Chapter 5 – Supply Chain Management

Fundamentals of Operations Management

Lecturer:- Prem Gaire
Boston International College (Pokhara University)

Learning Objectives

- Describe the strategic importance of supply chains
- Describe the supply chain strategies
- Describe supply chains for service orgs
- Describe the major issues that affect supply chain management
- Describe electronic commerce
- Describe global issues in supply chain management

Learning Objectives con't

- Describe supply chain performance metrics
- Outsourcing & Risks in Outsourcing
- Ethical issues in Outsourcing

Supply Chains & SCM Defined

A supply chain is the network of all the activities involved in delivering a finished product/service to the customer

- Sourcing of: raw materials, assembly, warehousing, order entry, distribution, delivery

Supply Chain Management is the vital business function that coordinates all of the network links

- Coordinates movement of goods through supply chain from suppliers to manufacturers to distributors
- Promotes information sharing along chain like forecasts, sales data, & promotions

SCM and Logistics Management

Supply chain management is a way to link major business processes within and across companies into a high-performance business model that drives competitive advantage.

Logistics refers to the movement, storage, and flow of goods, services and information inside and outside the organization

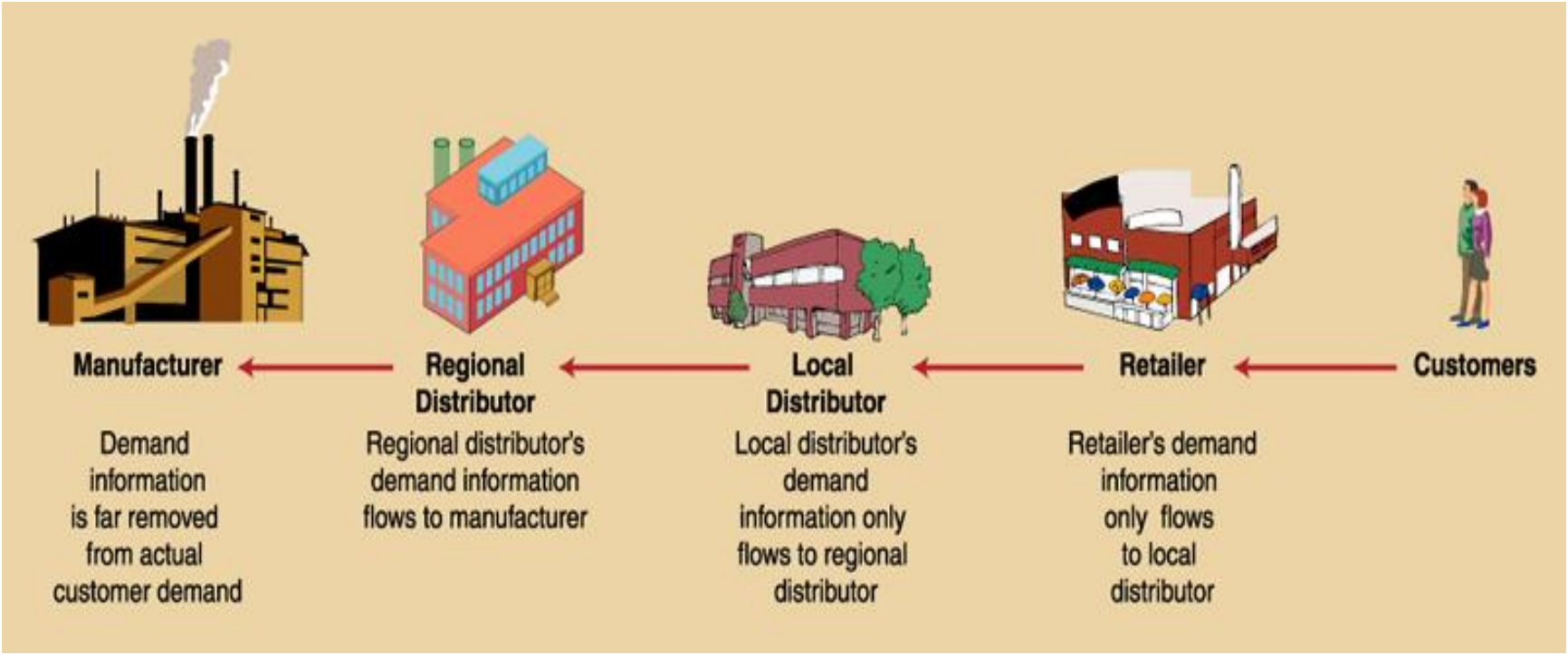
Components of a Supply Chain for a Manufacturer

