

Chapter 1: Supply Chain Management: An Overview

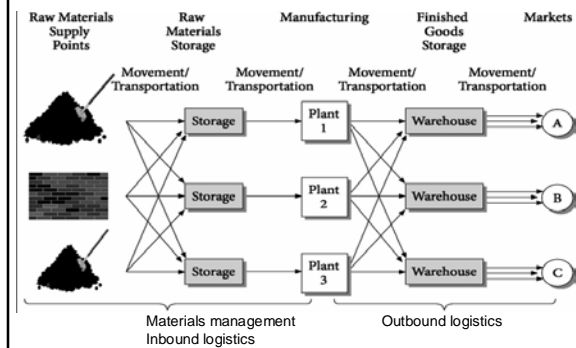
Five major forces are driving changes in logistics and supply chain management:

- globalization
- technology
- organizational consolidation
- the empowered consumer
- government policy and regulatory reform

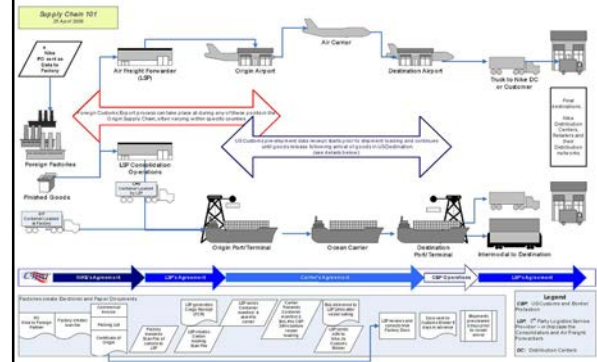
Development of the Supply Chain Concept

- 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

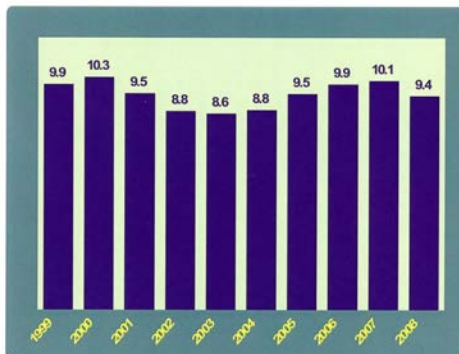
A View of Business Logistics in a Company



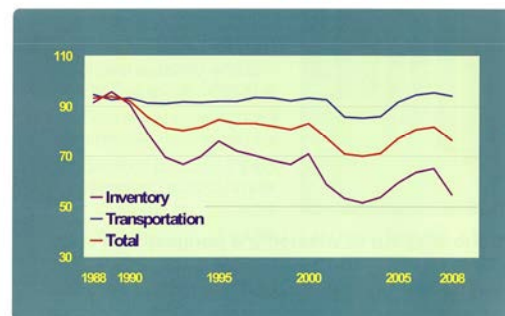
Nike Supply Chain



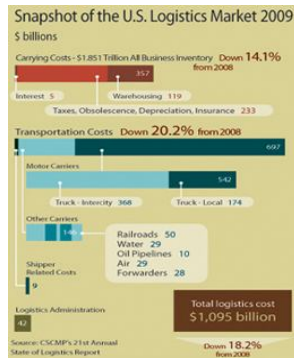
US Logistics Cost as % of GDP



Index of Logistics Costs as a Percent of GDP 1988 - 2008



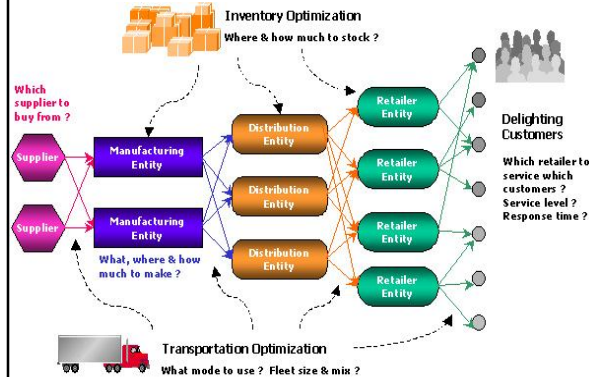
US Logistics Cost Fell to 7.7% of GDP in 2009



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

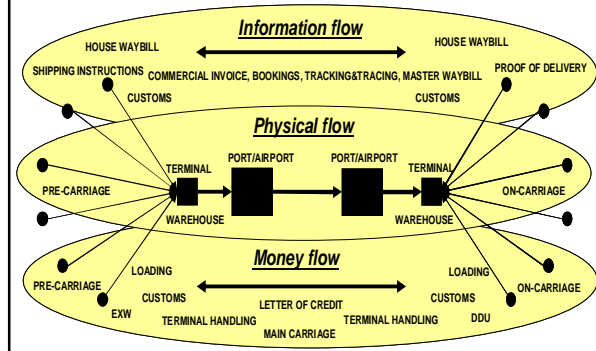
- By Customer:
 - Getting the right product, to the right customer, in the right quantity, right condition, at the right place, right time, and the right cost
- Council of Supply Chain Management
 - The art and science of management, engineering, and technical activities concerned with requirements, 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.

Business Logistics Flows

(Source Naula 2007)



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:
 - $ROA = (Revenue - Expenses) / Assets$
 - $ROA = Gross\ Profit / Assets$

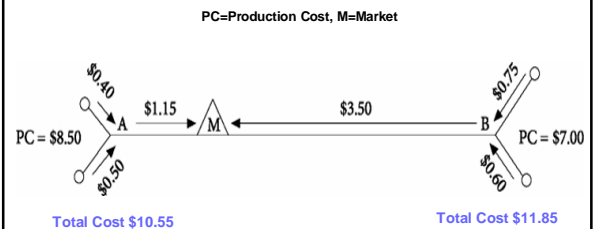
Good logistics practice increases Gross Profit and reduces Assets required to sustain the business. It leads to dramatic improvement in ROA

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



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

Cost Centers	Rail	Motor
Transportation	\$3.00	\$4.20
Inventory	5.00	3.75
Packaging	4.50	3.20
Warehousing	1.50	0.75
Cost of lost sales	2.00	1.00
Total cost	\$15.00	\$13.00*

*Costs per unit.

