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Supply Chain Drivers and Metrics

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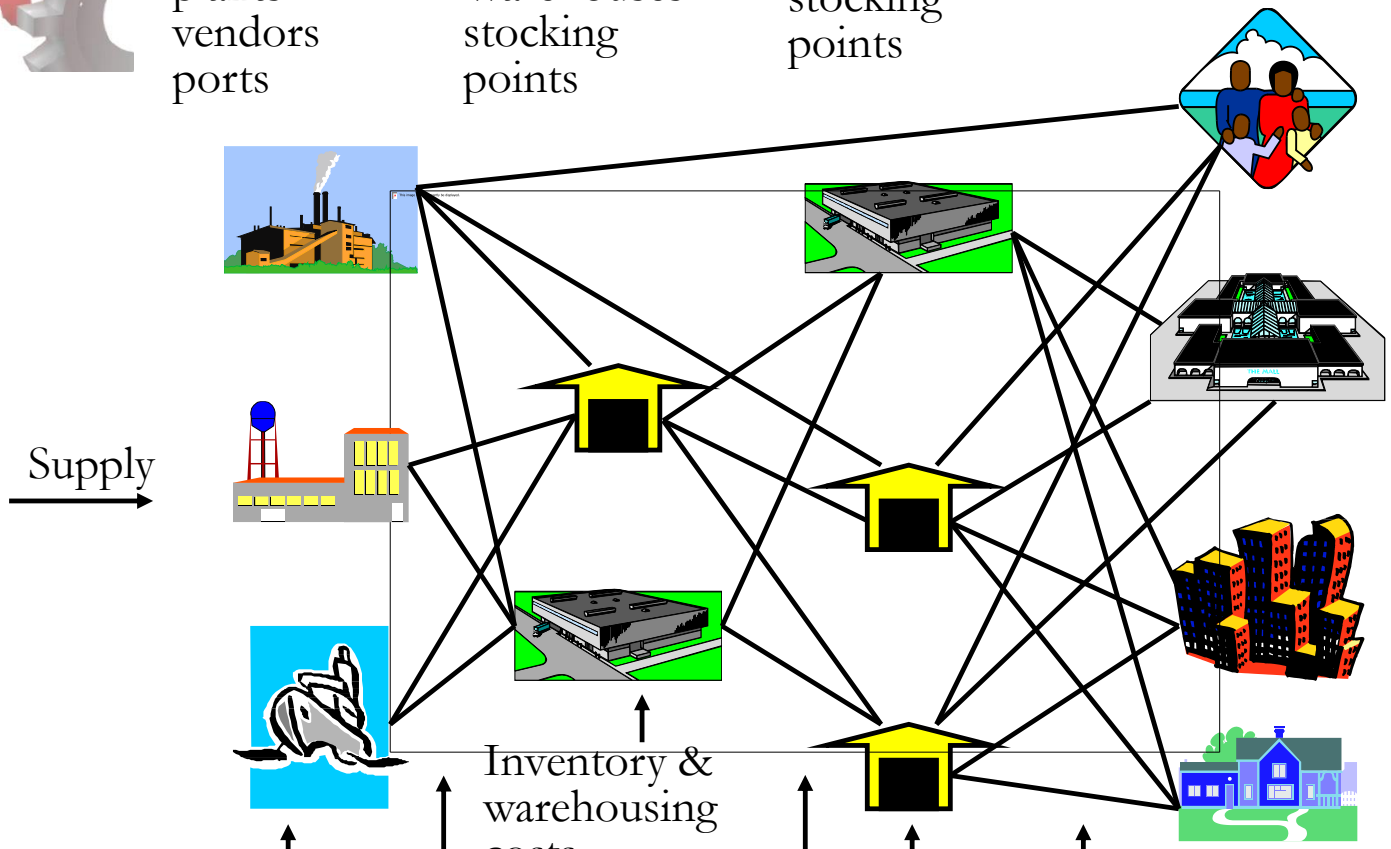
PowerPoint presentation to accompany
Chopra and Meindl Supply Chain Management, 5e

