier Act (1980), 458, 459
- motor carriers, 419–420, 421
 - federal regulation, 459
- movement dimension of materials
 - handling, 403
- MPS. *See* master production schedule (MPS)
- MRO. *See* maintenance, repair, and operating items (MRO) items
- MRP program, 337
- MSSP. *See* Managing Strategic Sourcing Process (MSSP)
- MTO. *See* make-to-order (MTO)
- multi-echelon logistics channel, 87, 88
- N**
- NAFTA. *See* North American Free Trade Agreement (NAFTA)
- National Clean Diesel Campaign, 418
- National Motor Freight Classification (NMFC), 467
- natural catastrophes, 8
- natural gas pipelines, 427
- needs assessment, 557
- Negotiated Rates Act (1993), 458
- negotiation, 165
 - online, 156, 156
- net income (NI), 517
- net income (or loss), 536

- network delays, 430
- network design. *See* supply chain network design
- network design issues, distribution, 378–381
- network facilities, 19. *See also* supply chain network design
- network factorization, 110
- NI.** *See* net income (NI)
- NIKE, Inc., 49
- NMFC. *See* National Motor Freight Classification (NMFC)
- nodes *vs.* links, 86–87, 87
- nonintegrated carriers, 424
- Non Vessel-owning Common Carriers (NVOCC), 435
- Nordstrom, 591
- normal demand, 211
- North American Free Trade Agreement (NAFTA), 45
- NVOCC. *See* Non Vessel-owning Common Carriers (NVOCC)
- O**
- obsolescence, 293
- Ocean Shipping Reform Act of 1984, 458
- Ocean Shipping Reform Act of 1998, 459
- offshoring, 181
- oil industry, 427
- omni-channel, 573
- omni-channel distribution option, 10
- omni-channel network design, 117–127
- channels of distribution, 119–121, 121
- customer fulfillment models, 121–127, 122
- dedicated fulfillment, 123, 123–124
- direct store delivery, 125–126, 126
- flow-through fulfillment, 127, 127
- integrated fulfillment, 121–123, 122
- overview, 117–119
- pool distribution, 124–125, 125
- "one size fits all" strategy, 547
- online marketplace, 159–160
- online negotiations, 156, 156
- online trading community, 160
- on-time deliveries, 525, 526, 528, 529
- operating expense, 536
- operating model, supply chain relationships, 477
- operating ratio, 536
- operations
- distribution, 369–375
- logistics costs, 168–169
- logistics interfaces with, 67
- packaging, 191–193
- production, 173–178
- opportunity cost, 298. *See also* capital costs
- optimization, information systems and, 547
- optimization models, 107–110
- order accuracy, 390
- order completeness, 390
- order cycle time (OCT), 267–270, 508
- financial impact, 269–270
- metrics, 268
- order execution, 233
- order execution process, 234
- order fill rates, 525, 527, 528, 530
- order fulfillment, 61
- ordering cost, 302–304
- carrying cost *vs.*, 304
- future perspectives, 304
- nature of, 303–304
- order management and customer services, 261–277
- financial impacts, 264–267
- logistics operations responsiveness (LOR), 270–273
- logistics system information (LSI), 273–274
- order cycle time, 267–270
- postsale logistics support (PLS), 275–277
- product availability, 262–264
- service recovery, 278
- order-picking station, 410
- order-to-cash cycle, 537
- order-to-cash (OTC) cycle, 244–248
- length and variability, 248–250, 249
- organizational consolidation and power shifts, 9–10
- organizational relationships, 20
- outbound logistics, 55. *See also* logistics
- outbound-to-customer logistics systems, 207
- outsourcing, 8, 482. *See also* strategic sourcing
- business case for, 181–182
- evolution of, 483
- participants, 482–483
- production, 181–182
- technology and, 9
- transportation services, 434–435
- P**
- packaging
- concerns, 191
- customized, 191
- design, 191
- industrial, 60, 68
- materials, 192–193
- operation, 191–193
- sustainable, 192–193
- Pain Away Corporation (PAC), 399
- Panama Canal Act (1912), 457
- Panama Canal Authority, 429
- Paper2Go.com, 535
- parent-component relationship, 186
- Pareto's law, 346
- partnerships, 473–474
- part-to-picker storage systems, 408–409, 410
- people *vs.* space, distribution tradeoffs, 374
- perfect order index (POI), 391
- performance measurement, 20–21
- performance metrics
- categories, 506–511
- costs, 506, 507
- decisions, financial impact, 519–524
- developing, 505
- dimensions, 500–504
- finance connection, 511–512
- financial impact, 513–516
- financial statements, 517–519
- quality, 506, 507
- revenue-cost savings connection,** 512–513
- service, financial implications of, 525–530
- time, 506
- performance monitoring, TMS, 449
- perishable goods, 439
- perpetual inventory system, 316
- petroleum-based fuels for transportation, 427. *See also* pipelines
- physical distribution, 13, 54, 207
- materials management *vs.*, 85
- picker-to-part storage systems, 408–409, 409
- pipeline costs, 427
- pipelines, 426–427
- place utility, 56–57
- planning software applications, 550–552, 551
- Playtime, Inc., 229
- PLS. *See* postsale logistics support (PLS)
- POI. *See* perfect order index (POI)
- pool distribution, 124–125, 125
- popularity criterion, distribution facility, 384
- population
- aging, 32
- growth rate, 35
- median age of, 30, 31, 32
- migration and, 32, 33
- top ten countries, 31
- urbanization, 32, 33