Table 2-4

Analysis of Total Logistics Cost with a Change to More Warehouses

Cost Centers	System 1 Three Warehouses	System 2 Five Warehouses
Transportation	\$850,000	\$500,000
Inventory	1,500,000	2,000,000
Warehousing	600,000	1,000,000
Cost of lost sales*	350,000	100,000
Total cost	\$3,300,000	\$3,600,000

*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 then type of cargo that can be transported

Global Transportation Options

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

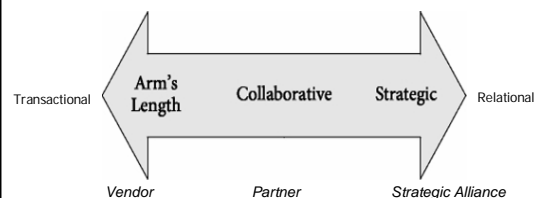
Types of Relationships

- 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

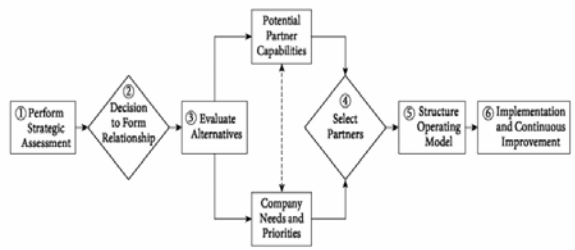
Relationship Perspectives



Regardless of form, relationships may differ in numerous ways:

- ☐ Duration
- ☐ Obligations
- ☐ Expectations
- ☐ Interaction/Communication
- ☐ Cooperation
- ☐ Planning
- ☐ Goals
- ☐ Performance analysis
- ☐ Benefits and burdens

Figure 4-2 Process Model for Forming Logistics Relationships



Source: Copyright 2001, C. John Langley PhD Used with permission

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”

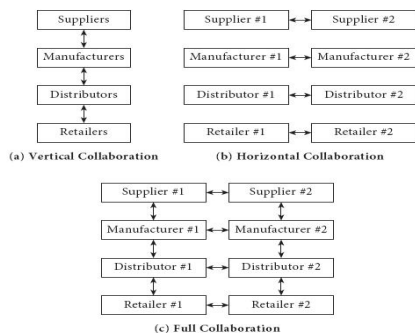
Facilitators

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.

Figure 4-5 Types of Collaboration



Source: C. John Langley Jr.

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

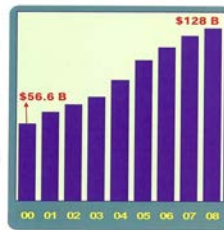


Table 4-4 Outsourced Logistics Services

	NORTH AMERICA	EUROPE	ASIA-PACIFIC	LATIN AMERICA
Transportation	83%	95%	95%	90%
Warehousing	74	74	74	54
Customs Clearance and Brokerage	74	54	84	64
Forwarding	54	54	64	14
Freight Bill Audit and Payment	54	24	14	14
Shipment Consolidation	44	54	54	34
Cross-Docking	34	44	34	14
Reverse Logistics	24	44	34	34
Transportation Management	24	34	44	14
Product Labeling, Packaging, Assembly, Kitting	24	44	34	24
Supply Chain Consulting Services Provided by 3PLs	24	14	14	14
Order Entry, Processing, and Fulfillment	14	14	14	14
Fleet Management	14	24	24	34
LLP/PL Services	14	14	4	14
Customer Service	4	4	14	14

Source: 2006 Elivorth Annual 3PL Study, Georgia Tech and Capgemini LLC. Used with permission.

Table 4-7 Expectation Setting Relative to 3PL Relationship Management

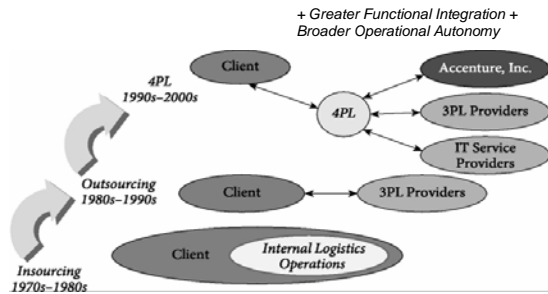
CUSTOMERS' EXPECTATIONS OF 3PL PROVIDERS	3PL PROVIDERS' EXPECTATIONS OF CUSTOMERS
<ul style="list-style-type: none"> • Superior service and execution (proven results and performance) • Trust, openness, and information sharing • Solution innovation and relationship reinvention • Ongoing executive-level support • Service offering aligned with customer strategy and deep industry knowledge 	<ul style="list-style-type: none"> • Mutually beneficial, long-term relationship with company • Trust, openness, and information sharing • Dedicating the right resources at the right levels, including executives • Clearly defined service-level agreements • Fiduciary responsibility and overall fairness relative to pricing

Table 4-8 Average Customer Results from Use of Third-Party Logistics Providers

Cost/Benefit	North America	Western Europe	Asia-Pacific	Latin America
Logistics cost reduction	10%	11%	14%	12%
Fixed logistics asset reduction	13%	22%	22%	37%
Average order-cycle length change (days)	From 11.0 to 8.4	From 10.1 to 6.5	From 15.7 to 13.9	From 14.9 to 10.0
Service level improvement (percent "yes")	62%	67%	64%	77%

Source: 2006 Elivorth Annual 3PL Study, Georgia Tech and Capgemini LLC. Used with permission. Service-level improvement figures taken from 2005 Tenth Annual 3PL Study, Georgia Tech and Capgemini LLC. Used with permission.

4PL (Fourth-Party Logistics)



Source: Accenture, Inc. Used with permission. *TM Registered trademark of Accenture, Inc.

