Five major forces are driving changes in logistics and supply chain management:
- Globalization
- Technology
- Organizational consolidation
- The empowered consumer
- Government policy and regulatory reform

Chapter 1: Supply Chain Management: An Overview

Development of the Supply Chain Concept

- Started in the 1960s, with the development of the physical distribution concept for finished goods
- During the 1980s, the integrated logistics management concept developed
- The total cost concept is important in logistics management
- Supply chain management can be viewed as a pipeline for the efficient and effective flow of products/materials, services, information, and funds

A View of Business Logistics in a Company

Nike Supply Chain

US Logistics Cost as % of GDP

Index of Logistics Costs as a Percent of GDP 1988 - 2008
US Logistics Cost Fell to 7.7% of GDP in 2009

Major Supply Chain Issues

- Technology Application
  - Challenge is to select and implement technology successfully
- Logistics Management
  - Getting the right product, to the right customer, in the right quantity, right condition, at the right place, right time, and the right cost
- Supply Chain Security
  - Important concern since 9/11 terrorist attack

Optimizing the Supply Chain

Chapter 2: Role of Logistics in Supply Chains

Logistics Definitions

- By Customer:
  - Getting the right product, to the right customer, in the right quantity, right condition, at the right place, right time, and the right cost
- Council of Supply Chain Management
  - The art and science of management, engineering, and technical activities concerned with requirements, design, and supplying and maintaining resources to support objectives, plans, and operations

Four Subdivisions of Logistics

- Business logistics:
  - That part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, service, and related information from point of use or consumption in order to meet customer requirements.
- Military logistics:
  - The design and integration of all aspects of support for the operational capability of the military forces (deployed or in garrison) and their equipment to ensure readiness, reliability, and efficiency.
- Event logistics:
  - The network of activities, facilities, and personnel required to organize, schedule, and deploy the resources for an event to take place and to efficiently withdraw after the event.
- Service logistics:
  - The acquisition, scheduling, and management of the facilities/assets, personnel, and materials to support and sustain a service operation or business.
List of Logistics Activities

- Transportation
- Warehousing and storage
- Industrial packaging
- Materials handling
- Inventory control
- Order fulfillment
- Demand forecasting
- Production planning/scheduling
- Procurement
- Customer service
- Facility location
- Return goods handling
- Parts and service support
- Salvage and scrap disposal

The impact of logistics upon Return on Assets (ROA) is large

- ROA is defined as follows:
  - $ROA = \frac{Revenue - Expenses}{Assets}$
  - $ROA = \frac{Gross\ Profit}{Assets}$

Good logistics practice increases Gross Profit and reduces Assets required to sustain the business. It leads to dramatic improvement in ROA.

Importance of Spatial Relationships in Logistics:

Spatial Relationships are extremely important in logistics.

The location of manufacturing, service and warehousing facilities in the supply chain with respect to demand and supply points strongly impacts the total supply chain cost.

Logistics and Spatial Relations

$PC = Production\ Cost, \ M = Market$

<table>
<thead>
<tr>
<th>PC</th>
<th>Production Cost, M = Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>$8.50$</td>
<td>$3.50$</td>
</tr>
</tbody>
</table>

Total Cost $10.55$  
Total Cost $11.85$

Important to adopt total cost perspective. Lower $7.00$ production cost at B is offset by higher inbound and outbound transportation cost.

Table 2-3: Analysis of Total Logistics Cost with a Change to a Higher Cost Mode of Transport

<table>
<thead>
<tr>
<th>Cost Centers</th>
<th>Rail</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>$3.00$</td>
<td>$4.20$</td>
</tr>
<tr>
<td>Inventory</td>
<td>$5.00$</td>
<td>$3.75$</td>
</tr>
<tr>
<td>Packaging</td>
<td>$4.50$</td>
<td>$3.20$</td>
</tr>
<tr>
<td>Warehousing</td>
<td>$1.50$</td>
<td>$0.75$</td>
</tr>
<tr>
<td>Cost of fuel</td>
<td>$2.00$</td>
<td>$1.00$</td>
</tr>
</tbody>
</table>
| Total cost   | $15.00$ | $13.70$*

*Costs per unit.

Table 2-4: Analysis of Total Logistics Cost with a Change to More Warehouses

<table>
<thead>
<tr>
<th>Cost Centers</th>
<th>System 1 Three Warehouses</th>
<th>System 2 Five Warehouses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>$850,000$</td>
<td>$550,000$</td>
</tr>
<tr>
<td>Inventory</td>
<td>$1,500,000$</td>
<td>$2,000,000$</td>
</tr>
<tr>
<td>Warehousing</td>
<td>$600,000$</td>
<td>$1,000,000$</td>
</tr>
<tr>
<td>Cost of fuel</td>
<td>$350,000$</td>
<td>$100,000$</td>
</tr>
<tr>
<td>Total cost</td>
<td>$3,360,000$</td>
<td>$3,600,000$</td>
</tr>
</tbody>
</table>

*Expected cost based upon probabilities of not having stock/inventory available when customers want it.
Chapter 3 Global Dimensions of Supply Chains

- The ability to connect companies across the globe and to link computer systems on a 24/7 basis enables collaboration horizontally and vertically in supply chains.
- Countries and companies can improve their “wealth” by specialization of tasks.
- Logistics help extend the market area of countries and companies through improved efficiency to lower the “landed cost” in new market areas.

Global Markets and Strategy

- The global business environment has become much more conducive to business activity between countries.
- Success in the global markets requires a cohesive strategy, including product development, technology, marketing, manufacturing, and supply chains.
- Global markets have four important characteristics:
  - Standardization reduces complexity
  - Global competition reduces the product life cycle
  - Organizational structures and business models frequently change
  - Globalization introduces more volatility

Supply Chain Security: A Key Focus after 9/11

- A delicate balance exists between security and the efficient flow of global commerce.
- “Trusted Partner” is a cooperative effort to secure the global supply chain and lessen impediment to legitimate cargo movement.

Global Transportation Options

Ocean

- The most common global shipment method, accounting for two-thirds of all international movements.
- Low rates and able to transport a wide variety of products and shipment size

Air

- Fast, reliable transit times
- High rates and significant restrictions on the type of cargo that can be transported

Motor

- Most common form of land transport
- Plays a large role in pick up and delivery of intermodal shipments

Rail

- Efficient in long distance land transport
- Multimodal shipments are growing globally
- Increasing use of double-stacked container trains

Strategic Channel Intermediaries

Freight Forwarders

- Supplies international transport expertise to shippers
- Consolidate small shipments into larger size lots

Non-Vessel-Operating Common Carriers

- Commits large cargo volume to ocean carriers for favorable rates
- Derives income from spread between retail rates and wholesale cost

Customs Brokers

- Oversee the movement of goods through customs and ensure that the documentation accompanying a shipment is complete and accurate for entry into the country
Storage Facilities

- Transit warehouses provide temporary storage while the goods await the next segment of the journey.
- Hold-on-dock storage are free storage provided by ocean carriers until the vessel’s departure date.
- Public warehouses are used for extended storage.
- Bonded warehouses operate under the customs agency’s supervision. Imported goods entered bonded warehouse with no payment of duties while they are in storage.

Packaging

- Export shipments moving by ocean transportation require more stringent packaging than domestic shipments.
- The shipper will find settling liability claims for damage to import/export goods very difficult. Usually, the freight handling involves many firms, and these firms are located in different countries, with different laws.

Border Management

- Complex border management process is a major impediment to international trade.
- Long and unpredictable border crossing time substantially increase supply chain cost.
- Difficult border crossing process lessen a country’s potential to be part of the global value chain.
- Difficult border crossing process also reduce the country’s attractiveness as a transit country.
- All developed countries have “trade friendly” border management practices.

Chapter 4 Supply Chain Relationships

Types of Relationships

- Vertical: The traditional linkages between firms in the supply chain such as retailers, distributors, manufacturers, and raw materials suppliers.
- Horizontal: Business arrangements between firms that occupy “parallel” positions in the supply chain (e.g., two ocean carriers that share ship capacity).
- Full Collaboration: Business arrangements between firms that occupy both vertical and parallel positions in the supply chain (e.g., consortium of carriers and shippers working to reduce empty truck movement).

Range of supply chain relationships

- Transactional: Both parties are at “arm’s length”, with limited commitment.
- Collaborative: Two or more business organizations cooperate to drive better long term combined results.
- Strategic: Represents deep and long term commitments among supply chain partners. Firms willingly modify their business objectives and practices to help achieve shared long-term goals and objectives.

Relationship Perspectives

[Diagram showing relationship perspectives: Transactional, Arm’s Length, Collaborative, Strategic, Strategic Alliance, Vendor, Partner, Relational]
Regardless of form, relationships may differ in numerous ways:
- Duration
- Obligations
- Expectations
- Interaction/Communication
- Cooperation
- Planning
- Goals
- Performance analysis
- Benefits and burdens

Drivers
defined as “compelling reasons to partner”; all parties “must believe that they will receive significant benefits in one or more areas and that these benefits would not be possible without a partnership”

Facilitators
defined as “supportive corporate environmental factors that enhance partnership growth and development”; they are the factors that, if present, can help to ensure the success of the relationship

Collaboration:
- Collaboration occurs when companies work together for mutual benefit.
- Companies leverage each other on an operational basis and creates a synergistic business environment in which the sum of the parts is greater than the whole.

Seven Immutable Laws of Collaborative Logistics
- Collaborative Logistics Networks Must Support:
  - Real and recognized benefits to all members
  - Dynamic creation, measurement, and evolution of collaborative partnerships
  - Flexibility and security
  - Collaboration across all stages of business process integration
  - Open integration with other services
  - Collaboration around essential logistics flows
**Definition of 3PL (Third-Party Logistics)**

- A third-party-logistics firm is an external supplier that performs all or part of a company's logistics functions.
- Multiple logistics activities are managed together to provide logistics/supply chain solutions.