Sources: plants vendors ports

Regional Warehouses: stocking points

Field Warehouses: stocking points

Customers, demand centers sinks



Supply

Inventory & warehousing costs

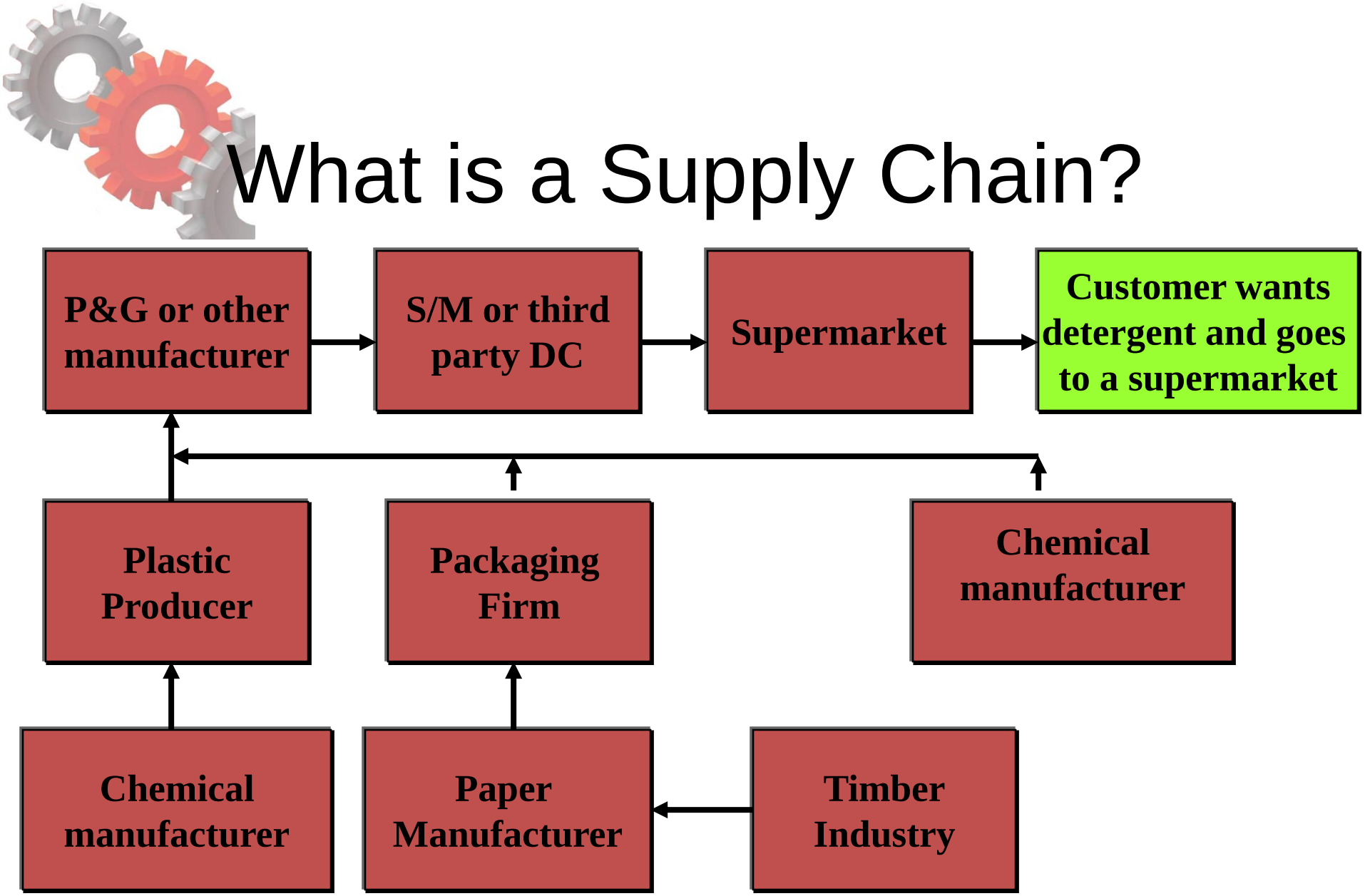
Production/ purchase costs

Transportation costs

Inventory & warehousing costs

Transportation costs

What is a Supply Chain?



What Is A Supply Chain?