- ports, 44
 - positioning equipment, 407, 407
 - possession utility, 59
 - postsale logistics support (PLS), 275–277
 - financial impact, 276–277
 - metrics, 275
 - posttransaction information, 256, 273
 - pre-consolidation, 384
 - predictive analytics, 582
 - prescriptive analytics, 582
 - pre-shipment decision making, TMS, 448
 - pretransaction information, 256, 273
 - price lists, 165
 - price measurement approaches, hierarchy of, 166
 - price quotations, 165
 - pricing
 - procurement and, 165–169
 - sources of, 165–166
 - value of service, 464, 464
 - proactive metrics, 502
 - process automation, 156, 156
 - procurement, 62
 - product availability, 262–264
 - product differentiation, 573–574
 - production
 - challenges, 177–178
 - planning, 184–186
 - strategies, 178–183
 - tradeoffs, 175–177
 - production economies, 293
 - production facilities, 175, 189–191
 - assembly line, 191
 - continuous process facilities, 191
 - layout, 189–191, 190
 - manufacturing cell, 191
 - project layout, 190
 - workcenter, 190
 - production metrics, 194–196
 - compliance metrics, 195
 - costs and profitability manufacturing metrics, 196
 - customer experience and responsiveness metrics, 194
 - efficiency manufacturing metrics, 195
 - flexibility and innovation, 196
 - inventory metrics, 195
 - maintenance manufacturing metrics, 195
 - quality manufacturing metrics, 195
 - production planning, 184–186
 - activities, 184
 - and scheduling, 62
 - production process, 174
 - functionality, 174–175
 - layout, 189–191, 190
 - production quantity, 185
 - production strategies, 178–183
 - production technology, 196–198
 - production tradeoffs, 175–177
 - product life cycle, global competition
 - and, 42
 - product life cycles
 - inventory management and, 8
 - shorter, 8
 - product placement, distribution facility, 384
 - product prototyping. *See also* 3-D printing technologies
 - product relationships, logistics and, 73–75
 - product safety, modal selection and, 437–438
 - product specification, 168
 - product value, 439
 - profitability manufacturing metrics, 196
 - profit margin, 537
 - project layout, 190
 - project management, 156, 156
 - project manufacturing, 188
 - promotion, defined, 59
 - public warehousing, 380
 - pull-based systems, 180
 - pull systems, 43, 67, 313–314
 - purchase discounts, 292
 - purchase economies, 293
 - purchasing
 - activity types, 144, 144–145
 - defined, 141
 - quadrant technique, 142–144, 143
 - purchasing software with data
 - standardization capabilities, 560
 - push-based strategy, 179
 - push system, 313–314
- Q**
- quadrant model, 348–349
 - quadrant technique, 142–144, 143
 - quadrant technique/model, 348, 348–349
 - qualitative performance metrics, 501
 - quality
 - costs, procurement and, 168
 - production metrics, 195
 - supplier selection, 149
 - quality manufacturing metrics, 195
 - quality of life, 103
 - quality specification, 168
 - quality standards, information systems, 542–544
 - quantity dimension, materials handling, 403–404
 - quantity utility, 58–59
 - Quik Chips (QC), 494
- R**
- racks, 408
 - radio-frequency identification (RFID) tags, 395, 396, 555, 556
 - Rail Passenger Service Act (1970), 458
 - Railroad Revitalization and Regulatory Reform Act (1976), 458
 - railroads, 421–422
 - federal regulation, 459–460
 - random variation, 211
 - rapid deployment center (RDC), 575
 - rate negotiations, transportation services, 441
 - RCCP. *See* rough-cut capacity plan (RCCP)
 - RDC. *See* rapid deployment center (RDC)
 - reactive capability, 181
 - reactive metrics, 502
 - re-buys, 144
 - receiving costs, 168
 - reconditioning, 590
 - recycling, 590
 - Red Fish–Blue Fish, 47
 - Reed-Bulwinkle Act (1948), 458
 - refined product pipelines, 427
 - regional economic integration, 39
 - Regional Rail Reorganization Act (1973), 458
 - Regional Trade Agreements (RTA). 40
 - regulation of transportation industry, 457–458, 457–461
 - relationship decision, 476–477
 - relationships
 - differences, 474
 - perspectives, 474
 - strategic alliance, 473
 - relationships model, supply chain, 475–478
 - alternatives, 477
 - implementation and continuous improvement, 478, 478
 - operating model, 477
 - partner selection, 477
 - relationship decision, 476–477
 - strategic assessment, 475
 - released value, 444
 - relevancy, information, 543
 - reliability
 - information, 544
 - performance measure, 507
 - reliability, modal selection and, 437