**Types of 3PL Providers**

- Transportation-based
- Warehouse/distribution-based
- Forwarder-based
- Shipper/management-based
- Financial-based
- Information-based firms

**US 3PL Market Growth ($Billion)**

*Third Party Logistics*

- Revenue up almost 4.9 percent in 2008, began to moderate in 4th quarter
- Revenue has declined 6.7 percent in the first quarter 2009
- International transportation management is down 14.6%
- Domestic transportation management is down 10.9%
- Value-added warehousing & distribution is down 4.3%
- Dedicated contract carriage is down 11.9%
- Modest growth in the 3 – 4 percent range for 2009

**Table 4-4** Balancing Logistics Services

<table>
<thead>
<tr>
<th>Service Description</th>
<th>North America</th>
<th>Europe</th>
<th>Asia-Pacific</th>
<th>Latin America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>94%</td>
<td>96%</td>
<td>94%</td>
<td>96%</td>
</tr>
<tr>
<td>Warehousing</td>
<td>74%</td>
<td>94%</td>
<td>94%</td>
<td>96%</td>
</tr>
<tr>
<td>Customs Clearance and Brokerage</td>
<td>78%</td>
<td>94%</td>
<td>94%</td>
<td>96%</td>
</tr>
<tr>
<td>Forwarding</td>
<td>76%</td>
<td>94%</td>
<td>94%</td>
<td>96%</td>
</tr>
<tr>
<td>Freight forwarder and Payment</td>
<td>56%</td>
<td>24%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Brokerage and Consultation</td>
<td>75%</td>
<td>84%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Tariffs, Tariff Analysis</td>
<td>23%</td>
<td>24%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>International Consulting Services Provided by 3PLs</td>
<td>24%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Documentation, Promotions, and PR</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Value Management</td>
<td>14%</td>
<td>24%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>IT/AVM</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Customer Service</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
</tr>
</tbody>
</table>

*Source: Deloitte Consulting, 2009 Study, George H. Hay and Associates, Ltd, forecasts & permission*

**Table 4-7** Expectations Relative to 3PL Relationship Management

<table>
<thead>
<tr>
<th>Customers' Expectations of 3PL Providers</th>
<th>3PL Providers' Expectations of Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support service and consultation</td>
<td>Mutually beneficial, long-term relationship with company</td>
</tr>
<tr>
<td>Trust, openness, and information sharing</td>
<td>Trust, openness, and information sharing</td>
</tr>
<tr>
<td>Solution innovation and relationship development</td>
<td>Delegating resources at the right levels, including wholistic</td>
</tr>
<tr>
<td>Ongoing executive-level support</td>
<td>Clearly defined service-level agreements</td>
</tr>
<tr>
<td>Services offering aligned with customer strategy and deep industry knowledge</td>
<td>Industry responsibility and overall fairness relative to pricing</td>
</tr>
</tbody>
</table>

**Table 4-8** Average Customer Results from Use of 3rd-Party Logistics Providers

<table>
<thead>
<tr>
<th>Customer</th>
<th>North America</th>
<th>Western Europe</th>
<th>Asia Pacific</th>
<th>Latin America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logistics cost reduction (%)</td>
<td>10%</td>
<td>11%</td>
<td>14%</td>
<td>12%</td>
</tr>
<tr>
<td>Fixed logistics cost reduction (%)</td>
<td>10%</td>
<td>11%</td>
<td>14%</td>
<td>12%</td>
</tr>
<tr>
<td>Average order cycle time change (days)</td>
<td>Faster 1.00 to 1.64</td>
<td>Faster 1.01 to 1.65</td>
<td>Faster 1.06 to 1.60</td>
<td>Faster 1.09 to 1.60</td>
</tr>
<tr>
<td>Service level improvement percent (%)</td>
<td>62%</td>
<td>63%</td>
<td>64%</td>
<td>75%</td>
</tr>
</tbody>
</table>

*Source: 2009 Deloitte Consulting Study, George H. Hay and Associates, Ltd, forecasts & permission*
Chapter 5: Supply Chain Performance Measurement and Financial Analysis

Questions about supply chain performance metrics:

- Is it quantitative?
- Is it easy to understand?
- Does it encourage appropriate behavior?
- Is the metric visible?
- Does it encompass both outputs & inputs?
- Does it measure only what is important?
- Is it multidimensional?
- Does it facilitate trust?

Supply Chain Performance Metrics commonly used:

- On-time delivery 90%
- Quality of goods/services 83%
- Service capability/performance 69%
- Price competitiveness 55%
- Compliance with contract terms 51%
- Responsiveness 50%
- Lead time 44%
- Technical capability 34%
- Environmental, health, and safety performance 30%
- Innovation 29%

Supply Chain Performance Metrics

- Successful supply chain performance measurement relies on appropriate metrics that capture the entire essence of the supply chain process.
- Cost has long been recognized as an important metric for determining efficiency.
- The focus on minimizing total supply chain cost requires measuring the cost tradeoffs when making changes to the configuration of the supply chain.

Developing Supply Chain Performance Metrics

- The development of performance metrics program should be a team effort.
- Involve customers and suppliers, where appropriate, in the metrics development process.
- Develop a tiered structure for the metrics.
- Identify metric "owners" and tie metric goal achievement to an individual’s or division’s performance evaluation.
- Establish procedure to mitigate conflicts arising from metric development and implementation.
- Secure top management support for supply chain metrics development.
The Supply Chain–Finance Connection

- Supply chain performance has high impact on financial performance.
- Logistics service affects sales/marketing and corporate profitability.
- Financing inventory affects the amount of capital required to fund the business.

The Supply Chain Financial Impact

- Supply chain plays a critical role in determining the level of profitability.
- A major objective for any corporation is to produce a satisfactory return for stockholders.
- Corporate financial efficiency is judged by the profit it generates in relationship to the assets utilized, or its return on assets (ROA).

Supply Chain Service Financial Implications

- The results of supply chain service failures are:
  - Costs to correct problems
  - Cost of lost sales
- When service failures occur, some customers experiencing the service failure will request that the orders be corrected and others will refuse the orders.
- The refused orders represent lost sales revenue that must be deducted from total sales.
- For the rectified orders, the customers might request an invoice deduction to compensate them for any inconvenience or added costs.
- Some customers may switch their purchase to competitors permanently and never return. The cost of lost sales can be high when this happens.

Chapter 6 Supply Chain Technology—Managing Information Flows

Information Technology and Supply Chains

- Information, along with materials and money, must readily flow across the supply chain to enable the planning, execution, and evaluation of key functions.
- Each participant in the supply chain needs relevant information to make effective forecasts and operational decisions.
- Existing supply chain information technologies support timely, cost-efficient sharing of information between suppliers, manufacturers, intermediaries, logistics service providers, and customers.
The Need for Information

- Information is the lifeline of business, driving effective decisions and actions. It is especially critical to supply chain managers because their direct line of sight to supply chain processes is very limited.
- A wide variety of information is needed for a supply chain to perform as anticipated.
- The seven R's - right customer, right place, right time, right quantity, right quality, right condition, right price
- Information must be accessible, relevant, accurate, timely, and transferable.

Six Drivers of Supply Chain Excellence

1. Connectivity
2. Visibility
3. Collaboration
4. Optimization
5. Execution
6. Speed

10 Golden Rules for Success

- Secure the commitment of senior management.
- Remember that it is not just an information technology project.
- Align the project with business goals.
- Understand the software capabilities.
- Select partners carefully.
- Follow a proven implementation methodology.
- Take a step-by-step approach for incremental value gains.
- Be prepared to change business processes.
- Keep end users informed and involved.
- Measure success with key performance indicators (KPIs).

Data Collection and Synchronization

- Data must be collected and synchronized so that it can be used by skilled individuals in the planning and execution of supply chain processes.
- Data collection of relevant information is needed at every point in the supply chain.
- Data synchronization focuses on the timely and accurate updating of item information within and across enterprises.
- Functional expertise in each organization will be enhanced by access to the synchronized data.

Supply Chain Execution

- Supply chain execution tools and suites carry out key tasks from the time an order is placed until it is fulfilled. This order-driven category of software focuses on the day-to-day activities required to buy, make, and deliver the materials that flow through the supply chain.

Supply Chain Event Management

- Supply chain event management tools collect data in real time from multiple sources across the supply chain and convert them into information that gives business managers a clear picture of how their supply chain is performing.
**Enterprise Resource Planning (ERP)**

- ERP systems are multimodule application software platforms that help organizations manage the important parts of their businesses.

- ERP systems branch out to include supplier relationship management, customer relationship management, and other supply chain components, the connections between SCIS and ERP grow stronger.

- ERP system provides a mechanism for supply chain members to efficiently share information

**Related Tools**

- Supply chain collaboration tools help users integrate their information technology systems with those of trading partners to streamline and automate supply chain processes.

- Data synchronization applications provide a platform for manufacturers, distributors, and retailers to aggregate and organize item-related data.

- Spreadsheets and database software provides managers with handy, portable tools for gathering, consolidating, and analyzing supply chain data.