- External Suppliers – source of raw material
  - Tier one supplier supplies directly to the processor
  - Tier two supplier supplies directly to tier one
  - Tier three supplier supplies directly to tier two
- Internal Functions include – processing functions
  - Processing, purchasing, planning, quality, shipping

Components of a Supply Chain

- Upstream
  - Suppliers (Tier 1, Tier 2, Tier 3)
- Manufacturer
- Downstream
  - Distributor (Dealer, wholesaler, etc)
  - Retailer
  - Customer

A Traditional Supply Chain Information Flow



How Supply-Chain Decisions Impact Strategy

	Low-Cost Strategy	Response Strategy	Differentiation Strategy
Process Characteristics	Maintain high average utilization	Invest in excess capacity and flexible processes	Modular processes that lend themselves to mass customization
Inventory Characteristics	Minimize inventory throughout the chain to hold down cost	Develop responsive system with buffer stocks positioned to ensure supply	Minimize inventory in the chain to avoid obsolescence

Table 11.1

The Bullwhip Effect - defined

Bullwhip effect - the inaccurate or distorted demand information created in the supply chain

- **Causes are generated by**:
  - demand forecasting updating,
  - order batching,
  - price fluctuations,
  - rationing and
  - gaming

The Bullwhip Effect

Counteracting the Effect:

- Change the way suppliers forecast product demand by making this information available at all levels of the supply chain
- Share real demand information (POS terminals)
- Eliminate order batching
- Stabilize pricing
- Eliminate gaming

Supply Chain Strategies

- Multiple Suppliers
- Few Suppliers
- Vertical Integration
- Keiretsu Network
- Virtual Companies

Vendor Selection

- Vendor Evaluation
  - It refers to finding potential vendors and determining the likelihood of them becoming good suppliers
    - Engineering, innovation, flexibility, technical assistance, delivery capability, Quality system, e-procurement, ERP, integrity (ethics/compliance)
- Vendor Development
  - Once vendor is evaluated and chosen then the vendor should transfer information regarding quality, product specifications, schedules, delivery, payment system and procurement policies, which is known as vendor development
- Negotiation
  - It refers to the terms and condition of the contractual relationship in relation to quality, delivery, payment and cost.
    - Cost based price model, market-based price model and competitive bidding

Logistics Management

- Concept:
  - Logistic management is an approach that seeks efficiency of operations through the integration of all material acquisition, movement and storage activities.
- Distribution Systems
  - Distribution systems can be defined as a sequential flow of procedures, systems, and activities which are designed and linked to facilitate and monitor the movement of goods and services from the source to the consumer.

Logistics Management

- Five Major Means of Distributions
  - **Trucking**: Vast majority of manufactured goods are moved by truck. Trucks provide flexibility. Useful for JIT systems.
  - **Railroads**: Rails are capable of carrying large loads but have limited flexibility. Rails are loser for JIT system.
  - **Airfreight**: Airfreight offers speed and reliability for national and international movement of lightweight items, such as medicines, flowers, fruits, electronic components, etc. Expensive means of distribution
  - **Waterways**: Waterways are oldest and cheapest mode of cargo transportation. They carry bulk, low-value goods like iron ore, grains, cement, coal, petroleum products, etc.
  - **Pipelines**: Pipelines are important to transport crude oil, natural gas, and other petroleum and chemical products.

Logistics Management

- Third-party logistics
  - Outsourcing the logistics management to third party firms like FedEx, UPS, DHL, etc. helps drive down inventory management cost, alongside improving reliability and speed.
- Cost of Shipping Alternatives
  - Long transit time = longer time of money invested
  - Faster shipping = more expensive
  - Holding cost vs shipping cost (which ever is lower)
  - Other factors like being on schedule, making customer happy, getting new product to market on time, etc need to be considered

Outsourcing

- Outsourcing is the act of moving some of the firm's internal activities and decision responsibility to outside providers.
- Offshoring = moving some of the business process to a foreign country while retaining the control over the business process.

