

TRADE OFF IN TRANSPORTATION DESIGN

Trade-offs in Transportation Design

- **The supply chain goal is to minimize the total cost while providing the desired level of responsiveness to customers.**

Tailored Transportation

- **The use of different transportation networks and modes based on customer and product characteristics.**
- **Factors affecting tailoring:**
 - ↗ **Customer density and distance**
 - ↗ **Customer size**
 - ↗ **Product demand and value**

ROLE OF IT IN TRANSPORTATION

Role of IT in Transportation

- **IT software can assist in:**
 - Identification of optimal routes by minimizing costs subject to delivery constraints**
 - Optimal fleet utilization**
 - GPS applications**

RISK MANAGEMENT IN TRANSPORTATION

- **There are three main types of risk to consider when transporting a shipment between two nodes on the network:**
 - **1. The risk that the shipment is delayed.**
 - **2. The risk that the shipment does not reach its destination because intermediate nodes or links are disrupted by external forces.**
 - **3. The risk of hazardous material.**

MAKING TRANSPORTATION DECISIONS IN PRACTICE

Learning Objectives

- 1. Understand the role of sourcing in a supply chain.**
- 2. Discuss factors that affect the decision to outsource a supply chain function.**
- 3. Identify dimensions of supplier performance that affect total cost.**

Learning Objectives

- 4. Structure successful auctions and negotiations.**
- 5. Describe the impact of risk sharing on supplier performance and information distortion.**
- 6. Design a tailored supplier portfolio.**

THE ROLE OF SOURCING IN A SUPPLY CHAIN

The Role of Sourcing in a Supply Chain

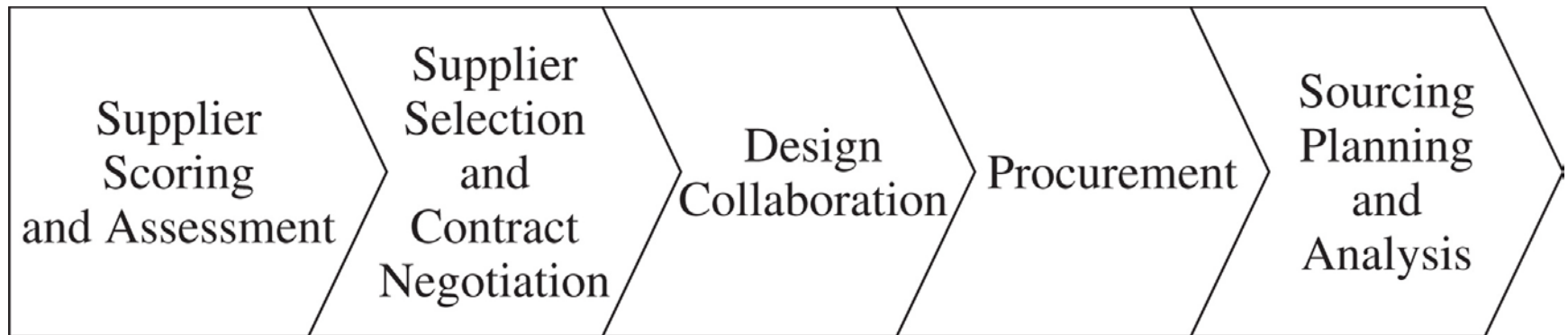
- Sourcing is the set of business processes required to purchase goods and services.
 - Outsourcing
 - Offshoring

The Role of Sourcing in a Supply Chain

- Outsourcing questions
 1. Will the third party increase the supply chain surplus relative to performing the activity in-house?
 2. How much of the increase in surplus does the firm get to keep?
 3. To what extent do risks grow upon outsourcing?

- A firm *off-shores a supply chain function if it maintains ownership* but moves the production facility offshore.
- In contrast, a firm *outsources if the firm* hires an outside firm to perform an operation rather than executing the operation within the firm.

The Role of Sourcing in a Supply Chain



Supplier Selection

- Identify one or more appropriate suppliers.
- Contract should account for all factors that affect supply chain performance.
- Should be designed to increase supply chain profits in a way that benefits both the supplier and the buyer.

Benefits of Effective Sourcing Decisions

- Better economies of scale through aggregated
- More efficient procurement transactions
- Design collaboration can result in products that are easier to manufacture and distribute
- Good procurement processes can facilitate coordination with suppliers
- Appropriate supplier contracts can allow for the sharing of risk
- Firms can achieve a lower purchase price by increasing competition through the use of auctions

IN HOUSE OR OUTSOURCE

In-House or Outsource

- Increase supply chain surplus through
 1. Capacity aggregation
 2. Inventory aggregation
 3. Transportation aggregation by transportation intermediaries
 4. Transportation aggregation by storage intermediaries
 5. Warehousing aggregation

In-House or Outsource

- 6. Procurement aggregation**
- 7. Information aggregation**
- 8. Receivables aggregation**
- 9. Relationship aggregation**
- 10. Lower costs and higher quality**

Factors for making sourcing decisions

- **What factors should be considered when making sourcing decisions?**

Factors for making sourcing decisions

- Replenishment lead time
- On-time performance
- Supply flexibility
- Delivery frequency/minimum lot size
- Supply quality
- Inbound transportation cost
- Pricing terms

THIRD AND FOURTH PARTY LOGISTICS PROVIDERS

Numerical

- Green Thumb, a manufacturer of lawn mowers and snow blowers, has historically purchased a thousand bearings per week from a local supplier who charges \$1.00 per bearing.
- The purchasing manager has identified another potential source willing to supply the bearings at \$0.97 per bearing

Numerical

- Before making his decision, the purchasing manager evaluates the performance of the two suppliers. The local supplier has an average lead time of two weeks and has agreed to deliver the bearings in batches of 2,000.