- reliability, supplier selection and, 150
- remanufacturing, 590
- remote tracking and monitoring, 579
- reorder point, 315, 321–322
- replenishment cycle, 244–248
- request for information (RFI), 147
- request for proposal (RFP), 147
- requests for quotes (RFQ), 165
- resource efficiency, distribution metrics, 392
- resource productivity, distribution metrics, 392
- resource requirements planning (RRP), 184–185
- resources, 34–35
- responsiveness, performance measure, 507
- retailers/retailing. *See also* omni-channel retailing
- return on assets, 537
- return on assets (ROA), 514
- return on equity, 523, 524, 537
- return on investment (ROI), 253, 289
- return on net worth, 514
- reuse, 590
- revenue-cost savings, 512–513
- RFI. *See* request for information (RFI)
- RFP. *See* request for proposal (RFP)
- RFQ. *See* requests for quotes (RFQ)
- risk mitigation, 548–549
- risk pooling, 373
- risk, supplier selection and, 150
- Robinson-Patman Act, 68
- Rocky Brands Inc., 232
- roll-on, roll-off (RO-RO) vessels, 426
- rough-cut capacity plan (RCCP), 185
- routing and scheduling, TMS, 448
- routing flexibility, 181
- RPI. *See* resource requirements planning (RRP)
- RTA. *See* Regional Trade Agreements (RTA)

- S**
- SAIL Distribution, 4–5
- safe delivery, 255
- safety regulation, transportation, 460–461
- safety stock, 293–294, 306–309
- SAILS. *See* strategic analysis of integrated logistics systems (SAILS)
- sales and operations planning (S&OP), 221–222, 545
- sales terms. *See* terms of sale
- satellite tracking, 444
- sawtooth model, 319, 319
- scale economies, 292
- scheduling, TMS, 448
- scorecard, 502
- scorecard, transportation performance, 446, 447
- search engines, 9
- seasonality, 296
- Seasonal stocks, 296
- security, 21–22
 - ports, 44
- segmentation, information systems and, 547
- sell-side system, 159
- Senco Electronics Company, 81
- sensitivity analysis, 116, 134–135. *See also* grid technique
- service failures, 525, 525, 525–530
- service, financial implications of, 525–530
- service logistics, 55
- service-oriented architecture (SOA), 560, 577, 578
- service quality, transportation KPI, 445–446
 - monitoring, 446–447
- service recovery, 234, 278
- service, transportation rates
 - cost of, 463–464
 - level of, 467
 - value of, 464
- setup costs, 302–304
 - nature of, 303–304
- shareholders' equity, 537
- shifting locations, of customer and supply market, 96
- shipment preparation and tendering, 441–442
- shipment, weight of, 466
- shippers, 586
- Shipping Act of 1984, 460
- shortline carriers, 422
- short-range plans, 184
- short-run analysis, logistics systems, 82–83
- simple logistics channel, 87, 88
- simple moving average, 214–216
- simulation models, 111
- Six Sigma, 149
- slotting, 384
- smaller production facilities, 175
- small package carriers, 420
- smart manufacturing, 182
- SmartWay, 418
- SOA. *See* service-oriented architecture (SOA)
- social networks, 9
- social sustainability, 588
- software, 550–556
 - automatic identification, 555–556
 - business analytics and business intelligence, 553–554
 - categories, 550
 - CRM, 555
 - ERP system, 554–555
 - event management, 553
 - execution applications, 552, 552–553
 - MES, 197, 198
 - planning applications, 550–552, 551
 - seamless integration of, 560
 - SRM, 555
 - TMS, 448, 449
 - WMS, 393–395
- software as a service (SaaS), 559, 578
- software on demand, 559
- software selection, 557–559
 - development alternatives, 557–558
 - purchase options, 559
 - solutions packages, 558–559
- sortation function, distribution facility, 371
- sources of pricing, 165–166
- sourcing. *See* strategic sourcing
- space dimension, materials handling, 404
- space, distribution facility, 382
- space vs. equipment, distribution tradeoffs, 373
- spatial relationships. logistics and, 76, 76
- special handling requirements, 75
- specialization of labor, 29
- SPM. *See* strategic profit model (SPM)
- square-root rule, 349–351
- SRM. *See* supplier relationship management (SRM)
- Staggers Rail Act of 1980, 458, 459
- static analysis, logistics systems, 82–83, 83
- status tracking, TMS, 449
- stockout
 - back orders, 260
 - defined, 259
 - expected cost, 259–261, 306–310
 - lost customers, 261
 - lost sales, 260, 310
 - safety stock, 306–309
- storage, 60
- storage equipment, 408–410
- stowability, 466
- strategic analysis of integrated logistics systems (SAILS), 109–110
- strategic assessment, relationship, 475