Types of Outsourcing

- Any business activity can be outsourced
- However the following can be outsourced
  - Purchasing
  - Logistics
  - R & D
  - Operation of facilities
  - Management of services
  - Sales/marketing
  - Accounting
  - Training
  - Legal processes

Advantages of Outsourcing

- Cost savings
- Gaining outside expertise
- Improving operations and service
- Focusing on core competencies
- Gaining outside technology
- Other advantages
  - Association with outstanding supplier
  - Downsizing or "reengineering" of its business

Disadvantages of Outsourcing

- Increased transportation costs
- Loss of control
- Creating future competitions
- Negative impact on employees
- Longer-term impact

Risks in Outsourcing

- Nearly half of outsourcing agreements fail because of inappropriate planning and analysis.
- Sometimes, outsourcing may look like a failure due to high expectation (cost reduction goal of 70% may cause the achievement of 30% cost reduction look like a failure)
- The business will lose its expertise, and control over its outsourced business activity
- Other risks: changes in employment levels, vastly expanded logistic issues like insurance, customs, time, etc.

Ethical Issues in Outsourcing

Laws, trade agreements, and business practices are contributing to a growing set of international ethical practices for the outsourcing industry.

Electronics industry (comprising of HP, Dell, IMB, Intel and 12 other companies) have created the 'Electronics Industry Code of Conduct' (EICC) which

- Sets environmental standards
- Bans child labour and excessive overtime
- Audits outsourcing producers to ensure compliance

Ethical Issues in Outsourcing

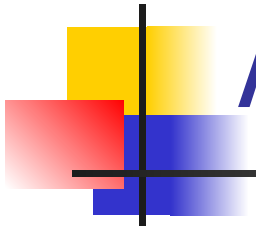
Ethics Principle	Outsourcing Linkage
Do not harm indigenous culture	E.g. do not make employees work during religious holidays
Do not harm ecological systems	Don't use outsourcing to move pollution from one country to another
Uphold universal labour standards	Don't use outsourcing to take advantage of cheap labour that leads to employee abuse
Uphold basic human rights	Don't accept outsourcing that violates human rights

Supply Chain Metrics

Percentage of Inventory Invested = Total Inventory Investment/Total Assets x 100

Inventory Turnover = Cost of Goods Sold/Inventory Investment

Weeks of Supply = Inventory Investment/(Avg. Cost of Goods Sold/52 Weeks)



Additional Reading

Additional reading for your reference.

Major Issues Affecting SCM

- Information technology – enablers include the Internet, Web, EDI, intranets and extranets, bar code scanners, and point-of-sales demand information
- E-commerce and e-business – uses internet and web to transact business

Major Issues con't

- Business-to-business (B2B) E-commerce – businesses selling to and buying from other businesses
- Business-to-Business (B2B) Evolution:
  - Automated order entry systems started in 1970's
  - Electronic Data Interchange (EDI) started in the 1970's
  - Electronic Storefronts emerged in the 1990's
  - Net Marketplaces emerged in the late 1990's

Major Issues con't

Benefits of B2B E-Commerce

- Lower procurement administrative costs,
- Low-cost access to global suppliers
- Lower inventory investment due to price transparency/reduced response time
- Better product quality because of increased cooperation between buyers and sellers, especially during the product design and development

Types of E-Commerce

Business-to-Consumer (B2C) E-Commerce - on-line businesses sell to individual consumers:

- Advertising Revenue Model – Provides users w/information on services & products; provides opportunity for suppliers to advertise
- Subscription Revenue Model – Web site charges a subscription fee for access to the site
- Transaction Fee Model – Company receives a fee for executing a transaction

Types of E-Commerce con't

- Sales Revenue Model – A means of selling goods, information, or service directly to customers
- Affiliate Revenue Model – Companies receive a referral fee for directing business to an affiliate
- Intranets – An organization's internal networks
- Extranets – Intranets linked to the Internet for suppliers and customers to interact within their system.