- The system of suppliers, manufacturers, transportation, distributors and vendors that exists to transform raw materials to final products and supply those products to customers.
- That portion of the supply chain which comes after the manufacturing process is sometimes known as the distribution network.

What Is the Goal of Supply Chain Management?

- Supply chain management is concerned with the efficient integration of suppliers, factories, warehouses and stores so that merchandise is produced and distributed:
  - In the right quantities
  - To the right locations
  - At the right time
- In order to
  - Minimize total system cost
  - Satisfy customer service requirements

Decision phases in a supply chain

1. **Supply chain strategy or design** (several years)
- products to be produced
- chain configuration
- resources to be allocated
- facilities and relevant capacities
- markets to be served

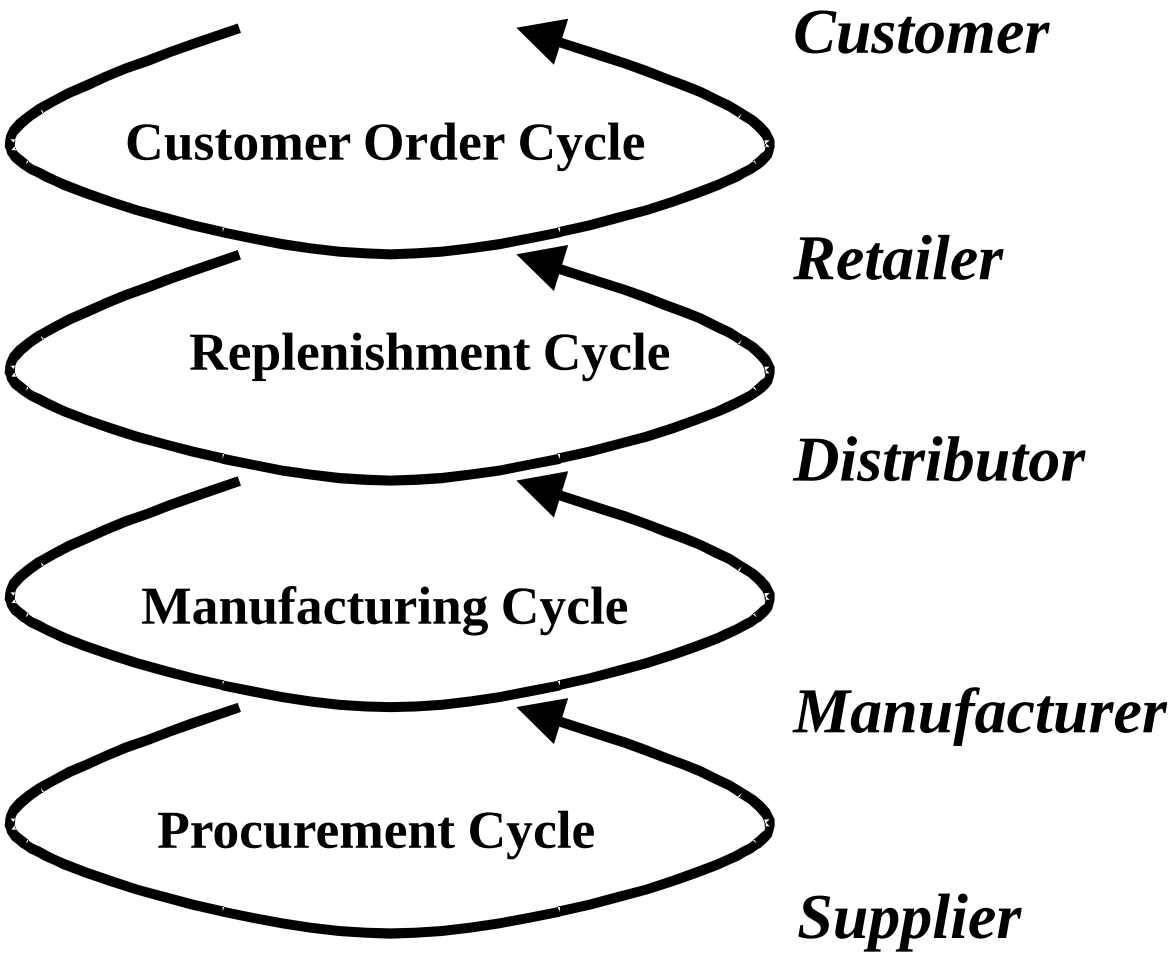
2. **Supply chain planning** (a quarter to year)
- which markets will be supplied from which locations
- make or buy
- inventory policies to be followed
- timing and size of marketing