- strategic decision making, 544–545
- strategic profit model (SPM), 523, 524
- strategic sourcing, 574–575
 defined, 141
- e-commerce models, 159–160
- e-sourcing and e-procurement, 155–156, 156
- c-sourcing and e-procurement
 functionality, 155–158, 156
- items and services purchased, 142–145
- process, 145–152
- strategic evolution of, 142, 142
- supplier evaluation and relationships, 152–153
- total landed cost (TLC), 154–155
- unique aspects of, 141
- supplier
 choice of, 151
- contractual agreement, 151
- evaluation and relationships, 152–153
- portfolio screening process, 147
- selection criteria, 149, 149–150
- supplier networks, 105
- supplier relational costs, 167
- supplier relationship management (SRM), 555
- supply and demand, 473
 balancing, 210–211
- misalignment, 208, 208–209
- supply chain, 16
- supply chain analytics, 580–585
 concept, 580
- maturity model for, 581–583, 582
- supply chain and organizational strategies, 472
- supply chain and trading partners, 473
- supply chain audit, 99, 99
- supply chain innovation, 592–593
- supply chain issues, 18–22
 complexity, 19
- cost and value, 20
- information, 19–20
- inventory deployment, 19
- network facilities, 19
- organizational relationships, 20
- performance measurement, 20–21
- security, 21–22
- talent management, 22
- technology, 21
- transportation management, 21
- supply chain management, 53
 blockchain technology, 540
- distribution operations, 369–375
- and financial outcomes, 572
- principles, 571–576
- production operations in, 173–178
- software, 550–556
- talent management, 585–587, 587
- technology implementation, 557–560
- technology innovations, 561–562
- transportation in, 415–418
- supply chain network design
 alternatives, 100
- audit, 99, 99
- decision making, IOI
- facility location analysis, 100–101
- implementation plan, IOI
- issues and concerns, 116–117
- long-range planning, 94–97
- modeling approaches, 107–117
- overview, 92–94
- process, 97–101, 98
- strategic importance of, 94–95
- Supply Chain Operations and Reference (SCOR) model, 507, 508
- supply chain performance metrics
 categories, 506–511
- costs, 506, 507
- decisions, financial impact, 519–524
- developing, 505
- dimensions, 500–504
- finance connection, 511–512
- financial impact, 513–516
- financial statements, 517–519
- quality, 506, 507
- revenue–cost savings connection, 512–513
- service, financial implications of, 525–530
- time, 506
- supply chain relationships model, 475–478
 alternatives, 477
- implementation and continuous improvement, 478, 478
- operating model, 477
- partner selection, 477
- relationship decision, 476–477
- strategic assessment, 475
- supply chains
 change drivers/factors, 6–13
- global economy, 39–41
- software, 550–556
- technology innovations, 561–562
- supply chain security, 21–22, 43–44
- supply chain service failures, 525, 525, 533
- supply chain transformation, 593–595, 594, 595
- supply chain-wide technology strategy, 575
- supply market, shifting locations of, 96
- supply sources, 147
- susceptibility to damage, 75
- sustainability, 12–13, 588–592
 approaches, 590
- benefits and challenges, 588–589
- economic, 588
- environmental, 588
- goals of, 588
- H&M group, 590
- reducing risk, 589
- reverse flow, 591–592
- "Rs" of, 589–590, 590
- social, 588
- supplier selection and, 150
- sustainable packaging, 192–193
- sustainable supply chain management (SSCM), 12
- synchronization, information systems and, 546
- systems analysis, logistics and, 77, 82–89
 approaches to, 85–88
- dynamic analysis, 83–84, 84
- static analysis, 82–83, 83
- techniques of, 82–84
- systems convergence, WMS, 393
- systems/total cost concept, 14
- T**
- talent management, 22, 585–587, 587
- tankers, 426
- tapering rate principle, 117, 465
- task interleaving, WMS, 393
- taxes, 104–105
- technology, 9. *See also* software
 dimensions, 35
- distribution, 392–396
- globalization and, 35
- implementation, 557–560
- innovations, 561–562
- key resources and, 34
- needs assessment, 557
- production, 196–198
- as supply chain issue, 21
- transportation, 447–450
- technology companies, 8, 42
- Telco Corporation, 281
- temperature-sensitive goods, 439
- Ten Principles of Materials Handling, 404
- terms of sale, 168, 432–434
 FOB terms, 432–433
- Incoterms, 433, 434