Numerical

- Based on past on-time performance, the purchasing manager estimates that the lead time has a standard deviation of one week.
- The new source has an average lead time of six weeks with a standard deviation of four weeks.

Numerical

- The new source requires a minimum batch size of 8,000 bearings. Which supplier should the purchasing manager go with? Green Thumb has a holding cost of 25 percent. It currently uses a continuous review policy for managing inventory and aims for a cycle service level of 95 percent. Weekly demand has a mean of 1,000 and a standard deviation of 300.

SUPPLIER SELECTION- AUCTIONS & NEGOTITATIONS

Supplier Selection – Auctions and Negotiations

- Auctions:
 - Sealed-bid first-price auctions
 - English auctions
 - Dutch auctions
 - Second-price (Vickery) auctions

Negotiations

- **The difference between the values of the buyer and seller is referred to as the *bargaining surplus*.**

BASIS AND RATIONALE

- **A supply chain contract specifies parameters governing the buyer-supplier relationship.**

Contracts, Risk Sharing, and Supply Chain Performance

1. How will the contract affect the firm's profits and total supply chain profits?
2. Will the incentives in the contract introduce any information distortion?
3. How will the contract influence supplier performance along key performance measures?

Contracts for Product Availability and Supply Chain Profits

- **Three contracts that increase overall profits by making the supplier share some of the buyer's demand uncertainty are:**
 - 1. Buyback or returns contracts**
 - 2. Revenue-sharing contracts**
 - 3. Quantity flexibility contracts**

Buyback Contracts

- Allows a retailer to return unsold inventory up to a specified amount at an agreed upon price.
- The manufacturer specifies a wholesale price c and a buyback price b .
- The manufacturer can salvage s_M for any units that the retailer returns.
- The manufacturer has a cost of v per unit produced and the retail price is p .

$$\begin{aligned} \text{Expected manufacturing profit} &= O^* (c - v) - (b - s_M) \\ &\times \text{expected overstock at retailer} \end{aligned}$$

Revenue-Sharing Contracts

- Manufacturer charges the retailer a low wholesale price c and shares a fraction f of the retailer's revenue.
 - Allows both the manufacturer and retailer to increase their profits.
 - Results in lower retailer effort.
 - Requires an information infrastructure.
 - Information distortion results in excess inventory in the supply chain and a greater mismatch of supply and demand.

Revenue-Sharing Contracts

$$CSL^* = \text{probability (demand} \leq O^*) = \frac{C_u}{C_u + C_o} = \frac{(1-f)p - c}{(1-f)p - s_R}$$

$$\begin{aligned} \text{Expected manufacturers profits} &= (c - v)O^* \\ &\quad + fp(O^* - \text{expected overstock at retailer}) \end{aligned}$$

$$\begin{aligned} \text{Expected retailer profit} &= (1-f)p(O^* - \text{expected overstock at retailer}) \\ &\quad + s_R \times \text{expected overstock at retailer} - cO^* \end{aligned}$$

Quantity Flexibility Contracts

- **Allows the buyer to modify the order (within limits) after observing demand.**
- **Better matching of supply and demand.**
- **Increased overall supply chain profits if the supplier has flexible capacity.**
- **Lower levels of information distortion than either buyback contracts or revenue sharing contracts.**

Quantity Flexibility Contracts

- If the retailer orders 0 units, the manufacturer is committed to supplying Q units.
- As a result, we assume that the manufacturer produces Q units. *The retailer purchases q units if demand D is less than q , D units if demand D is between q and Q , and Q units.*
- if demand is greater than Q . *Note that in the following formulas, F_s is the standard normal cumulative distribution function and f_s is the standard normal density function.*