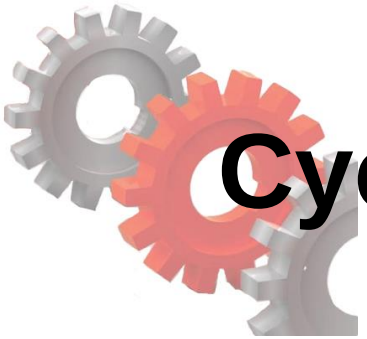
3. **Supply chain operation** (weekly or daily)
- handling incoming customer orders

Process View of a Supply Chain

- Cycle view: processes in a supply chain are divided into a series of cycles, each performed at the interfaces between two successive supply chain stages
- Push/pull view: processes in a supply chain are divided into two categories depending on whether they are executed in response to a customer order (pull) or in anticipation of a customer order (push)

Cycle View of Supply Chains





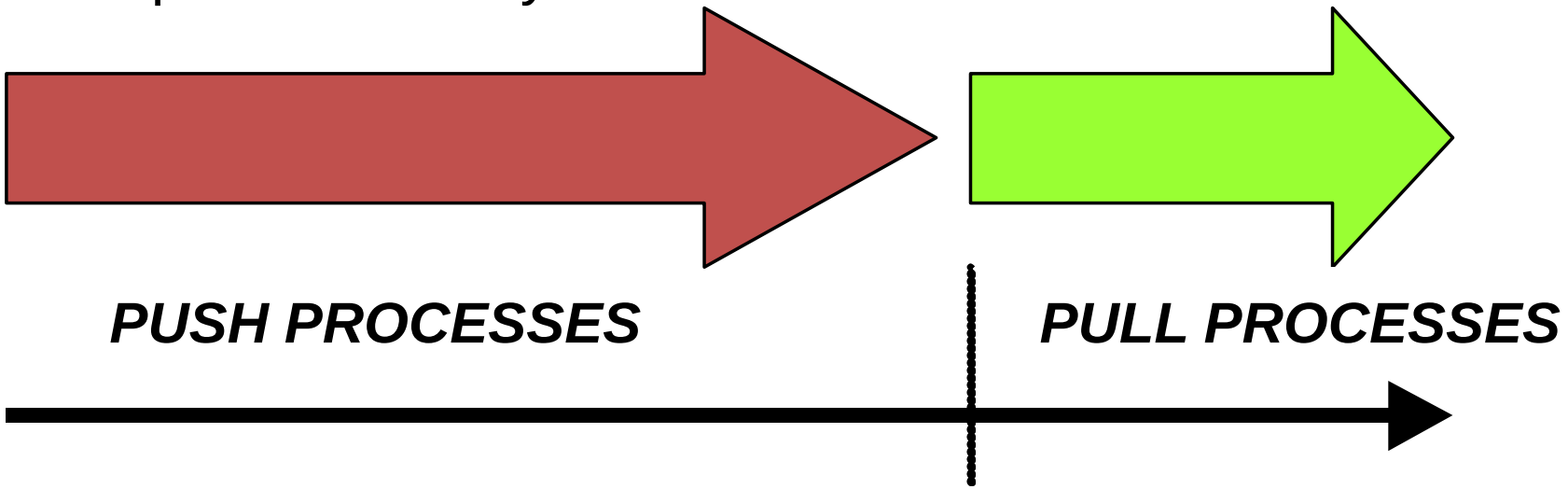
Cycle View of a Supply Chain

- Each cycle occurs at the interface between two successive stages
- Customer order cycle (customer-retailer)
- Replenishment cycle (retailer-distributor)
- Manufacturing cycle (distributor-manufacturer)
- Procurement cycle (manufacturer-supplier)
- Cycle view clearly defines processes involved and the owners of each process. Specifies the roles and responsibilities of each member and the desired outcome of each process.