Major Issues con't

- **SCM** must consider the following trends, improved capabilities, & realities:
  - **Consumer Expectations and Competition** – power has shifted to the consumer
  - **Globalization** – capitalize on emerging markets
  - **Government Regulations and E-Commerce –** issues of Internet government regulations
  - **Green Supply Chain Management** – recycling, sustainable eco-efficiency, and waste minimization

Global SCM Factors

- **Managing extensive global supply chains introduces many complications**
  - **Infrastructure issues** like transportation, communication, lack of skilled labor, & scarce local material supplies
  - **Product proliferation** created by the need to customize products for each market

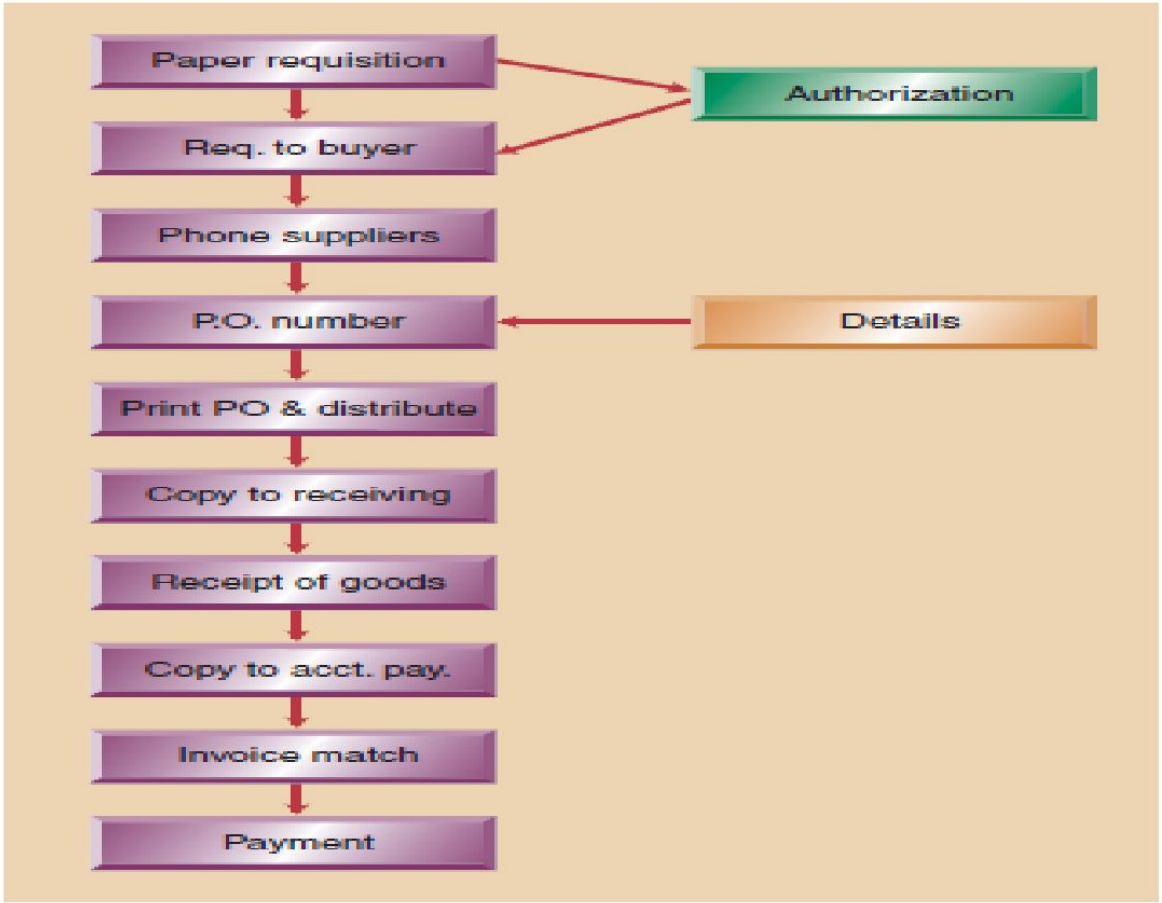
Sourcing Issues

- Which products to produce in-house and which are provided by other supply chain members
- Vertical integration – a measure of how much of the supply chain is owned by the manufacturer
  - Backward integration – owning or controlling of sources of raw material and component parts
  - Forward integration – owning or control the channels of distribution
- Vertical integration related to levels of insourcing or outsourcing products or services