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%

Source: Logistics Management (January 2006)

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

Figure 5-4 Process Measure Categories

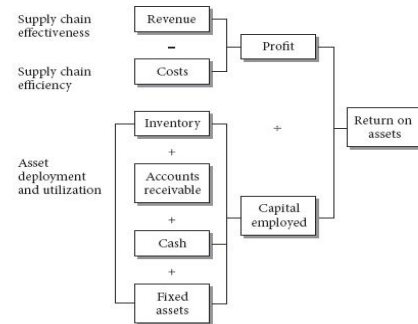
TIME	COST
On-time delivery/Receipt	Finished goods inventory turns
Order cycle time	Days sales outstanding
Order cycle time variability	Cost to serve
Response time	Cash-to-cash cycle time
Forecasting/Planning cycle time	Total delivered cost
Quality	<ul style="list-style-type: none"> Cost of goods Transportation costs Inventory carrying costs Material handling costs
Overall customer satisfaction	All other costs
Processing accuracy	<ul style="list-style-type: none"> Information systems Administrative
Perfect order fulfillment*	Cost of excess capacity
<ul style="list-style-type: none"> On-time delivery Complete order Accurate product selection Damage-free Accurate invoice 	Cost of capacity shortfall
Forecast accuracy	Other/Supporting
Planning accuracy	<ul style="list-style-type: none"> Approval exceptions to standard Minimum order quantity Change order timing
Schedule adherence	Availability of information

Source: J. S. Keebler et al., Keeping Score, Council of Logistics Management, (1999).
*Contains a time component.

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.

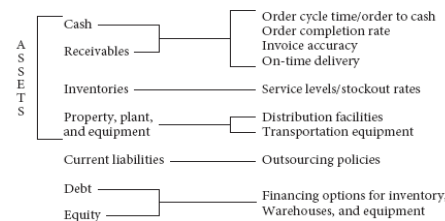
Figure 5-9 Supply Chain Impact on Return on Assets



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).

Figure 5-10 Supply Chain Impacts on the Balance Sheet



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

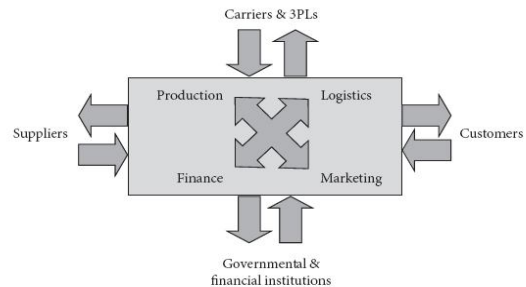
Information Technology and Supply Chains

- 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 services providers, and customers.

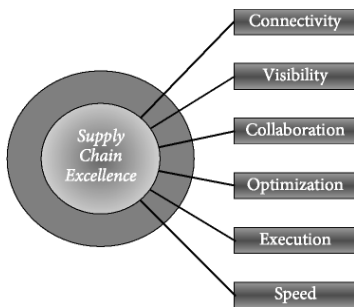
The Need for Information

- 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.

Figure 6-1 Supply Chain Information Flows



Six Drivers of Supply Chain Excellence



10 Golden Rules for Success

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

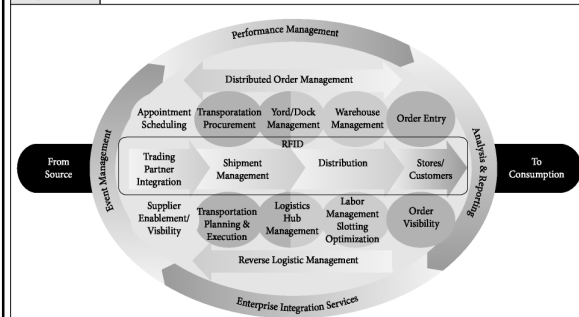
- Supply chain collaboration tools help users integrate their information technology systems with those of trading partners to streamline and automate supply chain processes.
- Data synchronization applications provide a platform for manufacturers, distributors, and retailers to aggregate and organize item-related data.
- Spreadsheets and database software provides managers with handy, portable tools for gathering, consolidating, and analyzing supply chain data.

Table 6-1 Supply Chain Event Management Opportunities

	1. DECIDE WHAT YOU WANT TO KNOW AND MEASURE	2. DECIDE WHAT ACTIVITIES AND INFORMATION YOU NEED TO BE TOLD ABOUT.	3. DRIVE TOWARD RESOLUTION OF PROBLEMS TO THE APPROPRIATE SYSTEMS.
	MEASURE	MONITOR/NOTIFY	SIMULATE/CONTROL
Orders	<ul style="list-style-type: none"> Customer satisfaction levels across products 	<ul style="list-style-type: none"> Late deliveries or notifications of past-due dates 	<ul style="list-style-type: none"> Choose alternative transportation modes or alternative suppliers
Shipments	<ul style="list-style-type: none"> On-time shipments Carrier pick-up performance levels 	<ul style="list-style-type: none"> Late arrivals of shipments Projected carrier pick-up behind schedule 	<ul style="list-style-type: none"> Notify carrier of lateness Choose alternative carriers or alternative modes of transportation
Inventory	<ul style="list-style-type: none"> Inventory levels and adherence to safety-stock levels 	<ul style="list-style-type: none"> Stock-outs Inventory below safety levels 	<ul style="list-style-type: none"> Determine alternative source of inventory Increase orders to suppliers
Manufacturing	<ul style="list-style-type: none"> WIP levels by family 	<ul style="list-style-type: none"> Delays in production WIP build-ups 	<ul style="list-style-type: none"> Choose alternative manufacturing solution Push WIP into finished goods
Financial	<ul style="list-style-type: none"> Order-to-cash cycle time 	<ul style="list-style-type: none"> Payments pending Late payments Late invoicing 	<ul style="list-style-type: none"> Remind suppliers of payments Renegotiate pricing

Source: "Tackling Uncertainty: Improving Responsiveness with Supply Chain Event Management" (Cambridge, MA: Sapient Corporation, 2002).