- terrorism, supply and demand volatility, 8
- Tesla Gigafactory, 172
- Theory of Absolute Advantage, 29
- "The Real Gap: Fixing the Gender Pay Divide" (2016), 585
- The Retail Equation, 592
- third-party logistics (3PL), 586
 - definition of, 481–484
 - industry overview, 481
 - providers, example services of, 484–485
 - transportation services, 435, 484
- Third Party Logistics (3PL) Research Study
 - Annual Third-Party Logistics Study, 485
 - customer value framework, 491
 - industry trends, 491
 - information technology, 487, 487–489, 489
 - management and relationship issues, 489–490, 490
 - outsourcing activities profile, 486–487
 - strategic view of, 491
- time
 - customer services, 254
 - in-transit and work-in-process inventories, 294–296
 - materials handling dimension, 403
 - performance metrics, 506
- time-definite carriers, satellite tracking, 444
- timeliness, distribution metrics, 390–391
- timeliness, information, 543
- time utility, 56–57
- Tires for You, Inc. (TFY), 227
- total landed cost (TLC), sourcing
 - materials and services, 154, 154–155
- Total Quality Management (TQM), 149
- Toyota production system (TPS), 179, 180
- TQM. See Total Quality Management (TQM)
- Trade Act of 2002, 43
- tradeoffs, distribution, 372–374
 - equipment vs. people, 373
 - people vs. space, 374
 - space vs. equipment, 373
- tradeoffs, production, 175–177
- trading community, online, 160
- trading partners, supply chain and, 473
- traditional basic input costs, 166
- trailer-on-flatcar (TOFC) service, 429
- transactional procurement systems, 156
- transactional relationships, 473, 477
- transaction information, 256, 273
- Trans-Changi, Inc., 164
- transferability, information, 543
- transformation process model, 594, 594–595, 595
- transformation utility, 56
- transit time, modal selection and, 437
- transload freight, 430
- transportation, 36, 59–60
 - discounts, 293
 - execution and control, 441–447
 - federal regulation, 457–458, 457–461
 - functional control of, 431–432
 - modes, 418–431
 - planning and strategy, 431–441
 - 3PL providers, 435, 484
 - seasonality and, 296
 - in supply chain management, 415–418
 - technology, 447–450
 - uncertainty, 293–294
- Transportation Act (1940), 457
- Transportation Act (1958), 458
- Transportation Act of 1920, 457
- transportation buyers, 448
- transportation costs, 438–439, 508
 - advantage, 438
 - disadvantage, 438
 - modal selection, 438–439
 - warehouses, 379
- transportation economies, 293, 370
- transportation effect, 71, 72, 73
- Transportation Equity Act for the 21st Century (1998), 458
- transportation management, as supply chain issue, 21
- transportation management systems (TMS), 448–449, 450
- transportation metrics, 445, 445–446
- transportation rates
 - commodity characteristics, 466–467
 - cost of service, 463–464
 - distance, 464–465
 - level of service, 467
 - value of service, 464
 - weight of shipment, 466
- transportation service availability, 416
- transportation services, locational
 - determinants, 103
- transport equipment, 406–407
- trend, demand fluctuation, 212
- trucking industry, 418–420, 440
- Trucking Industry Regulatory Reform Act (1994), 458
- truckload (TL) carriers, 420, 466
- truckload carriers, satellite tracking, 444
- trunk lines, 427
- TV Gadgetry (TVG), 401
- two-bin model, 315
- two-dimensional (2D) barcodes, 396
- ## U
- uncertainty, 293–294
- understanding, 580
- United Express, 496
- United States
 - construction industry, 296
 - energy pipelines, 426–427
 - population by age and gender, 34–36
 - railroads, 421
 - trading partners, 37, 38, 39
 - water transportation, 424
- unit load formation equipment, 407–408, 408
- unit size, distribution facility, 384
- unit trains, 422
- unmanned autonomous vehicles (UAVs), 411
- UPS, 63–64
- urbanization, and population growth, 32.33
- usability, information, 543
- U.S. Coast Guard, 43
- U.S. Customs and Border Protection (CBP) Agency, 44
- U.S. Customs 24-Hour Advance Vessel Manifest Rule, 444
- U.S. Customs Service, 44
- U.S. Department of Homeland Security, 44
- U.S. Department of Transportation (DOT), 460
- U.S. Oil Industry, 427
- utilities, 105
- ## V
- value
 - information, 544
 - of service pricing, 464, 464
 - as supply chain issue, 20
- value-based costs, 300
- value chain concept, 14
- value of service pricing, 464, 464
- variable-based costs, 300
- variable costs, 127
- velocity, information systems and, 546
- vendor-managed inventory (VMI), 304, 343–345
- vendor relationships, 473. See also relationships

vertical carousels, 409, 410
 vertical collaboration, 479
 vertical marketing systems (VMS), 119
 Vibrant Video (V-), 453
 Vintage Shoes Inc. (VSi), 567
 virtual mode of transportation, 431
 visibility of in-transit freight, 444
 VISTA (Vietnam, Indonesia, South Africa, Turkey and Argentina), 30, 36
 VMI. *See* vendor-managed inventory (VMI)
 VMS. *See* vertical marketing systems (VMS)

W

WACC. *See* weighted average cost of capital (WACC)
 War Eagle Golf Ltd. (WEGL), 203
 warehouse automation technology, 411
 Warehouse Education and Research Council (WERC), 503
 warehouse management system (WMS), 246, 393–395
 warehouse technology, 394–395
 warehousing. *See also* distribution contract, 380
 public, 380
 warehousing costs, 380
 Wash & Dry, Inc., 534
 wastes, Toyota production system, 179, 180
 water carriers, 424–426
 federal regulation of, 459
 Webers, Inc., 283
 weighted average cost of capital (WACC), 299
 weighted moving average, 216–218
 weight of shipment, 466