DESIGN COLLABORATION

THE PROCUREMENT PROCESS

Product Categorization

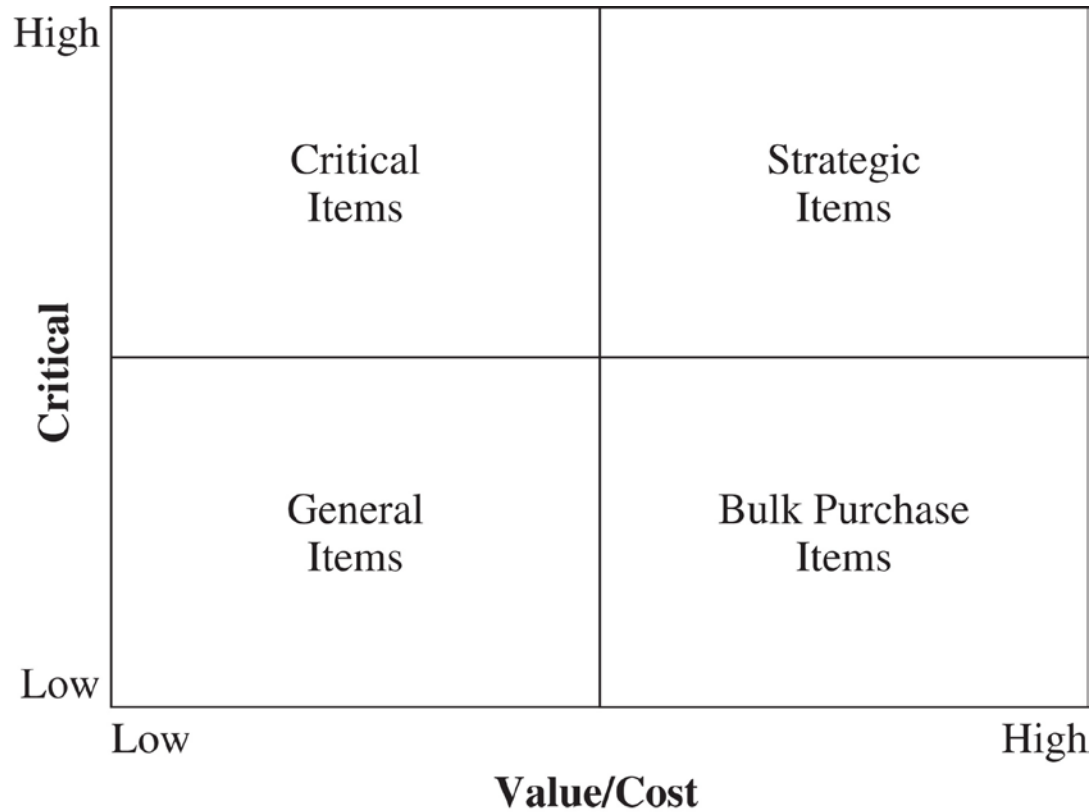


Figure 15-2

DESIGNING A SOURCING PORTFOLIO

Designing a Sourcing Portfolio: Tailored Sourcing

- **Tailor supplier portfolio based on a variety of product and market characteristics.**

THE ROLE OF IT IN SOURCING

The Role of IT in Sourcing

- Some of the of the major IT product areas within sourcing:
 - ***Design collaboration***
 - ***Source.***
 - ***Negotiate***
 - ***Buy.***
 - ***Supply collaboration***

RISK MANAGEMENT IN SOURCING

Risk Management in Sourcing

Sourcing risks may result in:

- Inability to meet demand on time
- An increase in procurement costs
- Loss of intellectual property

Quote

- **Develop a Sourcing Workbook**
- Put together a sourcing spreadsheet workbook. I like to create tabs for the;
- Sourcing schedule
- Supplier requirements and commercial terms
- Part data

Quote

- Quote template
- Contact information contacted suppliers
- Logistics cost estimate
- Quote analysis by part
- Quote analysis overview

Learning Objectives

- **1. Understand the role of revenue management in a supply chain.**
- **2. Identify conditions under which revenue management tactics can be effective.**

Learning Objectives

- **3. Describe trade-offs that must be considered when making revenue management decisions.**

Describe trade-offs that must be considered when making revenue management decisions (5/12

- **When overbooking, the trade-off is between not overbooking enough and wasting the available asset and overbooking too much and having to arrange for backup capacity at high cost.**

Describe trade-offs that must be considered when making revenue management decisions (7/

- **The trade-off is between the additional cost of serving the seasonal peak, and the impact on demand and thus revenue from offering an off-peak discount.**

THE ROLE OF PRICING AND REVENUE MANAGEMENT IN THE SUPPLY CHAIN

Copyright © 2013 Dorling Kindersley (India) Pvt. Ltd.

Role of Revenue Management

- ***Revenue management* is the use of pricing to increase the profit generated from a limited supply of supply chain assets.**
- **Supply chain assets exist in two forms—capacity and inventory.**
- **Capacity assets in the supply chain exist for production, transportation, and storage.**

Role of Revenue Management

- To increase the total margin, managers must use all available levers, including price.**
- This is the primary role of revenue management. Traditionally, firms have often invested in or eliminated assets to reduce the imbalance between supply and demand.**

Benefits of Revenue Management

- **Revenue management has a significant impact on supply chain profitability when one or more of the following four conditions exist:**

Benefits of Revenue Management

- **1. The value of the product varies in different market segments.**
- **2. The product is highly perishable or product wastage occurs.**
- **3. Demand has seasonal and other peaks.**
- **4. The product is sold both in bulk and the spot market.**

Benefits from Differential Pricing

- **In theory, the concept of differential pricing increases total profits for a firm.**

Benefits from Differential Pricing

- **1. Price based on the value assigned by each segment.**
- **2. Use different prices for each segment.**
- **3. Forecast at the segment level.**

The Role of Pricing and Revenue Management in the Supply Chain

- **Revenue management is the use of pricing to increase the profit generated from a limited supply of supply chain assets.**

The Role of Pricing and Revenue Management in the Supply Chain

↗ 1. The value of the product varies in different market segments.

↗ 2. The product is highly perishable or product waste occurs.

The Role of Pricing and Revenue Management in the Supply Chain

↗ 3. Demand has seasonal and other peaks.

↗ 4. The product is sold both in bulk and on the spot market.

PRICING AND REVENUE MANAGEMENT FOR MULTIPLE CUSTOMER SEGMENTS

Pricing and Revenue Management for Multiple Customer Segments

- **Two fundamental issues must be handled in practice**
 - 1. How can the firm differentiate between the two segments and structure its pricing to make one segment pay more than the other?**

Pricing and Revenue Management for Multiple Customer Segments

↗ 2. How can the firm control demand such that the lower-paying segment does not utilize the entire availability of the asset?