Figure 6-7 Supply Chain Software Suite



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?

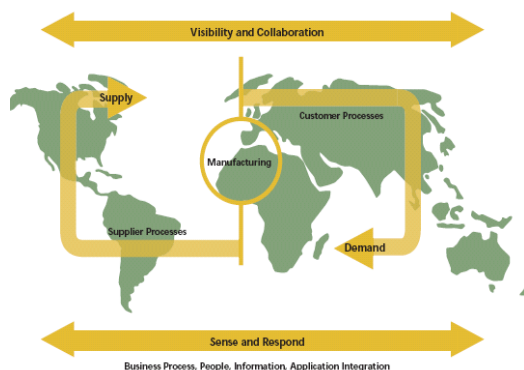
Radio-Frequency Identification (RFID)

- 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.

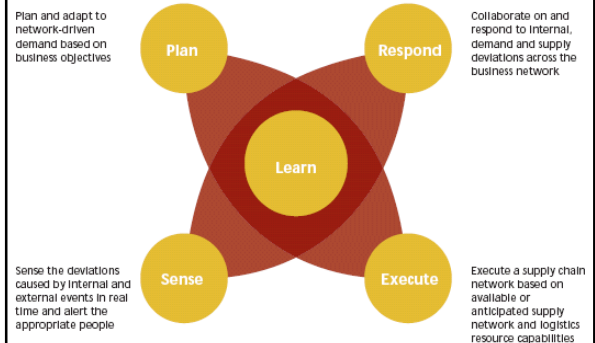
Adaptive Supply Chain Networks (ASCN)

- 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.

Adaptive Supply Chain Networks



Adaptive Supply Chain Networks

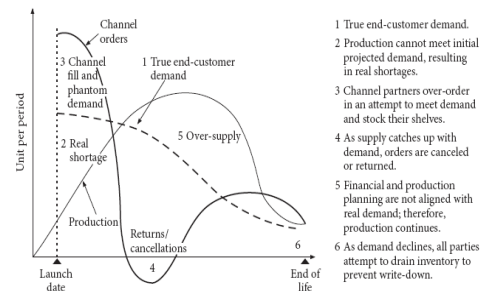


Chapter 7 Demand Management

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

Figure 7-1 Supply/Demand Misalignment



Source: Accenture, Stanford University, and Northwestern University, Customer-Driven Demand Networks: Unlocking Hidden Value in the Personal Computer Supply Chain (Accenture, 1997): 15.

Table 7-1 How Demand Management Supports Business Strategy

STRATEGY	EXAMPLES OF HOW TO USE DEMAND MANAGEMENT
Growth strategy	<ul style="list-style-type: none"> Perform "what if" analyses on total industry volume to gauge how specific mergers and acquisitions might leverage market share. Analyze industry supply/demand to predict changes in product pricing structure and market economics based on mergers and acquisitions. Build staffing models for merged company using demand data.
Portfolio strategy	<ul style="list-style-type: none"> Manage maturity of products in current portfolio to optimally time overlapping life cycles. Create new product development/introduction plans based on life cycle. Balance combination of demand and risk for consistent "cash cows" with demand for new products. Ensure diversification of product portfolio through demand forecasts.
Positioning strategy	<ul style="list-style-type: none"> Manage product sales through each channel based on demand and product economics. Manage positioning of finished goods at appropriate distribution centers, to reduce working capital, based on demand. Define capability to supply for each channel.
Investment strategy	<ul style="list-style-type: none"> Manage capital investments, marketing expenditures, and research and development budgets based on demand forecasts of potential products and maturity of current products. Determine whether to add manufacturing capacity.

Source: Jim R. Langabeer II, "Aligning Demand Management with Human Strategy," Supply Chain Management Review (May/June 2000): 68. Reprinted with permission of Supply Chain Management Review, a Capgemini publication.

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)

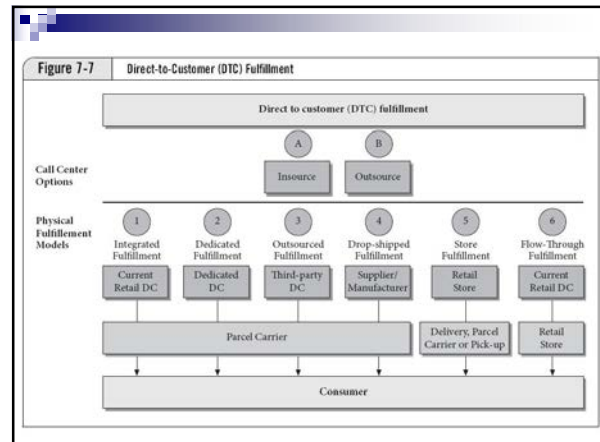
- Run initial sales forecast
- Demand planning – sales/marketing to review forecast and adjust for promotion & introduction of new products
- Supply planning – operations to review different options to match capacity to forecast
- Pre S&OP meeting – sales/marketing, operations, and finance work to solve 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 are 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

Nordstrom's DTC Fulfillment Center at Cedar Rapids, Iowa (Operated by 3PL)



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

Order Management

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

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

Profitability as a method to classify customers

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
 - charge 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.

Proper Product/Service Package for Each Customer Segment

Table 8-1

Hypothetical Product/Service Offerings: Option A

PRODUCT/SERVICE OFFERING	CUSTOMER SEGMENT A	CUSTOMER SEGMENT B	CUSTOMER SEGMENT C
Product quality (% defects)	Less than 1%	5%–10%	10%–15%
Order fill	98%	92%	88%
Lead time	3 days	7 days	14 days
Delivery time	Within 1 hour of request	On day requested	During week requested
Payment terms	4/10 net 30	3/10 net 30	2/10 net 30
Customer service support	Dedicated rep	Next available rep	Through Web site

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

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

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

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



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

Rationale for Holding Inventory

- 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 sits in a manufacturing facility.