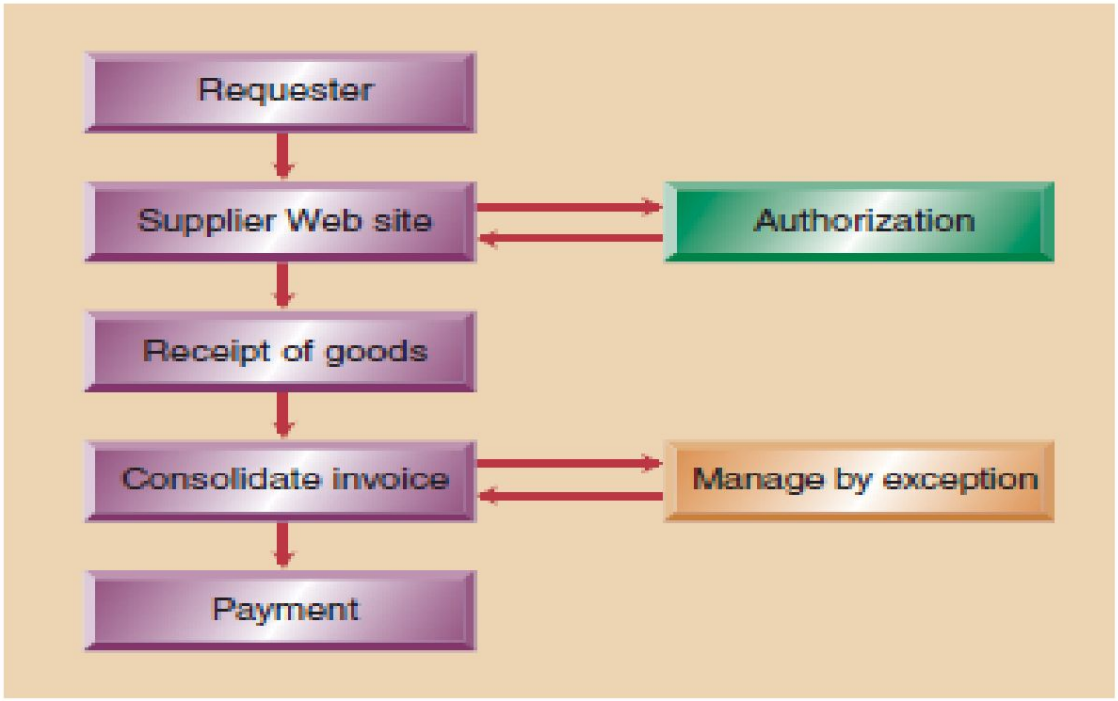
The Role of Purchasing

- The purchasing dept plays important role in SCM and is responsible for:
  - Selecting suppliers
  - Negotiating and administering long-term contracts
  - Monitoring supplier performance
  - Placing orders to suppliers
  - Developing a responsible supplier base
  - Maintaining good supplier relations

The Traditional Purchasing Process



The E-purchasing Process



Insourcing vs. Outsourcing

Questions to ask before sourcing decisions are made:

- Is product/service technology critical to firm's success?
- Is product/service a core competency?
- Is it something your company must do to survive?

Make or Buy Analysis

- Analysis will look at the expected sales levels and cost of internal operations vs. cost of purchasing the product or service

Total Cost of Outsourcing:

$$TC_{Buy} = FC_{Buy} + \left(VC_{Buy} \times Q\right)$$

Total Cost of Insourcing:

$$TC_{Make} = FC_{Make} + \left(VC_{Make} \times Q\right)$$

Indifference Point:

$$FC_{Buy} + \left(VC_{Buy} \times Q\right) = FC_{Make} + \left(VC_{Make} \times Q\right)$$

Make or Buy Example

Mary and Sue decide to open a bagel shop. Their first decision is whether they should make the bagels on-site or buy the bagels from a local bakery. If they buy from the local bakery they will need airtight containers at a fixed cost of $1000 annually. They can buy the bagels for $0.40 each. If they make the bagels in-house they will need a small kitchen at a fixed cost of $15,000 annually. It will cost them $0.15 per bagel to make. They believe they will sell 60,000 bagels.