---

**Table 6-1**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Do What Activities Are Required for Supply Chain Management?</th>
<th>Where Can This Be Done?</th>
<th>How Can This Be Done?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orders</td>
<td>• Customer satisfaction, build brand and image products</td>
<td>• Late delivery or nonconformance of in-stock items</td>
<td>• Choose alternative transportation models or alternative suppliers</td>
</tr>
<tr>
<td>Shipments</td>
<td>• Order shipments • Complete pick-up</td>
<td>• Late arrival of shipment • Process pick-up schedules</td>
<td>• Verify order information • Choose alternative carriers or alternative method of transportation</td>
</tr>
<tr>
<td>Inventory</td>
<td>• Stock levels and order points • Safety stock levels</td>
<td>• Stock-out • Inventory level ramp-ups</td>
<td>• Determine alternative suppliers in inventory • Information about inventory levels</td>
</tr>
<tr>
<td>Material</td>
<td>• WIP/FAI by family • Delivered production • MRP by group</td>
<td>• Late delivery • Nonconformance of raw material</td>
<td>• Choose alternative manufacturing solution • Focus WIP into test groups</td>
</tr>
<tr>
<td>Financial</td>
<td>• Order to cash cycle time • Net working capital</td>
<td>• Late payments • Late capital cost</td>
<td>• Review capital needs • Review capital pricing</td>
</tr>
</tbody>
</table>

**Figure 6-7**

Source: Manhattan Associates, Inc.

---

**Software Options**

- Commercial software

- In-house solutions
  - choose between single vendor suites, applications from multiple vendors, consider licensing versus on-demand purchases

- Solutions Packages
  - determine what types of applications are needed and how they should be purchased

**Purchase Options**

- Software vendors
  - installed on the buyer’s powerful client-server systems
  - downside is high capital investment and complex deployment associated with conventional licensed applications

- Application Service Providers
  - ASP owns and operates the software application and its servers that run the application with access via the Internet.
Data Standardization

- Coordinating and sharing information across the supply chain can be a significant challenge.
- EDI provides interorganizational, computer-to-computer exchange of structured information in a standard, machine-processable format.
- XML is a robust, logically verifiable text format based on international standards. It provides a flexible way to create structured, common information formats and share both the format and the data via the Internet, intranets, and other networks.

Asking the Right Questions

- Who will lead our implementation effort?
- How will technology support our business needs and processes?
- What is the status of our existing data?
- How well does our existing system integrate with suppliers and customers?
- What external issues must our systems address?

Radio-Frequency Identification (RFID)

- RFID is an automatic identification method. RFID tags consist of a microchip and a printed antenna that can be packaged into many forms, such as a label, or imbedded in between the cardboard layers in a carton or product packaging.
- Unique product identification information, in the form of a universal electronic product code (EPC) identifying the manufacturer, product category, and individual item, is stored on these 96-bit tags.
- RFID technology costs must continue to decline to make product tagging economically feasible; equipment issues such as reader range, sensitivity, and durability must improve; the case for supplier return on investment of RFID mandates must be made; and consumer privacy issues must be resolved.

Adaptive Supply Chain Networks (ASCN)

- These integrated, flexible networks of companies, technology tools, and processes focus on customers and their changing requirements. An effective ASCN can sense and respond to changes in real time, allowing the network to prevent or minimize supply chain problems.
- ASCNs help meet the growing need for supply chain connectivity and collaboration. Connectivity provides visibility.
Chapter 7 Demand Management

Demand Management represents focused effort to estimate and manage customer demand.

- The goal is to enhance ability of supply chain participants to collaborate on the flow of product, services, information, and funds.
- Challenges in achieving this goal:
  - Lack of coordination
  - Too much emphasis on demand forecasts, with less attention on the collaborative efforts as well as strategic and operational plans

Table 7-1 New Demand Management Supports Business Strategy

<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>EXAMPLES OF HOW TO USE DEMAND MANAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth strategy</td>
<td>- Define &quot;net all&quot; scripts on site to identify clear goals how specific changes will result in increased demand.</td>
</tr>
<tr>
<td>- Analyze sales data to forecast changes in product price and market share.</td>
<td></td>
</tr>
<tr>
<td>- Build demand forecasts that are dependent on demand data.</td>
<td></td>
</tr>
<tr>
<td>Portfolio strategy</td>
<td>- Manage product lines in current environment to optimize H-time events during lifecycles.</td>
</tr>
<tr>
<td>- Select new product development that fits current demand rate.</td>
<td></td>
</tr>
<tr>
<td>- Assess combination of demand and trade to optimize &quot;next level&quot; demand for new products.</td>
<td></td>
</tr>
<tr>
<td>- Evaluate selection of product families through demand forecasting.</td>
<td></td>
</tr>
<tr>
<td>Positioning strategy</td>
<td>- Manage product sales through select channel based on demand and predicated scenarios.</td>
</tr>
<tr>
<td>- Manage positioning of product growth in appropriate distribution channels to reduce working capital, based on demand.</td>
<td></td>
</tr>
<tr>
<td>- Define optimal supply forecast for each channel.</td>
<td></td>
</tr>
<tr>
<td>Value-added strategy</td>
<td>- Monitor capital investments, including capacity planning, and return on investment based on demand for new production and existing stock.</td>
</tr>
<tr>
<td>- Determine whether to add manufacturing capacity.</td>
<td></td>
</tr>
</tbody>
</table>


Balancing Supply & Demand

- External balancing methods – change manner customs orders to balance supply & demand
  - Price
  - Lead time
- Internal balancing methods – utilize internal process to manage supply/demand gap
  - Production flexibility
  - Safety stock

Sales & Operations Planning (S&OP)

- Run initial sales forecast
- Demand planning – sales/marketing to review forecast and adjust for promotion & introduction of new products
- Supply planning – operations to review different options to match capacity to forecast
- Pre S&OP meeting – sales/marketing, operations, and finance work to solve capacity issues by balancing demand and supply; develop alternatives
- Executive S&OP meeting – top executives from various functional areas agree on forecast and convert that into operating plan

Collaborative Planning, Forecasting & Replenishment (CPFR)

1. Develop front end agreement
2. Create joint business plan
3. Create sales forecast
4. Identify exceptions for sales forecast
5. Resolve/collaborate on exception items
6. Create order forecast
7. Identify exceptions for order forecast
8. Resolve/collaborate on exception items
9. Order generation
Direct-to-Customer (DTC) Fulfillment

- General Advantages:
  - Low start-up costs
  - Workforce efficiency from consolidated operations

- General Disadvantages:
  - Order profile will change (store orders in case and/or pallet quantities, consumer orders in small "eaches" quantities)
  - "Fast pick," or broken case operation must be added to the distribution center
  - Conflict between store priorities and DTC order

Integrated Fulfillment

- Retailer maintains both store and DTC presence
- Operates one distribution network serving both channels
- Advantage:
  - low start-up costs
  - existing network can service both
- Disadvantages:
  - order profile will change with addition of DTC orders
  - would require a "fast pick," or broken case operation
  - conflict might arise between store order & DTC order

Dedicated Fulfillment

- Store and Internet fulfillment by two separate distribution networks
- Advantage:
  - separate distribution network for store delivery and direct consumer delivery eliminates most of the disadvantages of integrated fulfillment
- Disadvantage:
  - duplicate facilities and duplicate inventories

Outsourced Fulfillment

- Use an outside firm to perform fulfillment functions
- Advantages:
  - low start-up costs to service the Internet channel
  - possible transportation economies
- Disadvantage:
  - loss of control over service levels

Drop-Shipped Fulfillment or Direct Store Delivery

- Vendor delivers directly to retailer, bypassing retailer’s distribution network
- Works best for products that have a short shelf life
- Advantages:
  - reduction of inventory in the distribution network
  - vendor has direct control of its inventories
- Disadvantage:
  - possible reduction of inventory visibility
**Store Fulfillment**

*The order is placed through the Internet site and sent to the nearest store for customer pick up*

- **Advantages:**
  - short lead time to the customer
  - low start-up costs for the retailer
  - returns can be handled through the store
  - product availability in consumer units

- **Disadvantages:**
  - reduced control and consistency over order fill
  - conflict may arise between inventories
  - must have real-time visibility to in-store inventories
  - stores may lack sufficient space to store larger product volume

**Flow-Through Fulfillment**

*Product is picked and packed at distribution center, then sent to the store for pickup*

- **Advantages:**
  - eliminates the inventory conflict
  - avoids the cost of the “last mile”
  - returns can be handled through the existing store network

- **Disadvantage:**
  - storage space at the store may be insufficient

---

**Chapter 8 Order Management and Customer Service**

Order Management executes the operating plan based on demand forecast. It is the interface between buyers and sellers and consists of:

**Influencing the Order**

- This is the phase where an organization attempts to change the manner by which its customers place orders.

**Order Execution**

- This is how the organization handles the order received from the customer.

---

**Order Management**

**Example of Order to Cash Cycle**

1. Process inquiry & quote
2. Receive, enter & validate order
3. Reserve inventory & determine delivery date: Available-to-Deliver (ATD), Available-to-Promise (ATP)
4. Consolidate orders
5. Plan & build loads
6. Route shipments
7. Select carrier & calculate transportation cost
8. Receive product at warehouses (important for ATP orders)
9. Pick product
10. Load vehicle, generate shipping document, verify credit and ship
11. Receive & verify order at customer site
12. Install product
13. Invoice

**Product availability from customer perspective:**

- Did I get what I wanted?
- When I wanted it?
- In the quantity I wanted?

*Product availability is the ultimate measure of logistics and supply chain performance.*
Order Management

Expected Cost of Stockouts:
- Stockout occurs when desired quantities are not available
- Four possible events:
  - the buyer waits until the product is available
  - the buyer back-orders the product
  - the seller loses current revenue
  - the seller loses a buyer and its future revenue

Customer Service is the interface between logistics and marketing. It includes all activities that impact information flow, product flow, and cash flow between the organization and its customers.