Rationale for Holding Inventory

- 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.
 - Step 1, determine the value of the item stored in inventory.
 - 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.
 - 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

COST CATEGORY	COMPUTATION	ANNUAL COST
1. Direct materials, labor, overhead		\$614.65
2. Inbound freight to DC		\$ 32.35
3. Labor	\$10 per unit received plus \$1 per unit per month \times 12 months	\$ 22.00
4. Space	\$0.30/sq. ft./month \times 8 sq. ft. \times 12 months	\$ 28.80
5. Insurance	\$2.00 per unit per year	\$ 2.00
6. Interest	10% \times \$614.65	\$ 61.47
7. Taxes	\$5 per \$100 value \times 20%	\$ 6.15
8. Loss and damage	3.9% per year \times \$614.65	\$ 23.97
9. Obsolescence	1% per year \times \$614.65	\$ 6.15
10. Total inventory carrying costs		\$182.89
11. Inventory carrying cost percent	\$182.89/\$614.65	29.8%

Trade Off between Order Cost and Inventory Carrying Cost

Table 9-9 Summary of Inventory and Order Cost

ORDER PERIOD	NUMBER OF ORDERS PER YEAR	AVERAGE INVENTORY (UNITS)	TOTAL ANNUAL ORDER COST**	CHANGE IN TOTAL ORDER COST	TOTAL ANNUAL INVENTORY CARRYING COST†	CHANGE IN TOTAL CARRYING COST	TOTAL COST
1 week	52	50	\$10,400		\$1,250		\$11,650
2 weeks	26	100	5,200	−\$5,200	2,500	+\$1,250	7,700
4 weeks	13	200	2,600	−2,600	5,000	+2,500	7,600
13 weeks	4	650	800	−1,800	16,250	+11,250	17,050
26 weeks	2	1,300	400	−400	32,500	+16,250	32,900
52 weeks	1	2,600	200	−200	65,000	+32,500	65,200

*Assumes sales or usage at 100 units per week. Average Inventory = (Beginning Inventory + Ending Inventory) \div 2
 **Cost per order is \$200.
 †Value is \$100 and carrying cost is 25%.

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

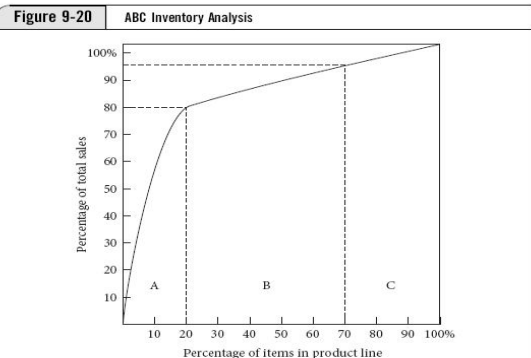
Vendor-Managed Inventory

- 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

Relationship between Items in Product line and Sales contribution



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

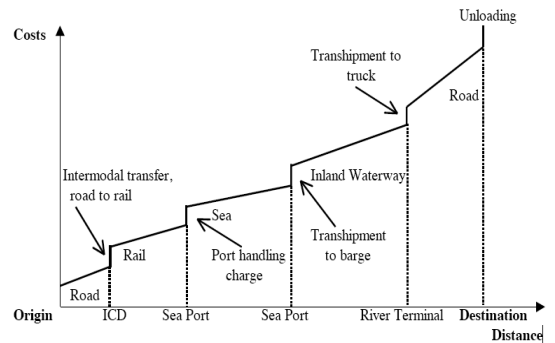
- truck
- rail
- air
- water
- pipeline
- multimodal transportation

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

Multimodal Transportation – Cost/Distance Graph



Terms of Sale & Responsibilities

Table 10-2 Key Responsibilities Under FOB and Freight Payment Terms

FOB TERM AND FREIGHT PAYMENT RESPONSIBILITY	WHO OWNS GOODS IN TRANSIT?	WHO HANDLES FREIGHT CLAIMS?	WHO SELECTS AND PAYS CARRIER?	WHO ULTIMATELY BEARS FREIGHT COSTS?	BEST USED WHEN _____ HAS GREATER INFLUENCE WITH CARRIER
FOB Origin, Freight Collect	Buyer	Buyer	Buyer	Buyer	Buyer
FOB Origin, Freight Prepaid	Buyer	Buyer	Seller	Seller	Seller
FOB Origin, Freight Prepaid & Charged Back	Buyer	Buyer	Seller	Buyer The seller adds freight costs to goods invoice.	Seller
FOB Destination, Freight Prepaid	Seller	Seller	Seller	Seller	Seller
FOB Destination, Freight Collect	Seller	Seller	Buyer	Buyer	Buyer
FOB Destination, Freight Collect & Allowed	Seller	Seller	Buyer	Seller The buyer deducts freight cost from goods payment.	Buyer

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

Common metrics for monitoring carrier performance

PERFORMANCE CRITERIA	WEIGHT FACTOR	PERFORMANCE EVALUATION	POTENTIAL SCORE	CRITERIA SCORE
On-time delivery	8	>98% = 5 96.01-98% = 4 94.01-96% = 3 92.01-94% = 2 <92% = 0	40	
Loss and damage rate	5	<0.5% = 5 0.5-1% = 4 1-1.5% = 3 1.5-2% = 2 >2% = 0	25	
Billing accuracy	3	>99% = 5 97-99% = 3 95-96% = 1 <95% = 0	15	
Equipment condition	2	Safe, clean, correct type = 5 Poor condition, incorrect = 0	10	
Customer service	2	Superior = 5 Good = 4 Average = 3 Fair = 2 Unacceptable = 0	10	
Total Score			100	