Pricing and Revenue Management for Multiple Customer Segments

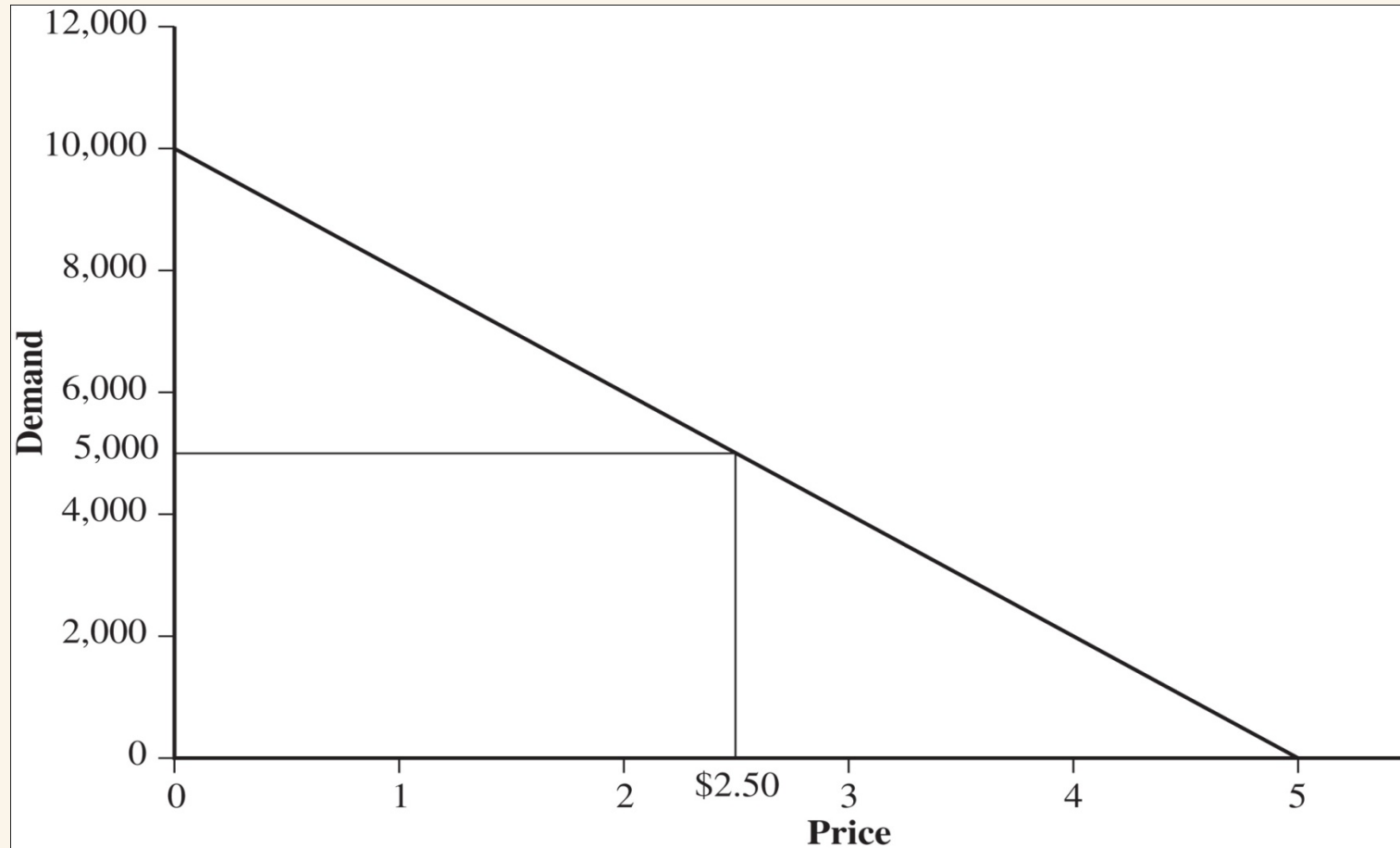


Figure 16-1

Pricing and Revenue Management for Multiple Customer Segments

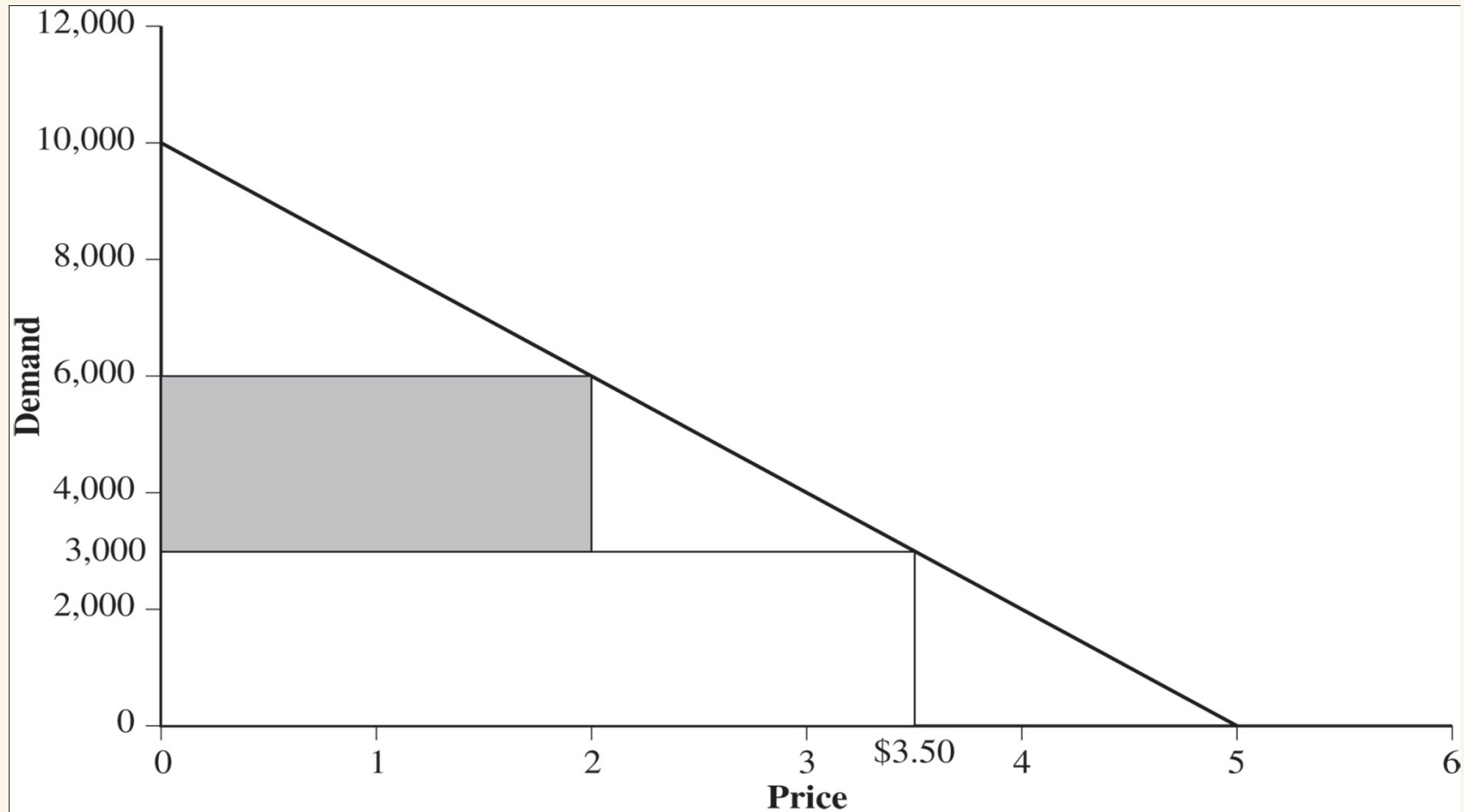


Figure 16-2

Pricing to Multiple Segments

Demand curve for segment $i = d_i = A_i - B_i p_i$

Supplier maximizes $(p_i - c)(A_i - B_i p_i)$

$$\text{Optimal price} = p_i = \frac{A_i}{2B_i} + \frac{c}{2}$$

Pricing to Multiple Segments

For capacity constrained by Q

$$\text{Max} \sum_{i=1}^k (p_i - c)(A_i - B_i p_i)$$

Subject to

$$\sum_{i=1}^k (A_i - B_i p_i) \leq Q$$

$$A_i - B_i p_i \geq 0 \quad \text{for } i = 1, \dots, k$$

Allocating Capacity to a Segment Under Uncertainty

$$R_H(C_H) = \text{Prob}(\text{demand from higher-price segment} > C_H) \times p_H$$

$$\text{Prob}(\text{demand from higher-price segment} > C_H) = p_L / p_H$$

$$C_H = F^{-1}\left(1 - p_L / p_H, D_H, \sigma_H\right) = \text{NORMINV}\left(1 - p_L / p_H, D_H, \sigma_H\right)$$

- **4. The Role of IT in Pricing and Revenue Management**
- **5. Using Pricing and Revenue Management in Practice**
- **6. Branding as a Price and Revenue Management Strategy**

PRICING AND REVENUE MANAGEMENT FOR PERISHABLE ASSETS

Pricing and Revenue Management for Perishable Assets