Make or Buy Computation

- **Mary and Sue wants to know if they should make or buy the bagels.**
- $FC_{Buy} + (VC_{Buy} \times Q) = FC_{Make} + (VC_{Make} \times Q)$
- $\$1,000 + (\$0.40 \times Q) = \$15,000 + (\$0.15 \times Q)$
- $Q = 56,000$ bagels

The Role of Purchasing

Purchasing role has attained increased importance since material costs represent 50-60% of cost of goods sold

- Ethics considerations is a constant concern
- Developing supplier relationships is essential
- Determining how many suppliers to use
- Developing partnerships

Developing Supplier Relationship

A strong supplier base is critical to the success of many organizations

- Top three criteria for choosing suppliers are:
  - Price
  - Quality
  - On-time delivery

Critical Factors in Successful Partnership Relations

- Critical factors in successful partnering include:
  - Impact – attaining levels of productivity and competitiveness that are not possible through normal supplier relationships
  - Intimacy – working relationship between two partners
  - Vision – the mission or objectives of the partnership

Win-Win Factors in Partnership Relations

Have a long-term orientation

Are strategic in nature

Share information

Share risks and opportunities

Share a common vision

Share short/long term plans

Driven by end-customer needs

- **Benefits of Partnering**
  - Early supplier involvement (ESI) in the design process
  - Using supplier expertise to develop and share cost improvements and eliminate costly processes
  - Shorten time to market

Ethics in Supply Management

Global Standards of Supply Management Conduct from ISM:

- Loyalty to your organization
- Justice to those with whom you deal
- Faith in your profession

Supply Chain Distribution

- Warehouses involved in supply chain distributions and include
  - Plant warehouses
  - Regional warehouses
  - Local warehouses
- Warehouses can either be
  - General – used for long-term storage
  - Distribution – used for short-term storage, consolidation, and product mixing

Supply Chain Distribution con't

- Transportation consolidation – warehouses consolidate less-than-truckload (LTL) quantities into truckload (TL) quantities
- Product mixing – warehouse value added customer service of grouping a variety of products into a direct shipment to the customer

Supply Chain Distribution con't

- Services are offered can improve customer service by moving goods closer to the customer and thus reducing replenishment time
- Crossdocking or movement of material without storage and order-picking material while still performing the receiving and shipping functions.

Supply Chain Distribution con't

- Radio Frequency Identification Technology (RFID) – automated data collection technology which relies on radio waves to transfer data between reader and RFID tag
- Third-party Service Providers – ease of developing an electronic storefront has allowed the discovery of suppliers from around the world

Integrated SCM

- **Implementing integrated SCM requires:**
  - Analyzing the whole supply chain
  - Starting by integrating internal functions first
  - Integrating external suppliers through partnerships

- **Supplier's Goals**
  - Increase sales volume
  - Increase customer loyalty
  - Reduce cost
  - Improve demand data
  - Improve profitability

Integrated SCM con't

- Manufacturer's Goals
  - Reduce costs
  - Reduce duplication of effort
  - Improve quality
  - Reduce lead time
  - Implement cost reduction program
  - Involve suppliers early
  - Reduce time to market

Leveraging SCM: A List

1. Regularly assess your SC network to ensure continued suitability to your needs
2. Maintain a global view of demand.
3. Decide how to get products to your customers
4. Improve asset productivity.

Leveraging SCM: A List con't

5. Expand your visibility.
6. Know what happens, when it happens.
7. Design to deliver.
8. Track performance to allow for continuous improvements.

Implementing these strategies should reduce operating expenses and result in benefits for members of chain.

Eliminating Sources of Waste in Supply Chain

- Overproduction: don't build product before needed
- Delay between activities in chain: eliminate them
- Unnecessary transport or conveyance of product: includes both internal and external movement

Eliminating Sources of Waste in Supply Chain con't

- Unnecessary movement of people: includes travel or reaching due to poorly designed work space
- Excess inventory ready and in position: includes early deliveries, excess inventory, etc.
- Suboptimal use of space: trailer loads, warehouses, etc.
- Errors that cause rework: billing errors, inventory discrepancies, etc.