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

Figure 11-1 The Distribution Center's Accumulation Role

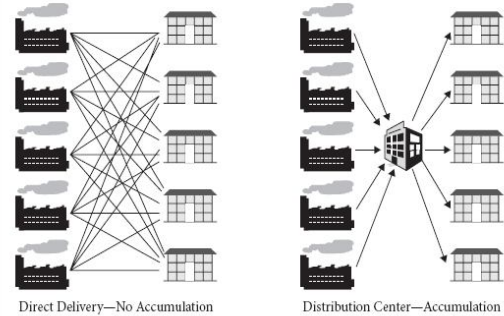
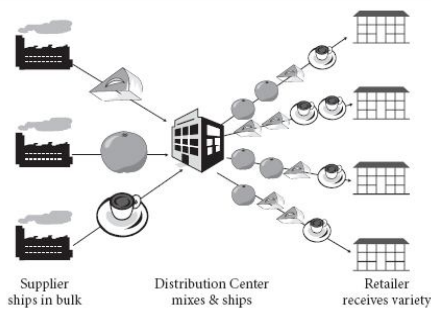


Figure 11-2 The Distribution Center's Mixing Capability



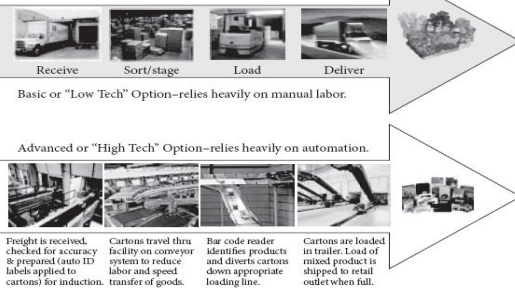
Distribution Planning & Strategy

- 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 trade offs before choosing direct shipping or movement through distribution facilities. Many companies have successfully use "cross docking" to improve distribution process.

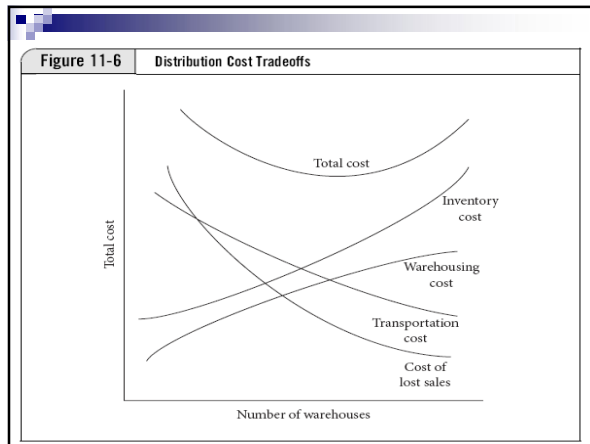
Figure 11-5 Cross-Docking Process

In cross-dock operations, goods flow from receiving to shipping with minimal interim sorting, thus eliminating storage and order picking—two costly, time-consuming activities—from the fulfillment 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



Distribution Facility Ownership

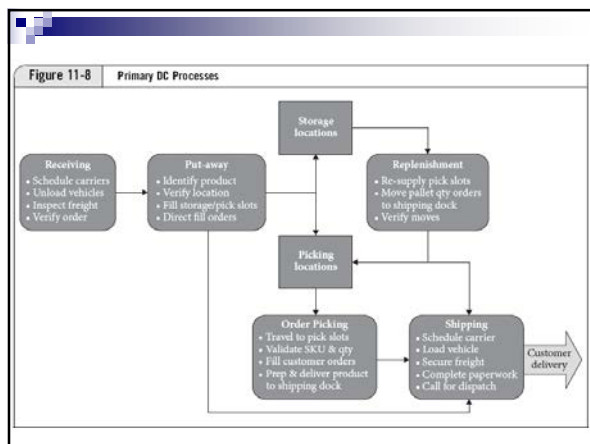
- Private or public distribution?
 - Private DCs are internally owned facilities
 - Contract warehousing is a customized version of public warehousing where a 3PL provides a variety of distribution services
- Choice between private and public distribution options requires significant planning and analysis

Table 11-2 Factors Affecting Distribution Facility Ownership

FIRM CHARACTERISTICS	FAVORS PRIVATE DISTRIBUTION	FAVORS 3PL DISTRIBUTION
Throughput volume	Higher	Lower
Demand variability	Stable	Fluctuating
Market density	Higher	Lower
Special physical control needs	Yes	No
Security requirements	Higher	Lower
Customer service requirements	Higher	Lower
Multiple use needs	Yes	No

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 tighter pallets
- Defer 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



Distribution Metrics

- 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 11-5 Top Distribution Measures and Benchmarks

MEASURE USED	REPORTED USAGE BY RESPONDENTS	BEST PRACTICE PERFORMANCE LEVEL
On-time shipment	96%	99-100%
Percent of overtime hours	92%	0-4%
Inventory count accuracy	91%	100%
On-time receipts	90%	98-100%
Percent of orders shipped complete	87%	99-100%
Order-picking accuracy	84%	100%
Annual workforce turnover	83%	0-3%
Percent of orders shipped without errors	83%	100%
Order fill rate	81%	99-100%
Average warehouse capacity used	81%	93-100%
On-time delivery	81%	Varies by definition

Source: Karl B. Marrott and Kate L. Vitasek, "DC Measures," WERWatch (Summer 2005).

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.

Need for Long Range Supply Chain Network Planning

- 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.

Need for Long Range Supply Chain Network Planning

- 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

Need for Long Range Supply Chain Network Planning

- 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)

Figure 12-1 Key Steps in the Logistics/Supply Chain Network Design Process

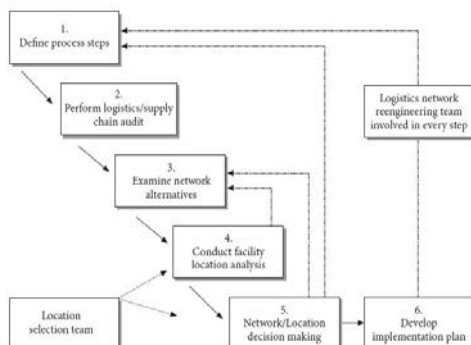


Table 12-1 Major Locational Determinants

NATIONAL/REGIONAL DETERMINANTS	SITE-SPECIFIC DETERMINANTS
Labor climate	Transportation access <ul style="list-style-type: none"> • Truck • Air • Rail • Water
Availability of transportation	
Services	
Infrastructure (road, rail, port, law, regulation, border management process, trade & transport impediments)	
Proximity to markets and customers	
Quality of life	
Taxes and industrial development incentives	Inside/outside metropolitan area
Supplier networks	Availability of workforce
Land costs and utilities	Land costs and taxes
Company preference	Utilities

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

Seven key steps in strategic sourcing methodology

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.