Push/Pull View of Supply Chains

Procurement, Manufacturing and Replenishment cycles

Customer Order Cycle



Customer Order Arrives

Push/Pull View of Supply Chain Processes

- Supply chain processes fall into one of two categories depending on the timing of their execution relative to customer demand
- Pull: execution is initiated in response to a customer order (reactive)
- Push: execution is initiated in anticipation of customer orders (speculative)
- Push/pull boundary separates push processes from pull processes

Supply Chain Macro Processes

All supply chain processes discussed in the two process views can be classified:

- Customer relationship management
- Internal supply chain management
- Supplier relationship management

Drivers of Supply Chain Performance

- Facilities
  - The physical locations in the supply chain network where product is stored, assembled, or fabricated
- Inventory
  - All raw materials, work in process, and finished goods within a supply chain
- Transportation
  - Moving inventory from point to point in the supply chain

Drivers of Supply Chain Performance

- Information
  - Data and analysis concerning facilities, inventory, transportation, costs, prices and customers throughout the supply chain
- Sourcing
  - Who will perform a particular supply chain activity
- Pricing
  - How much a firm will charge for the goods and services that it makes available in the supply chain

A Framework for Structuring Drivers

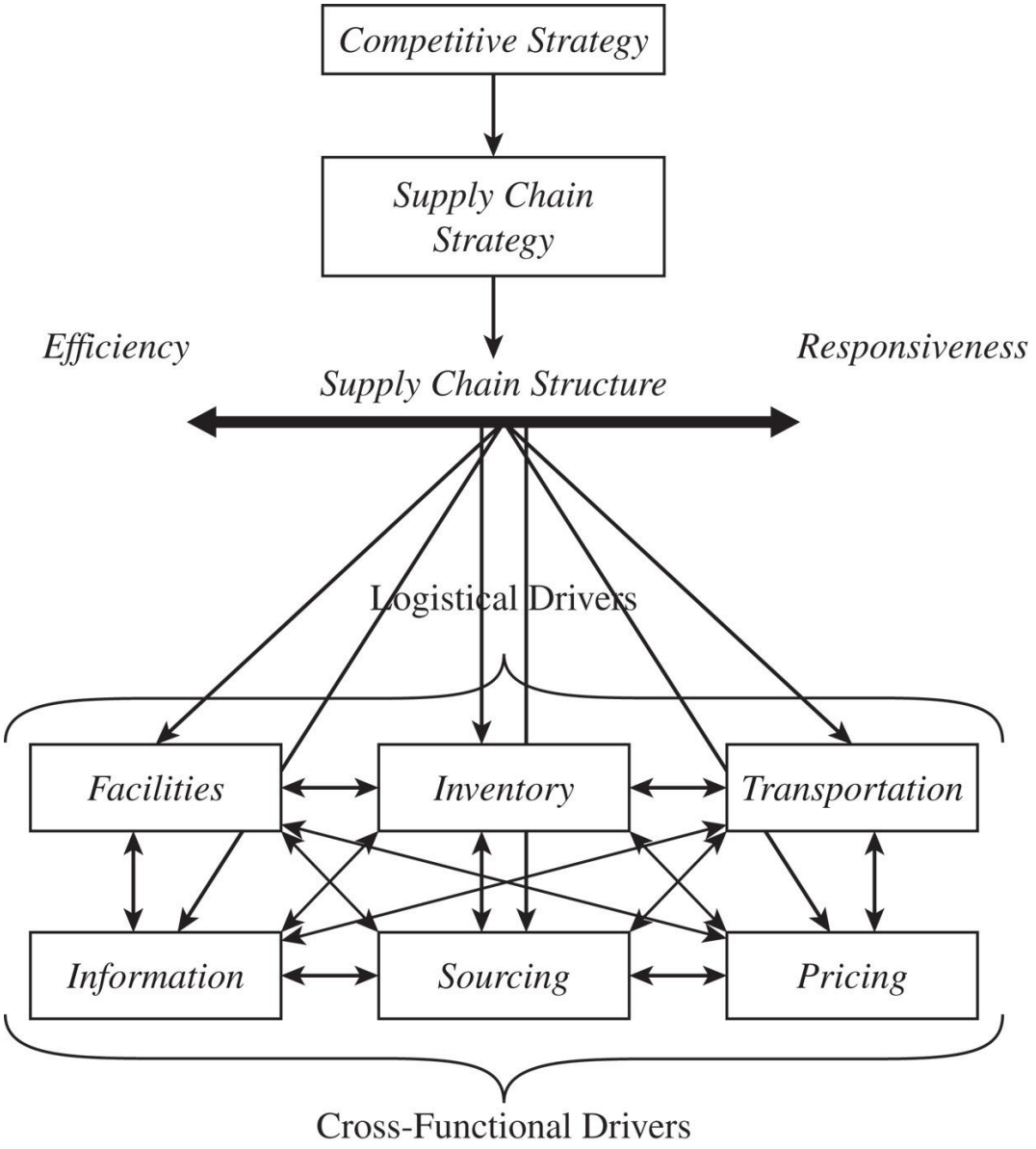


Figure 3-1

Inventory

- **Role in the Supply Chain**
  - Mismatch between supply and demand
  - Satisfy demand
  - Exploit economies of scale
  - Impacts assets, costs, responsiveness, material flow time

Inventory

- *Material flow time,* the time that elapses between the point at which material enters the supply chain to the point at which it exits
- *Throughput,* the rate at which sales occur
- Little's law