WMS. *See* warehouse management system (WMS)
 workcenter, 190
 working capital, 537
 work-in-process (WIP) inventory, 294–295, 294–296
 World Trade Organization (WTO), 39, 40
 WTO. *See* World Trade Organization (WTO)

X

XML. *See* extensible markup language (XML)

Z

Zappos, 591
 zone rate, 464
 zones, 117

Name Index

Note: *Italicized page numbers indicate illustrations or boxes text.*

A

ABC Power Tools, 294,300,301, 302
Accenture, 208, 277, 580
Airbnb, 9, 160, 587
Albertson's, 6, 540, 541
Alibaba, 92, 155, 472,587,599
Alligator, Inc., 162
Amazon.com, 6, 36, 54, 57, 58, 92, 96,
175,207,275,368,378,385,399,403,
416,472,485,557,565,579,591,592,
593,599
American Express, 424, 592
American Trucking Associations, 586
Anderson, David L., 571,572, 576
APM-Maersk, 425
Apple, 41, 42, 173,174,182,589,592
Ashe, Neil, 119
AT&T, 96
AT&T/Bell, 12

B

Bardi, Ed, 498
Bardi, Edward J., 113, 115, 134, 135,
379, 381, 464, 500, 513, 518, 520,
521, 522, 523, 524, 525,526,527,
529,530
Barnes & Noble, 159
Baseball Card Emporium (BBE), 354
BASE, 152
Bass Pro Shops, 232
Beierlein, Jean, 47, 81, 281
Berkshire Hathaway, 592
Berman, Jeff, 206, 289
Best Buy Co., 6, 592
Bethlehem Steel, 6
Bezos, Jeff, 368
Big Orange, 347
Bigelow stores, 133
Bing, 9
BlackBerry, 40
Blackwell, Kristina, 207
Blackwell, Roger D., 207
Blockbuster, 40, 592
BluJay Solutions, 40
BMW, 105,172
Bob's Custom BBQs, 455
Bobby Hilfiger, 164

Boeing, 340
The Boston Beer Company, 52
Boykin, Thomas D., 581
Boyst, William M., 335
Bowersox, Donald J., 607
Britt, Frank E., 571,572
Brooks, Mike, 232
Brzoznowski, Ioby, 220
Buffalo, 52, 112, 135
Bumble Bee Foods, 540, 541
Bursa, Karen, 220
Bushnell, 220
Burnson, Patrick, 104
Byline Industries, 281

C

Cabela's, 232
Calvin Klein, 484, 574
Camelbak, 220
Carr, Jeff, 496
Carrefour, 551
Cass Information Systems, 485
Catella, Vic, 565
Caterpillar, 182, 275, 485
CEVA Logistics, 484
Chainalytics, 159
Cheml.ogix, 159
Chipotle, 175
C.H. Robinson, 486
CLGN Book Distributors.com, 498, 513,
517,519
Closs, David J., 604
CMA CGM Group, 425
Coca-Cola, Inc., 152, 162, 193
Colgate-Palmolive, 545
College-Industry Council of Material
Handling Education, 405
Columbus, 342
Convermex, 482
Converse, 67
Cooper, M. Bixby, 176
COSCO Group, 425
Costco, 6
Costello, Bob, 207, 288, 586
Council of Supply Chain Management
Professionals, 54
Cox, Sharon, 498, 500

Coyle, John J., 5, 11, 25, 28, 35,315,317,
318, 320, 321, 322, 324, 329, 330, 331,
337, 338, 339, 346, 347, 356, 359, 364,
365, 458, 463
Coyote's, 64
CPG company, 140
Craftsman Tools, 275
Craig, Kenny, 354
Craigslis, 160
CTS!-Global, 485
CVS Health Corporation, 6

D

Dai-Tile's, 481
Dean, Olivia, 198
Deily, Karl, 193
Dell, 56, 180, 210, 250, 251, 313, 340,
343,571
Delta Airlines, 159, 424, 556, 581
Deming, W. Edwards, 149
DHL, 41, 54, 103, 484, 486
Dick's Sporting Goods, 232
Dicq, H. Ford, 345
DKNY Jeans, 571
Dollar General, 92
Domino's, 188
DSC Logistics, 484
DSV, 486
Durango, 232
Durtsche, D. A. 501, 504, 507

E

Easton Sports, 275
eBay, 160
Egan, Paul, 428
EJ Footwear, 232
Emmdhainz, Margaret A., 476
Exel/DHL, 484
Evergreen Line, 425
Expedia, 160
Expeditors, 486

F

Favre, Donavon, 156, 572, 573, 574, 576
Favre, Donavon J., 571, 572
Feather, Dave, 496