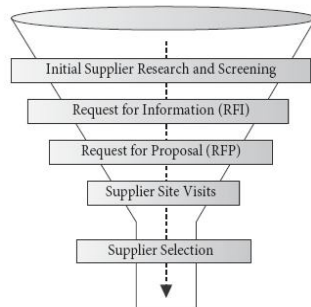
Step 6: Transition and Integrate

- 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.

Figure 13-6 Supplier Portfolio Screening Process



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

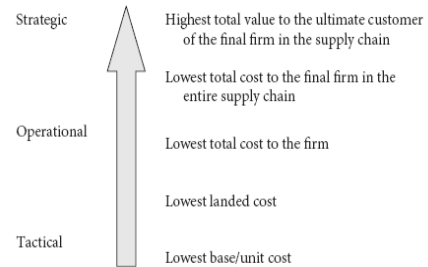
Supplier Commitment to Quality - Certifications and Registrations

- 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.

Figure 13-8 Hierarchy of Price Measurement Approaches



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 13-9 Total Procurement Price

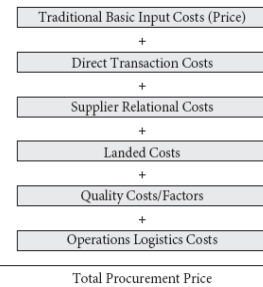
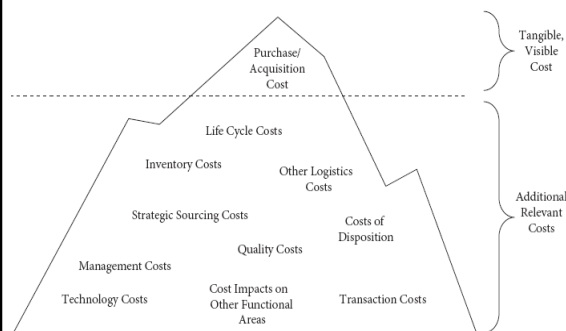


Figure 13-10 Understanding Total Cost of Ownership (TCO)



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

Figure 13-12 Advantages of Electronic Procurement

- Lower Operating Costs
 - Reduce paperwork
 - Reduce sourcing time
 - Improve control over inventory and spending
- Improve Procurement and Sourcing Efficiency
 - Find new supply sources
 - Improve communications
 - Improve personnel use
 - Lower cycle times
- Reduce Procurement Prices
 - Improve comparison shopping
 - Reduce overall prices paid

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

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.

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

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

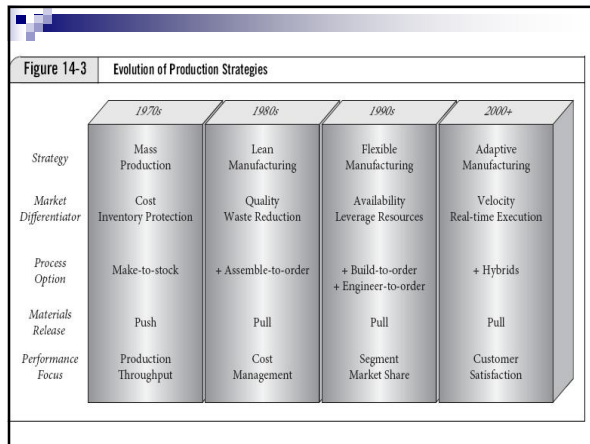
Production Strategies

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.



Production Process Functionality

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

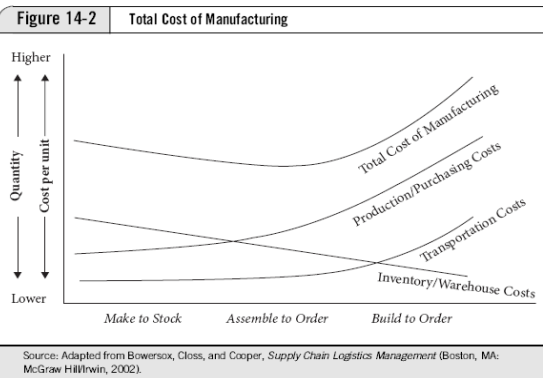


Table 14-1 TPS Seven Deadly Wastes

WASTE	DESCRIPTION
Overproduction	Making more parts than you can sell.
Delays	Waiting for processing, parts sitting in storage, etc.
Transporting	Excessive movement of parts to various storage locations, from process to process, etc.
Overprocessing	Doing more "work" to a part than is required.
Inventory	Committing money and storage space to parts not sold.
Motion	Moving parts more than the minimum needed to complete and ship them.
Making defective parts	Creating parts that cannot be sold "as is" or that must be reworked, etc.

TPS = Toyota Production System

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 14-2 Dimensions of Adaptive Manufacturing

CHARACTERISTIC	DESCRIPTION
Plan	Optimize and schedule production floor operations based on resource availability.
Execute	Manage, build, move, modify, track, and document activities on the production floor.
Sense	Monitor continually and alert in real time relevant expectations that impact production floor operations.
Respond	Act rapidly and efficiently on production floor to correct internal and external deviations.
Learn	Evolve continually and incorporate knowledge into manufacturing processes.

Source: *Manufacturing Strategy: An Adaptive Perspective* (Newtown Square, PA: SAP AG, 2003). Available from http://www.sap.com/solutions/business-suite/scm/pdf/BWP_Mfrl_Strategy.pdf. Reprinted by permission.