- Philosophy - an organization-wide commitment to provide customer satisfaction through superior customer service.
- Performance - emphasizes customer service as specific performance measures and address strategic, tactical, and operational aspects of order management.
- Activity - treats customer service as a particular task that an organization must perform to satisfy a customer’s order requirements.

Customer Relationship Management (CRM):
- is the art and science of strategically positioning customers to improve profitability and enhance relationships
- used by service industries (airline/hotel reward programs)
- has not been widely used in B2B environment until the last decade
- customer action affects firm’s cost
  - how customers order
  - how much customers order
  - what customers order
  - when customers order

Customer Relationship Management (CRM):

- Protect Zone
  - Customers in the “Protect Zone” are the most profitable.

- Danger Zone
  - Customers in the “Danger Zone” are the least profitable and might generate loss.
  - The firm’s options for “Danger Zone” customers:
    - change customer interaction with firm so they can move up to an acceptable zone
    - change the customer the actual cost of doing business

- Build Zone
  - These customers have a low cost to serve and a low net sales value, so the firm should maintain the cost to serve and build net sales value to help drive the customer into the “Protect” segment.

Profitability as a method to classify customers

Four basic steps in the implementation of CRM

- Step 1: Segment the Customer Base by Profitability
- Step 2: Identify Proper Product/Service Package for Each Customer Segment
- Step 3: Develop and Execute the Best Processes
- Step 4: Measure Performance and Continuously Improve

Four basic steps in the implementation of CRM

Proper Product/Service Package for Each Customer Segment

<table>
<thead>
<tr>
<th>Table 8-1</th>
<th>Hypothetical Product/Service Offerings: Option A</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT/SERVICE OFFERING</td>
<td>CUSTOMER SEGMENT A</td>
</tr>
<tr>
<td>Product quality (% defects)</td>
<td>Less than 1%</td>
</tr>
<tr>
<td>Order fill</td>
<td>98%</td>
</tr>
<tr>
<td>Lead time</td>
<td>3 days</td>
</tr>
<tr>
<td>Delivery time</td>
<td>Within 1 hour of request</td>
</tr>
<tr>
<td>Payment terms</td>
<td>4/10 net 30</td>
</tr>
<tr>
<td>Customer service support</td>
<td>Dedicated rep</td>
</tr>
</tbody>
</table>
E-Commerce Order Management Process

- Traditional business model – “Buy, Make, Sell”
- E-Commerce business model – “Sell, Make, Buy” (Dell) can be compelling
  - Dell uses “price & lead time” to influence orders

Four distinct dimensions of customer service:

- **Time**
  - Cycle time
  - Safe delivery
  - Correct orders
- **Dependability**
  - More important than the absolute length of lead time
- **Communications**
  - Pre-transaction
  - Transaction
  - Post-transaction
- **Convenience**
  - Service level must be flexible

Order Management Influence on Customer Service

- Product availability – order fill rate
- Order cycle time – time between order & shipment arrival
- Logistics operations responsiveness – ability to meet special request and sudden changes
- Logistics systems information – ability to supply timely and accurate information
- Post-sale product support – ability to provide tech info, parts support & handle product return

Customer Service Performance Measures from buyer’s view

- Orders received on time
- Orders received complete
- Orders received damage free
- Orders filled accurately
- Orders billed accurately

Importance of Service Recovery in Customer Service

- No matter how well an organization tries to provide excellent service, mistakes will occur
- Recovery requires a firm to realize that mistakes will occur and have process in place to fix them
- Superior service recovery builds customer loyalty

Chapter 9 Managing Inventory in the Supply Chain

- Inventory is an asset on the balance sheet and inventory cost is an expense on the income statement.
- Inventories impacts return on asset (ROA)
- Inventory is important to sales and customer service
- Inventory is also important to sourcing and production
Inventory in US Economy

The U.S. Business Logistics System Cost is the Equivalent of 9.4 Percent of Current GDP in 2008

<table>
<thead>
<tr>
<th>Carrying Costs</th>
<th>$ 1.965 Billion All Business Inventory</th>
<th>$ 1.965 Billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest</td>
<td>37</td>
<td>1.70%</td>
</tr>
<tr>
<td>Taxes, Depreciation, Insurance</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>237</td>
<td></td>
</tr>
<tr>
<td>Transportation Costs</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>Motor Carriers</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Truck - Intercity</td>
<td>280</td>
<td></td>
</tr>
<tr>
<td>Truck - Local</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Other Carriers:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Railroads (International: Domestic)</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Pipelines</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Air Freight</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Forwarders</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>184</td>
<td></td>
</tr>
<tr>
<td>Shipment Related Costs</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Logistics Administration</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>TOTAL LOGISTICS COST</td>
<td>$364</td>
<td></td>
</tr>
</tbody>
</table>

Rationale for Holding Inventory

- **Batching Economies**
  - Procurement
  - Production
  - Transportation

- **Uncertainty/Safety Stocks**
  - All organizations are faced with uncertainty.
  - On the demand side, there is uncertainty in the quantity and timing of customer orders.
  - On the supply side, there is uncertainty about getting what is needed from suppliers and order fulfillment time.

- **In-Transit and Work-in-Process (WIP) Stocks**
  - Time required for transportation means that even while goods are moving, an inventory cost is incurred. The longer the transit time, the higher the inventory cost.
  - WIP stock inventory cost can be significant while they sit in a manufacturing facility.

- **Seasonal Stocks**
  - Seasonality can occur in the supply of raw materials, in the demand for finished product, or in both.
  - Those faced with seasonality issues are constantly challenged when determining how much inventory to accumulate.
  - Seasonality can impact transportation.

- **Anticipatory Stocks**
  - A fifth reason to hold inventory arises when an organization anticipates that an unusual event might occur that will negatively impact its source of supply.

The Importance of Inventory in Other Functional Areas

- Inventory is more prominent in the interface of logistics with other functional areas
  - Finance (both balance sheet & income statement)
  - Marketing (sales growth, customer service, market share)
  - Manufacturing (production runs, seasonality)

Inventory Costs

- **Inventory Carrying Costs**
  - Cost of capital tied up in inventory
    - lost of opportunity from investing that capital elsewhere
  - hurdle rate
  - weighted average cost of capital (WACC).
Inventory Costs

Storage Space Cost
- Includes handling costs associated with moving products into and out of inventory, as well as costs like rent, heat, and light.

Inventory Service Cost
- Includes insurance and taxes.

Inventory Risk Cost
- Reflects the possibility that inventory value might decline for reasons beyond firm's control.

Calculating the Cost of Carrying Inventory
- Calculating the cost to carry (or hold) a particular item in inventory involves three steps.
  1. Step 1, determine the value of the item stored in inventory.
  2. Step 2, determine the cost of each individual carrying cost component to determine the total direct costs consumed by the item while being held in inventory.
  3. Step 3, divide the total costs calculated in Step 2 by the value of the item determined in Step 1.

Table 9-5: ABC Power Tools—Inventory Carrying Cost for Item 1

<table>
<thead>
<tr>
<th>COST CATEGORY</th>
<th>COMPUTATION</th>
<th>ANNUAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Direct materials, labor, overhead</td>
<td>$14.45 per unit sold</td>
<td>$100.45</td>
</tr>
<tr>
<td>2. Inbound freight to DC</td>
<td>$5 per unit received plus</td>
<td>$20.60</td>
</tr>
<tr>
<td>3. Labor</td>
<td>$10 per unit received plus $1 per unit per month x 12 months</td>
<td>$22.00</td>
</tr>
<tr>
<td>4. Space</td>
<td>$50 per sq ft @ $100 per sq ft x 12 months</td>
<td>$28.80</td>
</tr>
<tr>
<td>5. Insurance</td>
<td>$2.50 per unit per year</td>
<td>$2.50</td>
</tr>
<tr>
<td>6. Interest</td>
<td>10% @ $14.45 per year</td>
<td>$14.45</td>
</tr>
<tr>
<td>7. Taxes</td>
<td>$5 per $100 value @ 20%</td>
<td>$1.25</td>
</tr>
<tr>
<td>8. Loss and damage</td>
<td>3.9% per year @ $14.45 per year</td>
<td>$1.25</td>
</tr>
<tr>
<td>9. Obsolescence</td>
<td>1% per year @ $14.45 per year</td>
<td>$1.25</td>
</tr>
<tr>
<td>10. Total inventory carrying costs</td>
<td>$182.89</td>
<td>$182.89</td>
</tr>
<tr>
<td>11. Inventory carrying cost percent</td>
<td>182.89/114.45</td>
<td>15.98%</td>
</tr>
</tbody>
</table>

Trade Off between Order Cost and Inventory Carrying Cost

<table>
<thead>
<tr>
<th>ORDER PERIOD</th>
<th>NUMBER OF</th>
<th>AVERAGE INVENTORY (LAMPS)</th>
<th>TOTAL ANNUAL ORDER COST</th>
<th>CHANGE IN TOTAL ORDER COST</th>
<th>TOTAL ANNUAL INVENTORY CARRYING COST</th>
<th>CHANGE IN TOTAL CARRYING COST</th>
<th>TOTAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week</td>
<td>50</td>
<td>$104.00</td>
<td>$2.90</td>
<td>$1.25</td>
<td>$1.25</td>
<td>$1.25</td>
<td>$14.25</td>
</tr>
<tr>
<td>2 weeks</td>
<td>25</td>
<td>50</td>
<td>-2.60</td>
<td>-1.20</td>
<td>-1.20</td>
<td>-1.20</td>
<td>7.70</td>
</tr>
<tr>
<td>4 weeks</td>
<td>10</td>
<td>200</td>
<td>-2.60</td>
<td>-1.20</td>
<td>-1.20</td>
<td>-1.20</td>
<td>7.70</td>
</tr>
<tr>
<td>8 weeks</td>
<td>5</td>
<td>400</td>
<td>-1.80</td>
<td>-0.90</td>
<td>-0.90</td>
<td>-0.90</td>
<td>7.20</td>
</tr>
<tr>
<td>10 weeks</td>
<td>2</td>
<td>1,000</td>
<td>-1.80</td>
<td>-0.90</td>
<td>-0.90</td>
<td>-0.90</td>
<td>7.20</td>
</tr>
<tr>
<td>20 weeks</td>
<td>1</td>
<td>2,000</td>
<td>-1.80</td>
<td>-0.90</td>
<td>-0.90</td>
<td>-0.90</td>
<td>7.20</td>
</tr>
</tbody>
</table>

Order Cost is the expense of placing an order for additional inventory.