- Any asset that loses value over time is perishable
- Two basic approaches
 - ↪ Vary price dynamically over time to maximize expected revenue
 - ↪ Overbook sales of the asset to account for cancellations

PROBLEM OF PERISHABLE ASSETS

- **The basic trade-off to consider during overbooking is between having wasted capacity (or inventory) because of excessive cancellations and having a shortage of capacity (or inventory) because of few cancellations, in which case an expensive backup needs to be arranged.**

PRICING AND REVENUE MANAGEMENT FOR SEASONAL DEMAND

FORECASTING FOR REVENUE MANAGEMENT

PRICING AND REVENUE MANAGEMENT FOR BULK AND SPOT CONTRACTS

THE ROLE OF IT IN PRICING AND REVENUE MANAGEMENT

Copyright © 2013 Dorling Kindersley (India) Pvt. Ltd.

USING PRICING AND REVENUE MANAGEMENT IN PRACTICE

Copyright © 2013 Dorling Kindersley (India) Pvt. Ltd.

Using Pricing and Revenue Management in Practice

- **1. Evaluate your market carefully**
- **2. Quantify the benefits of revenue management**
- **3. Implement a forecasting process**
- **4. Keep it simple**
- **5. Involve both sales and operations**

Using Pricing and Revenue Management in Practice

- **6. Understand and inform the customer**
- **7. Integrate supply planning with revenue management**