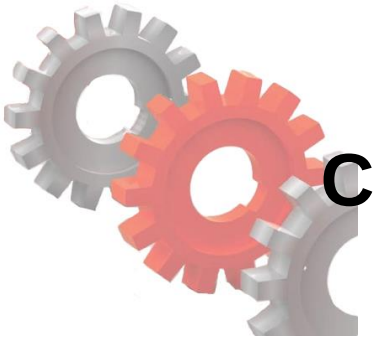
$$I = DT$$

where

I = flow time, T = throughput, D = demand

Inventory

- **Role in Competitive Strategy**
  - Form, location, and quantity of inventory allow a supply chain to range from being very low cost to very responsive
  - Objective is to have right form, location, and quantity of inventory that provides the right level of responsiveness at the lowest possible cost

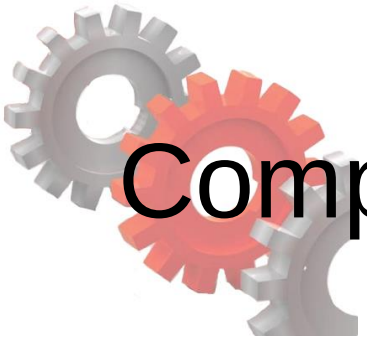


Components of Inventory Decisions

- **Cycle inventory**
  - Average amount of inventory used to satisfy demand between shipments
  - Function of lot size decisions
- **Safety inventory**
  - Inventory held in case demand exceeds expectations
  - Costs of carrying too much inventory versus cost of losing sales

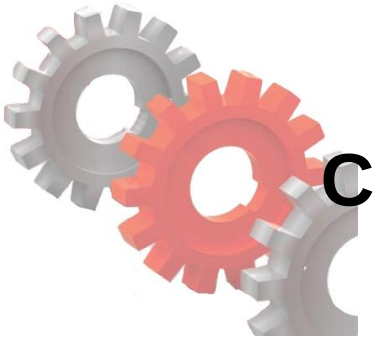
Components of Inventory Decisions

- **Seasonal inventory**
  - Inventory built up to counter predictable variability in demand
  - Cost of carrying additional inventory versus cost of flexible production
- ***Level of product availability***
  - The fraction of demand that is served on time from product held in inventory
  - Trade off between customer service and cost



Components of Inventory Decisions

- **Inventory-related metrics**
  - Cash-to-cash cycle time
  - Average inventory
  - Inventory turns
  - Products with more than a specified number of days of inventory
  - Average replenishment batch size



Components of Inventory Decisions

- **Inventory-related metrics**
  - Average safety inventory
  - Seasonal inventory
  - Fill rate
  - Fraction of time out of stock
  - Obsolete inventory

Inventory

- **Overall trade-off: Responsiveness versus efficiency**
  - Increasing inventory generally makes the supply chain more responsive
  - A higher level of inventory facilitates a reduction in production and transportation costs because of improved economies of scale
  - Inventory holding costs increase