In-Transit Inventory Carrying Cost
- Owner of product while it is in transit will incur inventory carrying costs.
- In-transit inventory carrying cost becomes especially important for global supply chains since distance and time from the shipping location both increase.

Determining the Cost of In-Transit Inventories
- Storage space cost not relevant to inventory in transit.
- Insurance needs requires special analysis.
- Inventory in transit may incur obsolescence or deterioration costs.
The Just-in-Time Approach

- Four major elements
  - Zero inventories
  - Short, consistent lead times
  - Small, frequent replenishment quantities
  - High quality, zero defects

Vendor-Managed Inventory

- Basic principles:
  - The vendor and its customer agree on which products are to be managed.
  - An agreement is made on reorder points and economic order quantities for each of these products.
  - As these products are shipped, the customer notifies the vendor by SKU, of the volumes shipped on a real-time basis.
  - The vendor is responsible to ensure timely replenishment and no stock out.

ABC Analysis: Focusing management attention on the important few

- Application of Pareto’s Law, or the “80–20 Rule”
  - Many business situations were dominated by a relatively few vital elements
- Assigns inventory items to one of three groups according to the relative impact or value of the items
  - A items are considered to be the most important
  - B items being of lesser importance
  - C items being the least important

Chapter 10 Transportation—Managing the Flow of the Supply Chain

- Transportation involves the physical movement of goods between origin and destination points.
- The transportation system links geographically separated facilities in a company’s supply chain.
- Transportation facilitates the creation of time and place utility.
- Transportation also has a major economic impact on the financial performance of businesses.

Role of Transportation in Supply Chain Management

- Transportation is a key supply chain process that must be included in supply chain strategy development, network design, and total cost management.
- Transportation provides the critical links between supply chain partners, permitting goods to flow between their facilities.
- Transportation service availability is critical to demand fulfillment in the supply chain.
- Transportation efficiency promotes the competitiveness of a supply chain.
Challenges to carrying out transportation’s role

- Supply chain complexity
- Competing goals among supply chain partners
- Changing customer requirements
- Limited information availability
- Synchronizing transportation with other supply chain activities
- Transportation capacity constraints and rising transportation rates
- Changing governmental requirements that affect cost and service
- Growing safety and environmental regulation

Modes of Transportation

- truck
- rail
- air
- water
- pipeline
- multimodal transportation

Multimodal Transportation

Movement of goods (in the same loading unit) through successive modes of transport without further handling

- Use the best features of different modes
- Expands accessibility
- Facilitates global trade
- Standardized containers promotes multimodal growth
- Serves as an effective bridge for rail system gaps
  - Disjointed rail network
  - Break of gauge

Terms of Sale & Responsibilities

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FOB</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Buyer</td>
</tr>
<tr>
<td>FOB, Freight Prepaid</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Seller</td>
<td>Seller</td>
<td>Seller</td>
</tr>
<tr>
<td>FOB, Freight Prepaid &amp; Changed Bill</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Seller</td>
<td>Buyer</td>
<td>Seller</td>
</tr>
<tr>
<td>FOB, Evaluation, Freight Prepaid</td>
<td>Seller</td>
<td>Seller</td>
<td>Seller</td>
<td>Seller</td>
<td>Seller</td>
</tr>
<tr>
<td>FOB, Evaluation, Freight Collect</td>
<td>Seller</td>
<td>Seller</td>
<td>Seller</td>
<td>Buyer</td>
<td>Buyer</td>
</tr>
<tr>
<td>FOB, Evaluation, Freight Collect &amp; Allowance</td>
<td>Seller</td>
<td>Seller</td>
<td>Buyer</td>
<td>Seller</td>
<td>Seller</td>
</tr>
</tbody>
</table>

Modal Characteristics

- Accessibility
  - Motor transportation has advantage over air, rail, and water
- Transit Time
  - Air and motor transportation has advantage over rail, water, and pipeline
- Reliability
  - Motor carriers and air carriers are generally more reliable than water carriers and rail carriers
- Product Safety
  - Goods suffered less damage when transported by air and motor, as compare to rail and water
- Cost
  - Motor and air transportation are more expensive than rail and water transportation
Modal Selection Criteria

- Cost
- Speed
- Durability of cargo
- Cargo value
- Route
- Cargo security and safety
- Equipment availability
- Cargo characteristics (e.g. oversize, dangerous goods)
- Difference in border management process (e.g. rail shipments generally have less cross border delays)

Carrier Selection Trend

- Core carrier concept
  - Long term relations with a small number of carriers
  - Leverage purchasing dollars to drive down transport cost and secure capacity and service quality commitments from carrier
  - Reduce carrier management cost and optimize dock space usage
  - Improve IT connection, get better track and trace ability

Transportation Rate & Service Negotiation Recommendations

- Centralize contract negotiations
- Leverage volume with a small number of carriers
- Develop contracts for tailored set of transportation services at specific prices and specific duration
- Achieve mutual productivity improvements, then get a share of carrier’s gains

Preparing Shipments for Transportation

- Corporate transportation routing guide
  - Ensures compliance with service contracts
  - Maintain centralized control over internal and external freight routing & tendering decisions

- Cost-saving actions
  - Consolidate freight
  - Coordinate shipment deliveries
  - Take full advantage of equipment capacity
  - Make accurate freight count
  - Inspect and note cargo loss & damage

Freight Documents

Bill of lading
- Originates the shipment
- Provides all the information the carrier needs
- Stipulates the contract terms, including carrier’s liability for loss and damage
- Acts as a receipt for the goods the shipper tenders to the carrier
- Certificate of title to goods in some cases (Order Bill of Lading)

Freight bill
- Carrier’s invoice for services provided
- Lists shipment origin & destination, address of shipper & consignee, itemizes cargo, total weight & total charges

Freight claims form

- Filed with the carrier to recoup monetary losses if carrier fails to properly protect the shipment.
- Carriers are not liable for freight claims if the damage is attributable to:
  - Natural disaster or some other “act of God”
  - Military attack or similar “act of public enemy”
  - Government seizure of freight or “act of public authority”
  - Failure to adequately package the freight or other negligent “act of the shipper”
  - Extreme fragility, perishability, or similarly problematic “inherent nature of the goods”
Transportation Performance Metrics

- Key performance indicators (KPI) are used to evaluate:
  - current performance versus historical results
  - internal goals
  - carrier commitments
- Challenge lies in narrowing down available metrics to a manageable number of KPI
- KPI should encompass service quality and efficiency

Table 11-5: Transportation Performance Scenario

<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>KPI</th>
<th>Performance Evaluation</th>
<th>Potential Sources</th>
<th>Disturbance Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-time delivery</td>
<td>3</td>
<td>3-5%</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Loss and damage rate</td>
<td>5</td>
<td>0.05%-0.1%</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Billing accuracy</td>
<td>3</td>
<td>0.05%-0.1%</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Equipment condition</td>
<td>2</td>
<td>0.05%-0.1%</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Customer service</td>
<td>2</td>
<td>0.05%-0.1%</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Total Score</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Transportation Management System (TMS)

- Critical applications include the following:
  - Routing and shipment scheduling
    - Proper routing & scheduling impact customer satisfaction & supply chain performance
  - Load planning
    - Preparation for safe, efficient deliveries
  - Load tendering
  - Delivery appointment scheduling
  - In-Transit Visibility

Maintain In-Transit Visibility

- Manage key events as product moves across the supply chain
- Information technology facilitates the ability to monitor product movements
- Visibility tools must be linked to other capabilities and processes to have an impact on supply chain event management

Chapter 11 Distribution - Managing Fulfillment Operations

- Modern distribution focuses on the flow of products at lowest cost and meeting customer expectations
  - Not just traditional long term storage
  - Provide many value added functions
  - Cross docking
  - E-commerce fulfillment
- Both speed and efficient management of distribution network are critical
  - Opportunities include limited product handling, facility consolidation and streamlining inventories

The Role of Distribution in SCM

- Stockpile inventory to balance supply and demand
  - Seasonal production for year-round demand (e.g. corn)
  - Year round production for seasonal demand (e.g. X'mas lights)
- Hold inventory for protection against uncertainty
  - Protection against forecast errors, supply disruptions, and demand spikes
- Bring products closer to market
  - Reduce length & variability of transit time
- Enable quantity purchase discounts.
  - Accommodate larger purchase quantities to reduce cost per unit.
- Support production requirements
  - Provide for long production runs or aging/ripening of product (e.g., wine, cheese, ham)
- Promote transport economies
  - Enable full utilizing transport equipment capacity and movement of product in larger quantities.
**Distribution Facility Functionality**

Four primary functions are:
- Accumulation (consolidate)
- Sortation (SKU)
- Allocation (fulfill)
- Assortment (assemble a variety of SKU)

Value-adding roles:
- Assembly (filling in-store display units)
- Inventory Management (VMI)
- Kitting (all components needed for certain function)
- Product packaging, labeling, tagging
- Sequencing (set up parts for JIT manufacturing)
- Recycle, repair and returns management

---

**Distribution Planning & Strategy**

- Product characteristics (e.g. product value, durability, temperature sensitivity, obsolescence, volume) must drive the design of the distribution process.
- Match distribution processes to the items being handled to protect product integrity, promote customer satisfaction, and provide greater control of the inventory.
- Two options for product flow:
  - Direct shipment from production site to customers
  - Movement through distribution facilities to customers

Analyze inventory, transportation, and service tradeoffs before choosing direct shipping or movement through distribution facilities. Many companies have successfully used “cross docking” to improve distribution process.