BRANDING AS A PRICE AND REVENUE MANAGEMENT STRATEGY

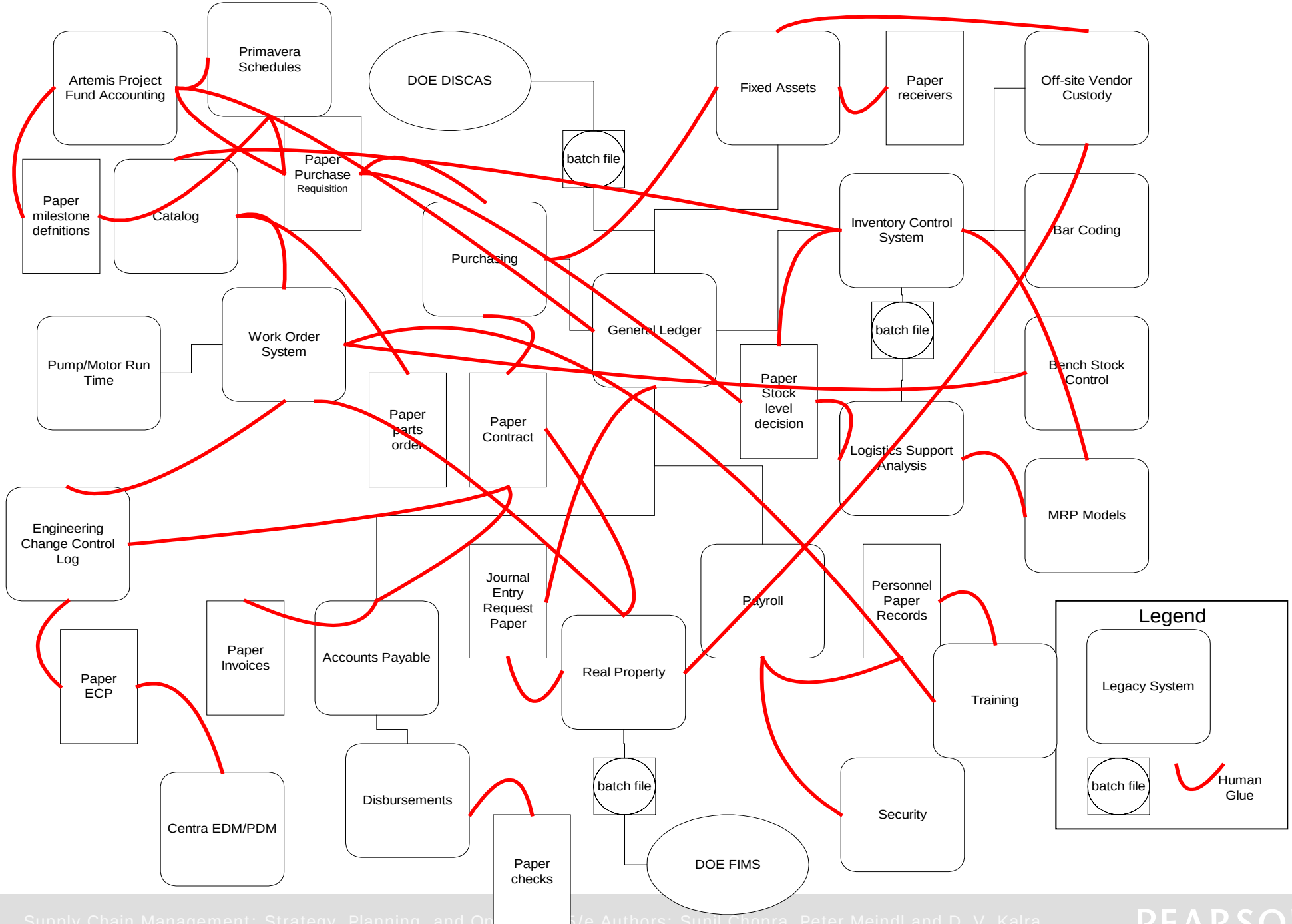
Learning Objectives

- **1. Understand the importance of information and information technology in a supply chain.**
- **2. Know at a high level how each supply chain driver uses information.**

Learning Objectives

- **3. Understand the major applications of supply chain information technology and the processes that they enable.**

ROLE OF IT IN SUPPLY CHAIN

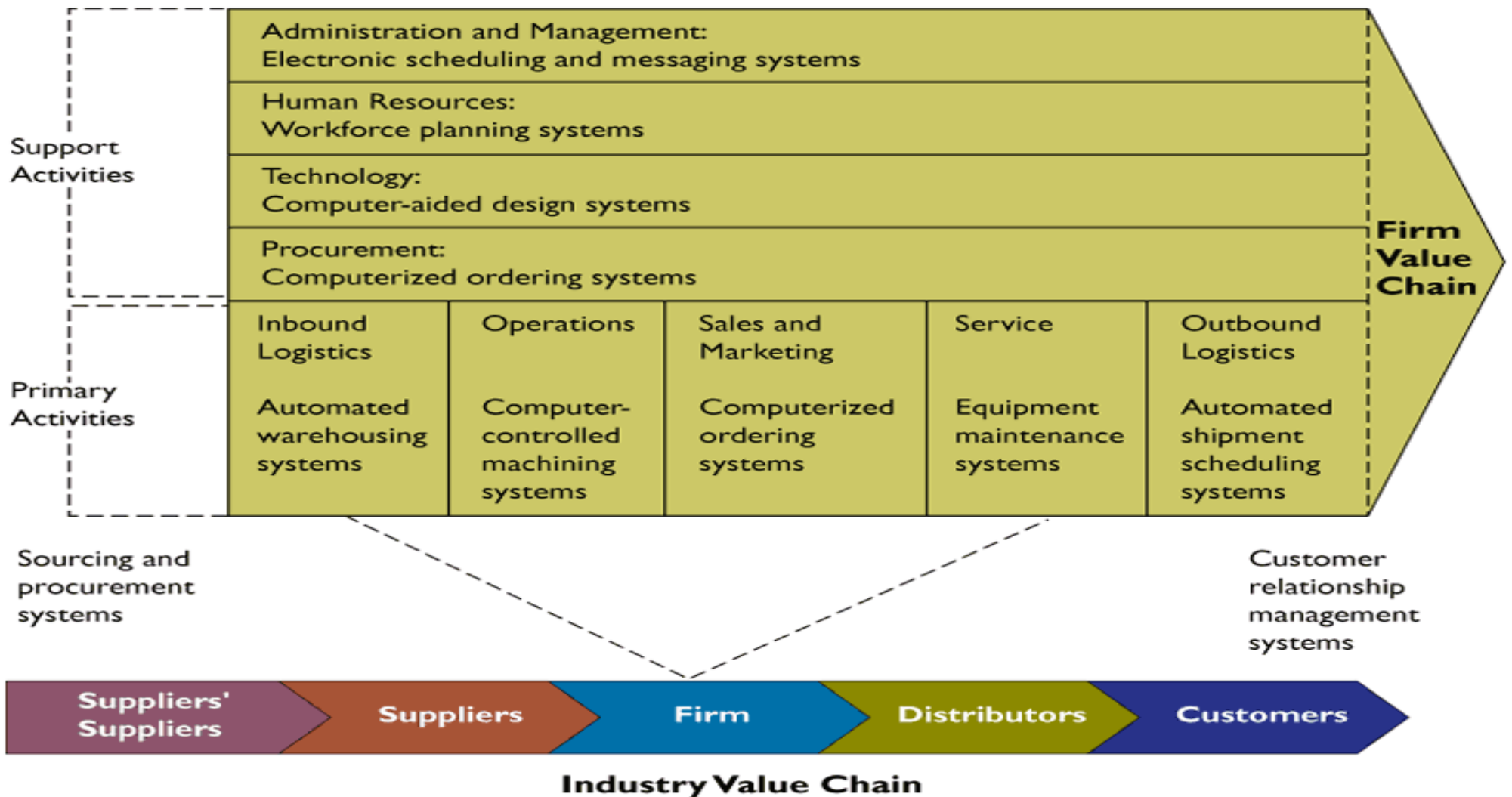


THE SUPPLY CHAIN IT FRAMEWORK

Supply Chain Management (SCM) Systems

- **SCM is the process of effectively managing the components of an extended value chain--from suppliers, through manufacturing and distribution chain, and to the consumers.**