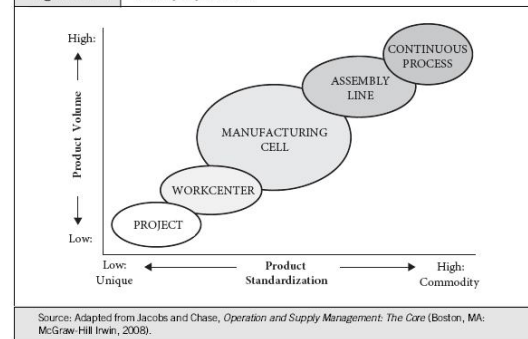
Production Process Layout

- 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
 - product-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.

Figure 14-5 Facility Layout Matrix



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.
 - Reverse 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)

Figure 15-1 A Closed Loop Supply Chain for Cartridge Reuse

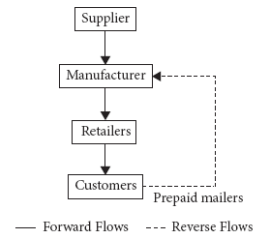
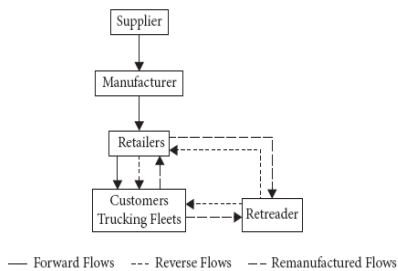


Figure 15-3 A Closed Loop Supply Chain for Commercial Tire Retreading



Reverse Logistics System



Reverse Logistics

- Customer Returns
 - Reasons for customer returns include defective or unwanted items, warranty problems, recalls, and miss-shipments.
- Environmental Challenges
 - Recycling and environmental concerns are frequently associated with regulatory policy. Increasingly a focus of firms in supply chain design.
- Economic Value
 - Corporations increasingly view reverse flows as a value stream instead of a waste stream.
- Making reverse flows profitable is a challenge as well as an opportunity.

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

Principles of Supply Chain Management

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

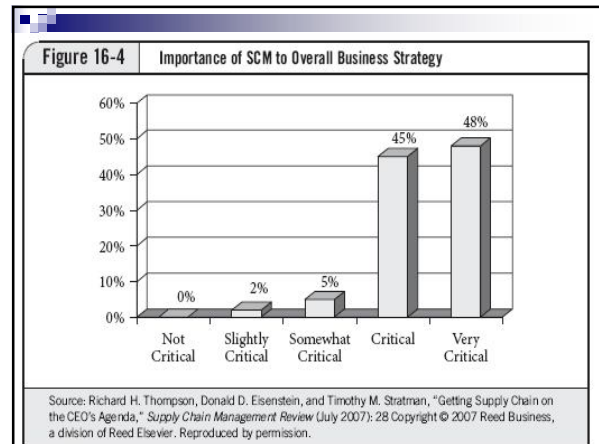
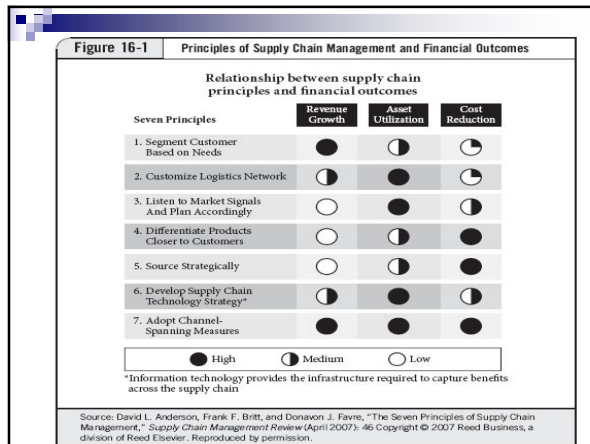
- replace inflexible, poorly integrated transactional systems with enterprise-wide systems that provides current, actionable information

Principles of Supply Chain Management

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

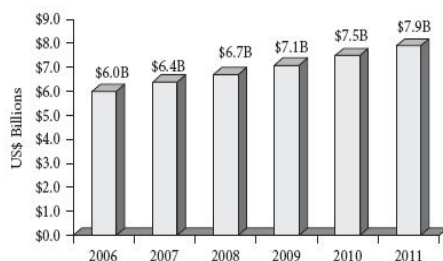
Financial Strategies

- 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.

Figure 16-5 SCM Technology Applications Revenue Estimate, 2006-2011



Source: John Fontanelle, Mark Hillman, Marianne D'Aquila, and Karen Carter, *The Supply Chain Management Market Sizing Report 2006-2011* (AMR Research, July 30, 2007). Reproduced by permission.

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

Elements of successful supply chain collaborations

- 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 16-1 Business Processes That Would Benefit from Improved Collaboration with 3PLs

BUSINESS PROCESS	ALL REGIONS	NORTH AMERICA	EUROPE	ASIA-PACIFIC	LATIN AMERICA
Inventory management	51%	49%	46%	51%	60%
Customer order management	49	44	55	49	50
Customer service	43	39	44	37	58
Supplier order management	41	45	34	41	40
International trade logistics	38	36	27	44	50
Sales and operations planning	36	25	41	34	52
Supply planning	33	28	29	36	42
Repack/returns management	29	25	28	35	25
Compliance (e.g., Sarbanes-Oxley, customs, etc.)	29	24	25	36	34
Demand planning	26	23	24	28	27
Accounts payable/receivable processes	18	18	18	17	18
Manufacturing scheduling	17	15	14	22	21
Product launch	16	18	11	16	20
Warranty management	12	10	6	17	18

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

Source: C. John Langley Jr. and Capgemini, LLC, 12th Annual Third-Party Logistics Study (2007). Reproduced by permission.

Exhibit 7 Joint Performance Measures