---

**Network Design Issues**

- Inventory positioning focuses on the issue of where inventory is located within the supply chain
  - Single vs. multiple locations
- Number of facilities needed for a supply chain involves the evaluation of cost tradeoffs:
  - Transportation costs
  - Cost of lost sales
  - Warehousing costs
  - Inventory costs
Private or public distribution?
- Private DCs are internally owned facilities
- Contract warehousing is a customized version of public warehousing where a 3PL provides a variety of distribution services

Choice between private and public distribution options requires significant planning and analysis.

Proper product slotting improve labor productivity and generate other advantages:
- Reduce order-picking labor requirements by locating product in the optimal pick sequence
- Reduce replenishment labor requirements by matching unit loads with the appropriate size storage slot
- Reduce response time and improve flow by balancing workload between operators
- Increase picking accuracy by separating similar products to avoid proximity picking errors
- Reduce product damage by organizing heavier product first in the pick path, ahead of crushable product
- Increase palletizing productivity by arranging product by case height, allowing the building of lighter pallets
- Defers capital expansion by maintaining the optimum warehouse layout and cube utilization, reducing the need for building expansion
- Increase store-level productivity by organizing product in family groups to eliminate or reduce sorting of product for restocking at the store level

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Distribution KPIs are objective measures of fulfillment performance that are critical to the success of the supply chain.

Important issues:
- cost efficiency
- inventory accuracy
- order fill rates
- capacity utilization
Customer Facing Measures

- Order accuracy and order completeness
  - Customers want to receive the exact products and quantities that they ordered, not substitute items, incorrectly shipped items, or wrong quantities
  - Timeliness is a critical component of customer service

- Perfect order index (POI)
  - Delivered to the right place
  - At the right time
  - In defect-free condition
  - With correct documentation, pricing, and invoicing

Distribution Technology

- Warehouse Management Systems (WMS)
  - Software system that improves product movement and storage through efficient management of information & assignment of tasks.
  - Value-added capabilities
    - generate performance reports
    - support paperless processes
    - enable integration of materials handling equipment
    - picking systems
    - sorting systems
    - leverage wireless communication

Table 11-1: Top Distribution Measures and Best Practices

<table>
<thead>
<tr>
<th>Measure Used</th>
<th>Reported Used by Respondents</th>
<th>Best Practice Performance Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-time shipment</td>
<td>96%</td>
<td>95–100%</td>
</tr>
<tr>
<td>Percent of invoice changes</td>
<td>92%</td>
<td>95–100%</td>
</tr>
<tr>
<td>Inventory accuracy</td>
<td>91%</td>
<td>95–100%</td>
</tr>
<tr>
<td>On-time receipts</td>
<td>92%</td>
<td>95–100%</td>
</tr>
<tr>
<td>Percent of items shipped complete</td>
<td>97%</td>
<td>95–100%</td>
</tr>
<tr>
<td>Order-picking accuracy</td>
<td>84%</td>
<td>95–100%</td>
</tr>
<tr>
<td>Annual workflow turnover</td>
<td>92%</td>
<td>95–100%</td>
</tr>
<tr>
<td>Percent of items shipped without errors</td>
<td>93%</td>
<td>95–100%</td>
</tr>
<tr>
<td>Order fill rate</td>
<td>97%</td>
<td>95–100%</td>
</tr>
<tr>
<td>Average warehouse capacity used</td>
<td>92%</td>
<td>95–100%</td>
</tr>
<tr>
<td>On-time delivery</td>
<td>97%</td>
<td>95–100%</td>
</tr>
</tbody>
</table>


WMS Automatic Identification Tools

- WMS utilizes Auto-ID data capture technologies to track, locate, and move product quickly—with near-perfect accuracy:
  - Barcode scanners
  - RFID readers
  - Mobile computers
  - Wireless local area networks (LAN)

Chapter 12 Supply Chain Network Analysis and Design

- The location of logistics and manufacturing facilities is critical, as firms search for new ways to lower costs and improve service to their customers
- An effective and efficient supply chain network can differentiate a firm in the market

Need for Long Range Supply Chain Network Planning

- In the short run, a firm’s supply chain network and the locations of its key facilities are fixed.
- Site availability, leases, contracts, and investments make changing facility locations impractical in the short run.
- In the long run, the design of the overall supply chain network is variable.
Need for Long Range Supply Chain Network Planning

- Strategic Importance of Logistics/Supply Chain Network Design
  - All businesses operate in a very dynamic environment in which change is the only constant.
  - It is questionable whether any existing supply chain network can be truly up to date.

- Changing Customer Service Requirements
  - Logistical requirements of customers are changing in numerous ways.
  - Some customers have intensified their demands for more efficient and more effective logistics services.
  - Others are seeking relationships with suppliers who can take logistical capabilities and performance to new heights.
  - Not just customer service requirements may change, the types of customers served may also evolve over time.

- Shifting Locations of Markets and/or Supply Sources
  - Population shifts
  - Move to JIT-based manufacturing
  - Political or customs union, free trade agreements
  - Continuous search for lower-cost manufacturing locations & sourcing from offshore suppliers
  - Growing economic importance of Asia, especially China

- Change in corporate ownership, M & A
  - Reconfigure network for new, merged operation

- Cost pressures
  - Take cost out of Supply Chain (e.g. lower manufacturing cost locations)

- Competitive capabilities
  - Improve service or lower cost
  - Exploit new transport alternatives (e.g. locate close to hub of express companies)

Table 12-1: Major Locational Determinants

<table>
<thead>
<tr>
<th>NATIONAL/REGIONAL DETERMINANTS</th>
<th>SITE-SPECIFIC DETERMINANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor climate</td>
<td>Transportation access:</td>
</tr>
<tr>
<td></td>
<td>• Truck</td>
</tr>
<tr>
<td></td>
<td>• Air</td>
</tr>
<tr>
<td></td>
<td>• Rail</td>
</tr>
<tr>
<td></td>
<td>• Water</td>
</tr>
<tr>
<td>Availability of transportation</td>
<td></td>
</tr>
<tr>
<td>Infrastructure (cost, rail, port, law, regulation, border management process, trade &amp; transport impediments)</td>
<td></td>
</tr>
<tr>
<td>Proximity to markets and customers</td>
<td></td>
</tr>
<tr>
<td>Quality of life</td>
<td></td>
</tr>
<tr>
<td>Taxes and industrial development incentives</td>
<td>Inside/outside metropolitan area</td>
</tr>
<tr>
<td>Supplier networks</td>
<td>Availability of workforce</td>
</tr>
<tr>
<td>Land costs and utilities</td>
<td>Land costs and taxes</td>
</tr>
<tr>
<td>Company preferences</td>
<td>Utilities</td>
</tr>
</tbody>
</table>
Optimization Models

- Mathematical procedures that aim to find the “best,” or optimal solution.
- Optimization selects the “best” course of action from a number of feasible alternatives.
- Simulation models & heuristics models are often used for network optimization.
- Relies heavily on computers.
- Optimization models have limitations.
- A stable, good enough solution can be better than an optimal solution that do not last.

Potential Supply Chain Modeling Pitfalls to Avoid

- Short-term horizon
- Too little or too much detail
- Thinking in two dimensions, ignore other factors
- Using published costs instead of real cost
- Inaccurate or incomplete costs
- Use of erroneous analytical techniques

Chapter 13 Sourcing Materials and Services

Purchasing, procurement and strategic sourcing become critical as organizations improve the performance of their supply chains.

■ Purchasing: The transactional function of buying products and services that involves the placement and processing of a purchase order.
■ Procurement: The process of managing a broad range of processes that are associated with a company’s acquisition of goods and services.
■ Strategic sourcing: Strategic sourcing is broader and more comprehensive than procurement. It focuses on the supply chain impacts of procurement and purchasing decisions, and works cross-functionally to achieve overall business goals.

Unique Aspects of Strategic Sourcing

- Consolidate & leverage purchasing power
- Emphasis on best value instead of lowest product cost
- Stronger and more comprehensive supplier relationship
- Focus on process improvements
- Enhanced teamwork and professionalism

Strategic Sourcing Methodology

Five core principles are recognized as key drivers to achieve high levels of value:

■ Assess the total (cost and value)
■ Develop individual sourcing strategies
■ Evaluate internal requirements
■ Focus on supplier economics
■ Drive continuous improvement

Seven key steps in strategic sourcing methodology:

Step 1: Project Planning and Kickoff, which suggests that a formal start to the strategic sourcing process is warranted.

Step 2: Profile Spend, to develop an accurate understanding of requirements.

- Identify or reevaluate needs
- Define and evaluate user requirements
- Decide whether to make or buy
Seven key steps in strategic sourcing methodology

Step 3: Assess Supply Market
- Critical step in the strategic sourcing process
- All potential sources of supply are identified
  - a thorough assessment of a supply market
  - identify all possible suppliers
  - prescreen all possible sources

Step 4: Develop Sourcing Strategy
- Develop a sourcing strategy
  - establish whether a supplier has the capabilities
  - RFP provides specific information as to what the buying company

Step 5: Execute Sourcing Strategy
- Begins with an evaluation of the suppliers that remain following the RFI and RFP processes and culminates in the award of a contract.