Value Chain Analysis



The Supply Chain IT Framework

- **The Supply Chain Macro Processes**
 - Customer Relationship Management (CRM)
 - Internal Supply Chain Management (ISCM)
 - Supplier Relationship Management (SRM)
 - Plus: Transaction Management Foundation

The Supply Chain Macro Processes

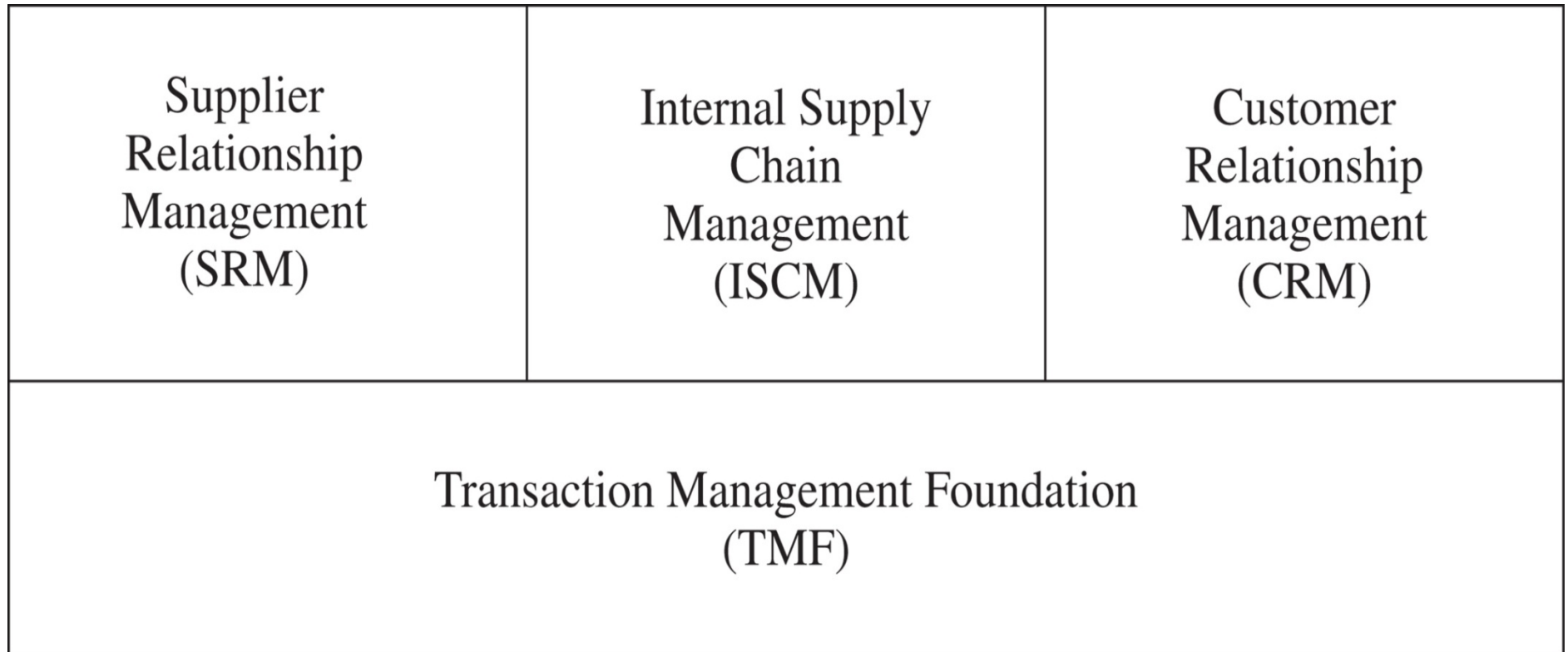


Figure 17-1

Customer Relationship Management

Internal Supply Chain Management