Federa ■ Motor Carrier Safety
Administration (FMCSA), 460
FedEx, 41, 54, 63, 64, 92, 97, 103, 246,
257, 275, 403, 420, 424, 431, 442, 465,
467, 543, 584
FedEx Supply Chain, 484
Fernandez, Ted, 210
The Ferrero Group, 482
Ferry, Korn, 585, 587
Fishbay, Lauren, 498, 500, 519
Fisher, Jeff, 47
Forbes.com, 106
ford, 105, 177
Ford, Henry, 592, 593
Fremont factory, 172
Frisco, 481
Frito-Lay, 125

G

Gander Mountain, 232
Gardner, John T, 476
Gartner, 160, 448, 545, 549, 554, 561,
571, 580
Gauthier, Arnaud, 551
GENCO, 275
General Electric (GE) Company, 6, 183,
345
General Motors, 177
GenPro, 488
GEO DIS, 484
Ghadar, Fariborz, 35
Gibson, Brian J., 174, 189, 370, 371, 372,
376, 377, 381, 383, 387, 391, 392, 415,
430, 431, 436, 443, 445, 447, 458, 463,
478, 540, 542, 548, 550, 562
Gingher, Nick, 354
Girl Scout Cookies, 52
The Global Shippers Forum, 506
Goentzel, Jarrod, 517
Goh, Brenda, 172
Golob, John, 489
Google, 9, 58, 578, 579
Green Sheep Water, 193
Grenoble, Skip, 81
Grocery Manufacturers Association
(GMA), 14

H

The Hackett Group, Inc., 104, 140, 210
Hadley, Arthur Twining, 465
Hallmark, 442
Hammer, Michael, 478
H&B, 164
H&M group, 590

Hapag-Lloyd, 425
Haslam, Bill, 92
Hershey, 291, 296, 482
Hibben Sports, 553
The Home Depot, 6, 9, 131, 301,
379, 575
Honda, 41, 177, 181, 543
Hub Group, 486
Hudson Guitars, 201
Hudson, Saul, 201
Hudson's Bay, 574
Hyundai, 177
Hyundai M.M., 425

IBM, 6, 41, 159, 561, 577, 579, 583, 592

IBM Food Trust, 540

IBM Global Business Services, 485

Incoterms, 433, 434

Inditex, 545

Inflate-a-Dome Innovations (ID!), 565

Infosys, 485

Ingersoll-Rand, 275

Institute for Supply Management (ISM),
140

Intermarche, 551

International Chamber of Commerce,
433

International Maritime Organization's,
426

Jacobs and Chase, 190

Jaggaer, 159

J. B. Hunt, 435

J.C. Penny Inc., 6, 592

JD.com, 54, 118, 155

)DA, 159, 541

Jensen, Bryan, 124

Johnson & Johnson, 152

Jones, Gail, 229

Jordano, Luigi, 79

Jordana, Mario, 79

Jordana Foods, 79

K

Keebler, J. S., 501, 504, 507

Keith, Stephanie, 428

Kelly, Pat, 565

Kelmach, Gary, 309-310

Kenco, 543

Kia, 177

Kimberly-Clark, 4, 40, 41, 56

Kmart, 6, 9

Knight-Swift Transportation, 435

Kodak, 40, 592

Komatsu, 55

Koster, 232

Kraft, 4

Kroger, 6, 9, 375, 442

Kuehne & Nagel, 486

L

Lambert, Douglas M., 249, 252, 299, 476

Landry, Troy, 281

Langabeer, Jim R., II, 209

Langley, C. John, Jr., 98, 99, 102, 121, 141,
142, 143, 144, 145, 148, 149, 154, 155,
156, 157, 166, 167, 303, 304, 305, 325,
326, 327, 485, 472, 474, 475, 476, 478,
480, 483, 486, 487, 489, 490, 491, 570,
582, 583, 586, 587, 594, 595

Larking, Dylan, 401

L Brands (Limited, Inc.), 153

Lear Corporation, 105

Ledyard, D. M., 501, 507

Lehigh, 232

Leonard, Matt, 551, 581

Leong, Keong G., 184

Li & Fung Limited, 484, 574

LLamasoft's, 220

Logility Voyager Solutions, 220

Lopez, Edwin, 92

Lowe's, 6, 301

Lutjann, Michael, 488

Lyft, 160

Lynch, Eric, 47

M

Macy's, 556

Manhattan Associates, 159

Manrodt, K., 503

Manrodt, K. B., 501, 504, 507

MAQ Corporation, 353

Mars Petcare, 92

Martignetti Companies, 309-310

Martin, Nick, 281

Maxwell, John C., 5

McCrea, Bridget, 310, 333

McDavis, Connor, 401

McDonald's, 6, 9, 41, 152, 175

McGrath, Rita Gunther, 593

McKinsy, 517

Michel, Roberto, 220

Michelin, 232

Modolo, Kate, 556

Molson Coors, 140

Monster Energy, 179
 Montezuma, Johnatas, 434
 Moody's, 147
 MTS products, 179
 Mundy, Ray A., 478