Supply Chain Metrics

- **Measuring supply chain performance**
  - Traditional measures include:
    - Return on investment
    - Profitability
    - Market share
    - Revenue growth
  - Additional measures
    - Customer service levels
    - Inventory turns
    - Weeks of supply
    - Inventory obsolescence

Supply Chain Performance Metrics con't

- Customer demands for better-quality requires company's to develop ways to measure improvements
- Some measurements include:
  - Warranty costs
  - Products returned
  - Cost reductions allowed because of product defects
  - Company response times
  - Transaction costs

Current Trends in SCM

Increased use of electronic marketplace such as:

- E-distributors – independently owned net marketplaces having catalogs representing thousands of suppliers and designed for spot purchases
- E-purchasing – companies that connect on-line MRO suppliers to business who pay fees to join the market, usually for long-term contractual purchasing

Current Trends in SCM – con't

- Value chain management – automation of a firm's purchasing or selling processes
- Exchanges – marketplace that focuses on spot requirements of large firms in a single industry
- Industry consortia – industry-owned markets that enable buyers to purchase direct inputs from a limited set of invited suppliers

- Decreased supply chain velocity due to greater distances with greater uncertainty and generally less efficient.
- Greening of the supply chain: packaging, distribution, carbon footprints, etc.

SCM Across the Organization

SCM changes the way companies do business.

- Accounting shares SCM benefits due to inventory level decreases
- Marketing benefits by improved customer service levels
- Information systems are critical for information sharing through PSO data, EDI, RFID, the Internet, intranet, and extranets
- Purchasing is responsible for sourcing materials
- Operations use timely demand information to more effectively plan production schedules

Chapter 4 Highlights

- Every organization is part of a supply chain, either as a customer or as a supplier. Supply chains include all the processes needed to make a finished product. SCM is the integration and coordination of these efforts.
- The bullwhip effect distorts product demand information passed between levels of the supply chain. The more levels that exist, the more distortion that is possible.
- Supply chains for service organizations can have external suppliers, internal processes and external distributors.

Chapter 4 Highlights con't

- Many issues affect supply chain management. The Internet, the WEB, EDI, intranets, extranets, bar-code scanners, and POS data are SCM enablers.
- B2B and B2C electronic commerce enable supply chain management. Net marketplaces bring together thousands or suppliers and customers. Allowing for efficient sourcing and lower transaction costs.

Chapter 4 Highlights con't

- Global supply chains increase geographic distances between members, causing greater uncertainty in delivery times.
- Government regulation affects SCM on several levels.
- Green SCM focuses on the environment and the processes in the SC that affect the environment.
- Purchasing has a major role in SCM. Purchasing is involved in sourcing decisions and developing strategic long-term partnerships.
- Sourcing is critical in establishing a solid, responsive supplier base.

Chapter 4 Highlights con't

- Companies make insourcing and outsourcing decisions. These make-or-buy decisions are based on financial and strategic criteria.
- Partnerships require sharing information, risks, technologies, and opportunities. Impact, intimacy, and vision are critical to successful partnering.
- Ethics in supply management is an ongoing concern. Since buyers are in a position to influence or award business, it is imperative that buyers avoid any appearance of unethical behavior or conflict of interest.

Chapter 4 Highlights con't

- Supply chain distribution requires effective warehousing operations. The warehouses provide transportation, consolidation, product mixing, and service.
- Implementing SCM usually begins with the manufacturer integrating internal processes first. The, the company tries to integrate the external suppliers. The last step is integrating the external distributors.
- A company needs to evaluate the performance of its supply chain. Regular performance metrics (ROI, profitability, market share, customer service levels, etc.) and other measures that reflect the objectives of the SC are used.

Chapter 4 Highlights con't

- The emergence of net marketplaces has significantly affected SCM. As supply chains become longer, it is likely that supply chain velocity will decrease. It is possible that a more strategic and integrated approach is needed to advance SCM to the next level.