Step 6: Transition and Integrate
- Important elements of this step are the finalization of the contractual agreement, planning the transition process, and receipt or delivery of the product or service.

Step 7: Measure and Improve Performance
- Post purchase performance evaluation is very important.

Managing Sourcing and Procurement Processes
- Determine the type of purchase
- Determine the necessary levels of investment
- Perform the procurement process
- Evaluate the effectiveness of the strategic sourcing process
  - Were the user’s needs satisfied?
  - Was the investment necessary?

Types and Importance of Items and Service Purchased:
- **Generics** are low-risk, low-value items and services that typically do not enter the final product.
- **Commodities** are items or services that are low in risk but high in value. Basic production materials (bolts), basic packaging (exterior box), and transportation services are examples of commodities that enhance the profitability of the company but pose a low risk.
- **Distinctives** are high-risk, low-value items and services such as engineered items, parts that are available from only a limited number of suppliers, or items that have a long lead time.
- **Criticals** are high-risk, high-value items that give the final product a competitive advantage in the marketplace.

Supplier Commitment to Quality - Certifications and Registrations:
- **TQM**
  - a strategy in which entire organization focused on an examination of process variability and continuous improvement
- **Six Sigma**
  - is similar to TQM its approach involves training experts
- **ISO 9000**
  - making sure that companies have standard processes in place that they follow
Procurement Price

- Sources of Price
  - Commodity markets
  - Price lists
  - Price quotation
  - Negotiation

- The objective of the procurement process is to purchase goods and services at the "best" price, which may not be the lowest price per unit at the vendor source.

Base cost and additional direct and indirect costs

- Traditional Basic Input Costs
  - the primary price of the product or materials as paid by the firm

- Direct Transaction Costs
  - costs of detecting, transmitting the need for, and processing the material flow

- Supplier Relational Costs
  - costs of creating and maintaining a relationship with a supplier

- Landed Costs
  - inbound transportation
    - actual transportation cost
    - FOB terms

Figure 13-8 Hierarchy of Price Measurement Approaches

- Strategic
  - Highest total value to the ultimate customer of the final firm in the supply chain

- Operational
  - Lowest total cost to the final firm in the entire supply chain

- Tactical
  - Lowest landed cost
  - Lowest base/unit cost

Figure 13-9 Total Procurement Price

\[
\text{Total Procurement Price} = \text{Traditional Basic Input Costs (Price)} + \text{Direct Transaction Costs} + \text{Supplier Relational Costs} + \text{Landed Costs} + \text{Quality Costs/Factors} + \text{Operations Logistics Costs}
\]

Figure 13-10 Understanding Total Cost of Ownership (TCO)

- Programmable, Visible Cost
- Life Cycle Costs
- Other Function Costs
- Franchise Costs
- Transaction Costs
- Additional Relevant Costs

e-Sourcing and e-Procurement

- the use of electronic capabilities to conduct activities and processes relating to procurement and sourcing
- enhance the effectiveness and efficiency of traditional buying processes
Chapter 14 Operations—Producing Goods and Services

Introduction

- Operations focus on the “make/build” portion of the supply chain.
- Production facilities must interact with supply chain functions.
- Operations create the outputs that are distributed through supply chain networks.

Production Challenges

- Intensified competition, more demanding customers, and relentless pressure for efficiency as well as adaptability
- New competition for many established manufacturers and service providers
- Customers’ demand for choice and rapidly changing tastes

Production Strategies

Mass Production

- Operations strategy focused on cost reduction, efficiency, and scale.
- The push-based strategy works well for supply chains that focus on the immediate delivery of off-the-shelf, low-cost, standardized goods.

Lean Manufacturing

- Materials arrive at the needed location just in time for rapid processing and flow through.
- Relies on pull-based systems to coordinate production and distribution with actual customer demand.

The Role of Production Operations in Supply Chain Management

- An effective production operation is supported by the supply chain and in turn supports the supply chain.
- Supply chain tradeoffs must be understood and made.
  - Inventory
  - Order cycle
  - Customer service
  - Total cost

e-Commerce Models

- Sell-side system:
  - Online businesses selling to individual companies or consumers

- Electronic marketplace:
  - Represents a seller-operated service consisting of electronic catalogs from vendors within a market

- Buy-side system
  - Buyer-controlled e-procurement or e-commerce service

- Online trading community:
  - Maintained by third-party technology vendor where multiple buyers and multiple sellers can conduct business

Chapter 14 Operations—Producing Goods and Services

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Production Process Functionality

- Make-to-stock (MTS) production is driven by demand forecast. Customer order fulfilled from inventory.
- Assemble-to-order (ATO) production method builds final product from common components, starting from a common base product and adding variable parameters (e.g., color). <PC, bicycles>
- Build to order (BTO) utilizes a combination of standard and custom parts. <servers, air planes>
- Engineer-to-order (ETO) focuses on highly customized products that require unique engineering and design. <bridges, power plants>

Production Tradeoffs

- Processes that can produce a range of products are said to have “economies of scope”.
- Low-volume production runs of a wide variety of products are required to meet fast changing customer demand.
- Tradeoffs between flexible production processes and manufacturing costs must be considered.
- Production and supply chain costs vary for make-to-stock, assemble-to-order, build-to-order products and engineered-to-order items.

Production Strategies

- Machine flexibility
  - general purpose machines staffed by cross-trained workers to produce different types of products
- Routing flexibility
  - provides managers with a choice between machines for a part’s next operation
- Offshoring
  - activity relocated to contract manufacturer in another country
- Adaptive manufacturing
  - ability to replace planning with execution based on real-time demand

Table 14-1: TPS Seven Deadly Wastes

<table>
<thead>
<tr>
<th>WASTE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>Description</td>
</tr>
<tr>
<td>Overproduction</td>
<td>Making more parts than you can sell.</td>
</tr>
<tr>
<td>Delays</td>
<td>Waiting for processing, parts sitting in storage, etc.</td>
</tr>
<tr>
<td>Transferring</td>
<td>Excessive movement of parts to various storage locations, from process to process, etc.</td>
</tr>
<tr>
<td>Overprocessing</td>
<td>Doing more “work” to a part than is required.</td>
</tr>
<tr>
<td>Inventory</td>
<td>Committing money and storage space to parts not sold.</td>
</tr>
<tr>
<td>Motion</td>
<td>Moving parts more than the minimum needed to complete and ship them.</td>
</tr>
<tr>
<td>Making defective parts</td>
<td>Creating parts that cannot be sold “as is” or that must be reworked, etc.</td>
</tr>
</tbody>
</table>
Production Process Layout

- **Facility layout**
  - The arrangement of machines, storage areas, and other resources within manufacturing or assembly facility.

- **Successful layout** is one that does the following:
  - Reduces bottlenecks in moving people or materials
  - Minimizes materials-handling costs
  - Reduces hazards to personnel
  - Utilizes labor efficiently
  - Increases morale and ease of supervision
  - Utilizes available space effectively and efficiently
  - Provides flexibility
  - Facilitates coordination and face-to-face communication

Production Process Layouts

- **Project layout**
  - Fixed location layout where the product remains in place for the duration of production

- **Workcenter**
  - Process-focused layout that groups together similar equipment or functions

- **Manufacturing cell**
  - Process-focused layout that dedicates production areas to a narrow range of products that are similar in processing requirements

- **Assembly line**
  - Process-focused layout in which machines and workers are arranged according to the progressive sequence of operations

- **Continuous process facilities**
  - Similar to assembly lines, with product flowing through a predetermined sequence of stops.

Packaging

- Protects goods in the package
- Design can affect labor and facility efficiency
- Design can also impact ability to use space and equipment
- Attractive packaging provides another level of product differentiation
- Packaging affects materials handling and transportation

Production Metrics

- Properly aligned with corporate objectives (help achieve goals that are important to the overall success of the business)
- Keep metrics simple (5-6 per team or function)
- Measure activity performance as input to overall production or supply chain performance
- Refrain from using metrics that are too narrow (e.g. using labor cost as surrogate for overall cost)
- Eliminate measurements that encourage wrong outcomes (e.g. using standard cost measures that promote labor efficiency, machine utilization at expense of inventory and quality)
Golden Production Metrics

- Total cost
  - all manufacturing cost on cash basis, compare to previous period
- Total Cycle Time
  - measure number of days of major components on hand in various forms as compared to planned usage per day of such components
- Delivery performance
  - % of orders shipped in accordance with customer request
- Quality
  - focus on quality from the perspective of the customer
- Safety
  - accident frequency, severity, and cost

Roles Operations Play in Supply Chain

- Key concept is the critical and co-dependent link between production and logistics.
- Production and logistics must be synchronized to move product efficiently and effectively through the supply chain.
- Fast, flexible and responsive production makes supply chain more dynamic and competitive
- Packaging plays an important role in transfer of finished product from plant to DC to customer
- Key production metrics should be linked to overall corporate objectives

Chapter 15 Managing Reverse Flows in the Supply Chain

- Traditionally, reverse flows were not viewed as adding value for customers or revenue for the manufacturer or producer.
- Information and financials (cash) are also an important dimension of reverse logistics and closed loop supply chains.
- Global supply chains present challenges and opportunities for reverse flows (e.g. difficulty in returning goods to distant manufacturing locations).

Importance and Magnitude of Reverse Flows

- Transportation cost of returns is very high due to uneven sizes, damages and generally poorer condition of packaging.
- Retailers lose 3 to 5% of gross sales to returns.
- Internet returns are about double the store sale returns.