N

NCAA licensing group, 565
 Neovia, Inc., 485
 Nestle, 545
 New Holland, 275
 Nike, 8, 49, 177, 484, 585, 592
 Nissan North America, 92
 Nordstrom, 591
 Nord Stream 2 pipeline, 428
 Norek, Christopher D., 156
 Novack, Robert A., 120, 122, 123, 125,
 126, 127, 213, 217, 219, 233, 235, 236,
 238, 239, 240, 242, 243, 253, 262, 264,
 265, 266, 267, 268, 273, 294, 295, 301,
 302, 307, 308, 309, 312, 345, 348, 350,
 458, 463, 509, 510, 514, 515, 516
 NTE, 160

O

Ocean Spray, 481
 O'Connor, Jim, 104
 Odyssey Logistics, 485
 Office Depot, 159, 368, 375
 Ohno, Tai'ichi, 180
 ONE (Ocean Network Express), 425
 Oracle, 159, 541
 Orlicky, Joseph, 336
 Osborne, James, 428
 Otto, 551
 Overbaugh, Ian, 227

P

Pain Away Corporation (PAC), 399
 Panama Canal Authority, 429
 Pareto, Vilfredo, 346
 Pearl, Hutch, 203
 Pearson, Mark, 277
 Penske Logistics, 435, 484, 485
 PepsiCo, /93, 434, 545
 Perry, Christy, 562
 Peterson, Erik, 35
 Pfizer, 556
 PIL (Pacific Int. Line), 425
 Playtime, Inc., 229
 Polaroid, 40, 592
 Porter, Michael, 15, 142
 Porter's, 153

Pro Keels, 67
 Procter & Gamble (P&G), 4, 41, 271, 272,
 482, 588
 Prose.com, 187
 Puma shoes, 67
 Purdum, Sue, 4, 498, 500
 PVH Corporation, 484

Q

Qualcomm, 96
 Quik Chips (QC), 494
 Quinn, Frank, 571

R

Randall, Tom, 172
 Raper, Charles Lee, 465
 Raytheon, 140
 RCA, 6
 Red Cross and Food Banks, 52
 Red Fish-Blue Fish, 47
 Rice, James B. Jr., 517
 Richards, Gwynne, 388
 Rocky, 232
 Russell, Stephen H., 55
 Rutkowski, Gail, 440
 Ryder Supply Chain Solutions, 435, 484

S

SAB Distribution, 4, 9
 Saddle Creek Corporation, 484
 Saenz, Norm, 333
 Safeway, 6
 SAILS: Strategic Analysis of Integrated
 Logistics Systems, 108
 Salesforce.com, 578
 Sam's Club, 292
 Samsung, 173
 SAS Viya, 551
 Schneider Logistics, 484
 Schneider-BidSmarl, /59
 Sealed Air, /93
 Sears Roebuck & Company, 6
 Sears, 6, 9, 592
 Semerod, Mary, 353
 Senco Electronics Company (Senco), 81
 Shannon, Tracie, 79, 498, 500
 Sharma, Ruchir, 35
 Shatzman, Celia, 187
 Sills, Chris, 281
 Simon, Mike, 488
 Smith, Adam, 29
 Smith, Fred, 584
 Smith, Jennifer, 52

Smith, Larry, 224
 Sobey's, 375
 Southwest Airlines, 175
 Spartan Stores, 133
 Spear, Chris, 207
 Speer, Jeff, 565
 Sprint, 12
 St. Louis, 112
 SI. Onge Co., 124, 333
 Staples Advantage, 140
 Starbucks, 584
 Starky, Colleen, 535
 Stenger, A. J., 342, 343
 Stiles, Peter M., 414
 Stock, James R., 249, 299
 Subway, 175
 Sumner, Gordon, 399
 Supply Chain Management Review, 562
 Suzuki, Yoshinori, 458
 Swan, Pete, 4
 Sysco, 434

T

Tang, Tony, 164
 Tan, Keah-Choon, 184
 Target, 6, 9, 124, 207, 556, 574
 Taylor, Chucky, 567
 Telco Corporation (Telco), 281
 Terry, Lisa, 481, 482
 Tesla Gigafactory, 3, 172
 Tesla.com, 173, 187
 Tesla Motors, /18
 Texas factory, 455
 Thomas, Jim, 229
 ThomasNet, 159-160
 Thompson, Bruce, 203
 Tillman, J., 503
 Tires for You, Inc. (TFY), 227
 Tommy Hilfiger, 484, 574
 Toyota, 41, 177, 333, 334
 Tractor Supply, 92, 232
 Trans-Changi, Inc., 164
 Transplace, Inc., 481, 485
 Transact Technologies, 485
 Trebilcock, Bob, 140, 232
 Tropicana, 481
 Tupperware, 482
 TV Gadgetry (TVG), 401

U

Uber, 9, 160, 587, 592, 593
 Undandy.com, 187
 Unilever, 4
 United Express, 424, 496