Eight categories of reverse flows:

- Products that have failed; are unwanted, damaged, or defective; but can be repaired or remanufactured and resold
- Products that are old, obsolete, or near the end of their shelf life but still have some value for salvage or resale
- Products that are unsold from retailers, usually referred to as overstocks that have resale value
- Products being recalled due to a safety or quality defect that may be repaired or salvaged

Eight categories of reverse flows:

- Products needing “pull and replace” repair before being put back in service
- Products that can be recycled such as pallets, containers, computer inkjet cartridges, etc.
- Products or parts that can be remanufactured and resold
- Scrap metal that can be recovered and used as a raw material for further manufacturing
Reverse Logistics Systems versus Closed Loops

- Reverse logistics—The process of transporting goods from their final destination for the purpose of capturing value or for proper disposal.
  - Reserve logistics involves the processes for sending new or used products “back up stream” for repair, reuse, refurbishing, resale, recycling, or scrap/salvage (e.g., recalled food & drugs, damaged printer, malfunction TV).
- Closed loop supply chains—Designed and managed to explicitly consider both forward and reverse flows activities in a supply chain.
  - Explicitly designed from the start for both forward and reverse flows (e.g., empty cartridges, beverage bottles, retread truck tires).

Closed Loop Supply Chain for Cartridge Reuse

- Explicitly designed from the start for both forward and reverse flows (e.g., empty cartridges, beverage bottles, retread truck tires).

Closed Loop Supply Chain for Commercial Tire Retreading

- Explicitly designed from the start for both forward and reverse flows (e.g., empty cartridges, beverage bottles, retread truck tires).

Achieving a Value Stream for Reverse Flows

- The barriers below may be internal or external:
  - Priority relative to other issues and potential projects or programs in the organization
  - Lack of attention from top management in the organization
  - Financial resources necessary for operations and asset infrastructure
  - Personnel resources required to develop and implement the reverse flows program
  - Adequacy of material and information systems to support the returns program
  - Local, state, and federal restrictions and/or regulations
- 3PL can add economic value in managing reverse logistics.
Recommendations for Managing Reverse Flows:

- **Avoidance**— Producing high-quality products and developing processes to minimize or eliminate returns.
- **Gatekeeping**— Checking and screening merchandise at the entry point into the reverse flows process to eliminate unnecessary returns or minimize handling.
- **Reducing reverse cycle times**— Analyzing processes to enable and facilitate compression of time for returns to enhance value recapture.
- **Information systems**— Developing effective information systems to improve product visibility, reduce uncertainty, and maximize economies of scale.
- **Returns centers**— Developing optimum locations and facility layouts for returns centers to facilitate network flow.

Recommendations for Managing Reverse Flows:

- **Asset recovery**— Classifying and disposing of returned items, surplus, scrap, and obsolete items to maximize returns and minimize cost.
- **Pricing**— Negotiating the best price for products being returned and resold.
- **Outsourcing**— Considering a relationship with a third-party organization to handle and manage reverse flows in cases where existing personnel, infrastructure, experience, and/or capital may not be adequate to implement a successful program.
- **Zero returns**— Developing a policy to exclude returns by giving a returns allowance and/or “destroying” the product in the field.
- **Financial management**— Developing guidelines and financial procedures to properly account for charges against sales and related financial issues when items are returned by customers.

Chapter 16 Strategic Challenges and Emerging Changes for Supply Chains

- Supply chain success will be facilitated by the development of effective, collaborative relationships between supply chain participants.
- The ability of organizations to develop and implement effective global supply chain strategies will define future success.
- The most important area is “supply chain transformation”— how an organization can transform itself into one that meets and exceeds future goals and objectives.

Principles of Supply Chain Management

**Principle 1:** Segment Customers Based on Service Needs
- segments customers based on logistics and supply chain needs (e.g. fulfillment priority, frequency of service) as compare to product or trade channel.

**Principle 2:** Customize the Logistics Network
- develop supply chain approaches responsive to the needs of individual customer segments (not the “average” customer or the toughest customer).

**Principle 3:** Listen to Signals of Demand and Plan Accordingly
- demand planning responsive to and aligned with market signals such as point-of-sale information.

**Principle 4:** Differentiate Products Closer to the Customer
- postpone product differentiation to last moment; gain greater understanding and control of cycle times.

**Principle 5:** Source Strategically
- supply chain management excellence requires customers and suppliers to work together to meet overall supply chain objectives.

**Principle 6:** Develop a Chain-wide Technology Strategy
- replace inflexible, poorly integrated transactional systems with enterprise-wide systems that provides current, actionable information.

**Principle 7:** Adopt Channel-Spanning Performance Measures
- realization of overall supply chain objectives is essential to the long-term success of individual supply chain participants.

Technology and “real time” intelligence will be the major change agents that separate winners and losers in supply chain management.
Focus of Supply Chain Management

- Significant challenge to get corporate leaders to appreciate the potential of effective supply chain management
- To contribute to growth, supply chain leaders need to focus on:
  1. Think beyond cost reduction, use supply chain excellence to drive revenue and earnings growth
  2. Develop world-class collaboration skills
  3. Aggressively grow personal leadership capabilities

Getting to Growth: Think Beyond Cost

- CEOs view SCM as being primarily cost reduction, not top-line growth
- Communicate the relationship between supply chain competency and growth
- Move from a mindset focused on delivering the “right product, at the right place, at the right time and at the lowest cost” to one oriented towards growth
- Modify traditional mindset from an “inside-out” perspective to an “outside-in” approach

Develop World-Class Collaboration Skills

- Define the benefits of collaboration
- Make the investment
- Earn trust and create mutual ownership
- Dedicate “A” players to SCM

Business people are trained to maximize self-interest. This must be avoided for collaboration to be successful.

Differentiation Strategies

Concept is that supply chain capabilities are viewed by customers as being sufficiently effective and unique to distinguish an organization in the marketplace

- Time-Based Strategies
  - Effective strategy based on tradeoffs between transportation, inventory, and warehousing costs as an example
- Reducing Cycle Time
  - Three factors:
    - Processes
    - Information
    - Decision making
- Change from the traditional push approach to a pull approach
Time-Based Strategies

- Tradeoffs between speed, transit time variability, transportation cost and inventory carrying costs
- Reduce Cycle Time
  - process
  - Information sharing
  - decision making
- Change from the traditional push approach to a pull approach

Financial Strategies

- Pursuit of operational efficiency to drive increase in ROA
- Inventory Productivity
  - reduce inventory levels without diminishing customer service (e.g. JIT, VMI, continuous replenishment)
- Facility Utilization
  - Effectively utilize the capacity of various types of supply chain facilities

Financial Strategies

- Equipment Utilization
  - logistics-related equipment such as materials-handling equipment used in warehouses and transportation equipment that is leased or owned by a company
- Outsourcing
  - has grown in popularity and now has grown into areas that are both strategic and customer focused
- 4PL providers
  - provision of competencies relating to knowledge availability, information technology, and skills in forming and sustaining successful supply chain relationships

Technology-Based Strategies

- Using hardware, software, and connectivity, as the springboard for progress and innovation
- Supply chain management applications market
  - $6 billion globally in 2006
  - Forecast to rise to $8 billion in 2011.

Elements of successful supply chain collaborations

To be successful, all supply chain organizations must work with each other in a manner that provides the greatest value for themselves, as well as the end-use customer or consumer.

- Well-Understood Goals and Objective
  - members need to understand their individual objectives and then be willing to share these openly with each other
- Trust and Commitment
  - may be thought of as “reliance on and trust in one’s partner”
- Corporate Compatibility
  - the relationship include sharing of vision, goals, objectives & cultures
- Communication
  - communication and sharing use of information are central to an effective collaborative relationship

Elements of successful supply chain collaborations

- Shared Decision Making and Ability to Reach Consensus
  - matters that are related to the success of the relationship should be treated jointly by all involved organizations

- Equitable Sharing of Gains, Losses, and Investments
  - successful collaborations require the development of mechanisms to share gains, losses, and investments

- Overall Benefits Greater Than Could Be Obtained Alone
  - successful collaborations need to create benefits for the involved parties that exceed what those organizations

- Effective Measurements as well as Measurement Strategies
  - all involved participants agree to the development of measurement strategies

- Strategic Plan for Collaborative Relationship
  - successful collaborations are not without their challenges and difficulties

- 3PLs
  - firms might benefit from improved collaboration with 3PLs
  - inventory management, customer order management, customer service, and supplier order management

<table>
<thead>
<tr>
<th>Table 15-1</th>
<th>Business Processes That Would Benefit from Improved Collaboration with 3PLs</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCESS</td>
<td>ALL REASONS</td>
</tr>
<tr>
<td>Inventory management</td>
<td>61%</td>
</tr>
<tr>
<td>Customer order management</td>
<td>60</td>
</tr>
<tr>
<td>Customer service</td>
<td>61</td>
</tr>
<tr>
<td>Supplier order management</td>
<td>64</td>
</tr>
<tr>
<td>Transportation</td>
<td>60</td>
</tr>
<tr>
<td>Sales and operations planning</td>
<td>25</td>
</tr>
<tr>
<td>Supply &amp; planning</td>
<td>65</td>
</tr>
<tr>
<td>Rapid/flexibility management</td>
<td>55</td>
</tr>
<tr>
<td>Compliance (e.g., collaborative quality, costs, etc)</td>
<td>60</td>
</tr>
<tr>
<td>Demand planning</td>
<td>50</td>
</tr>
<tr>
<td>Accounts payable/receivable processes</td>
<td>63</td>
</tr>
<tr>
<td>Manufacturing scheduling</td>
<td>87</td>
</tr>
<tr>
<td>Production</td>
<td>65</td>
</tr>
</tbody>
</table>

Note: Figures refer to percentages of study respondents indicating business processes would benefit from improved collaboration with 3PLs.