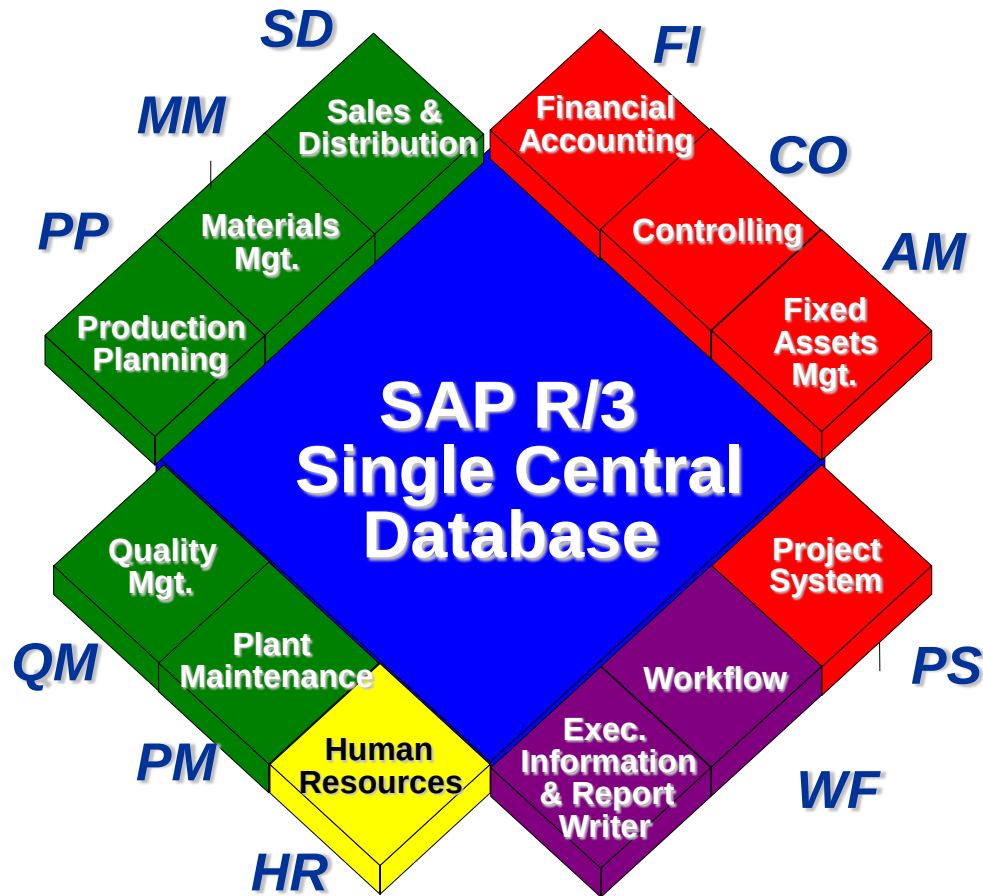
- **Strategic planning**
- **Demand planning**
- **Supply planning**
- **Fulfillment**
- **Field service**
- **There must be strong integration between the ISCM and CRM macro processes.**

RISK MANAGENT IN IT SCM

THE FUTURE OF IT IN A SUPPLY CHAIN

THE KEY ENABLER: ONE SYSTEM

THE SYSTEM IS THE DATABASE THE DATABASE IS THE SYSTEM

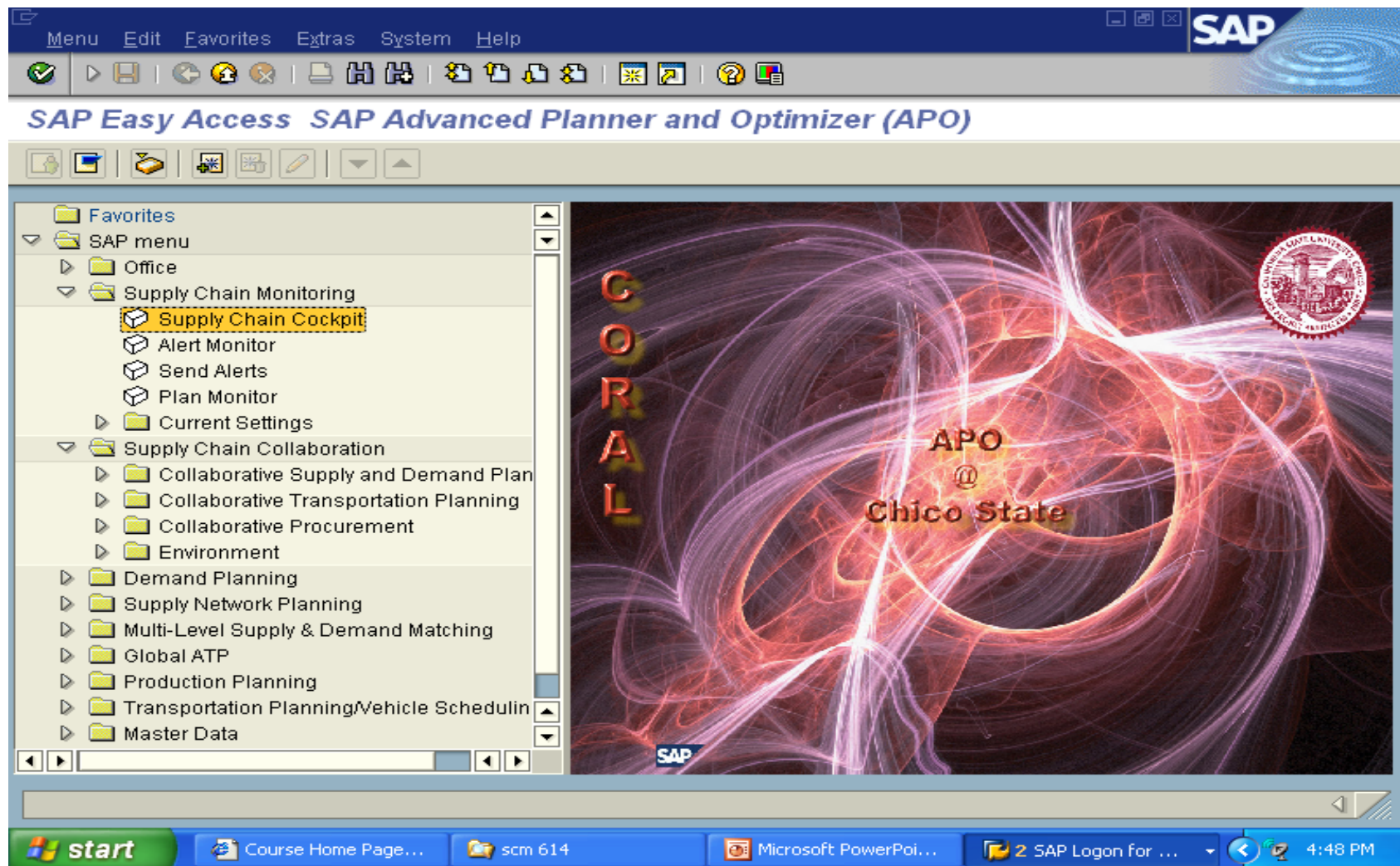


SAP R/3

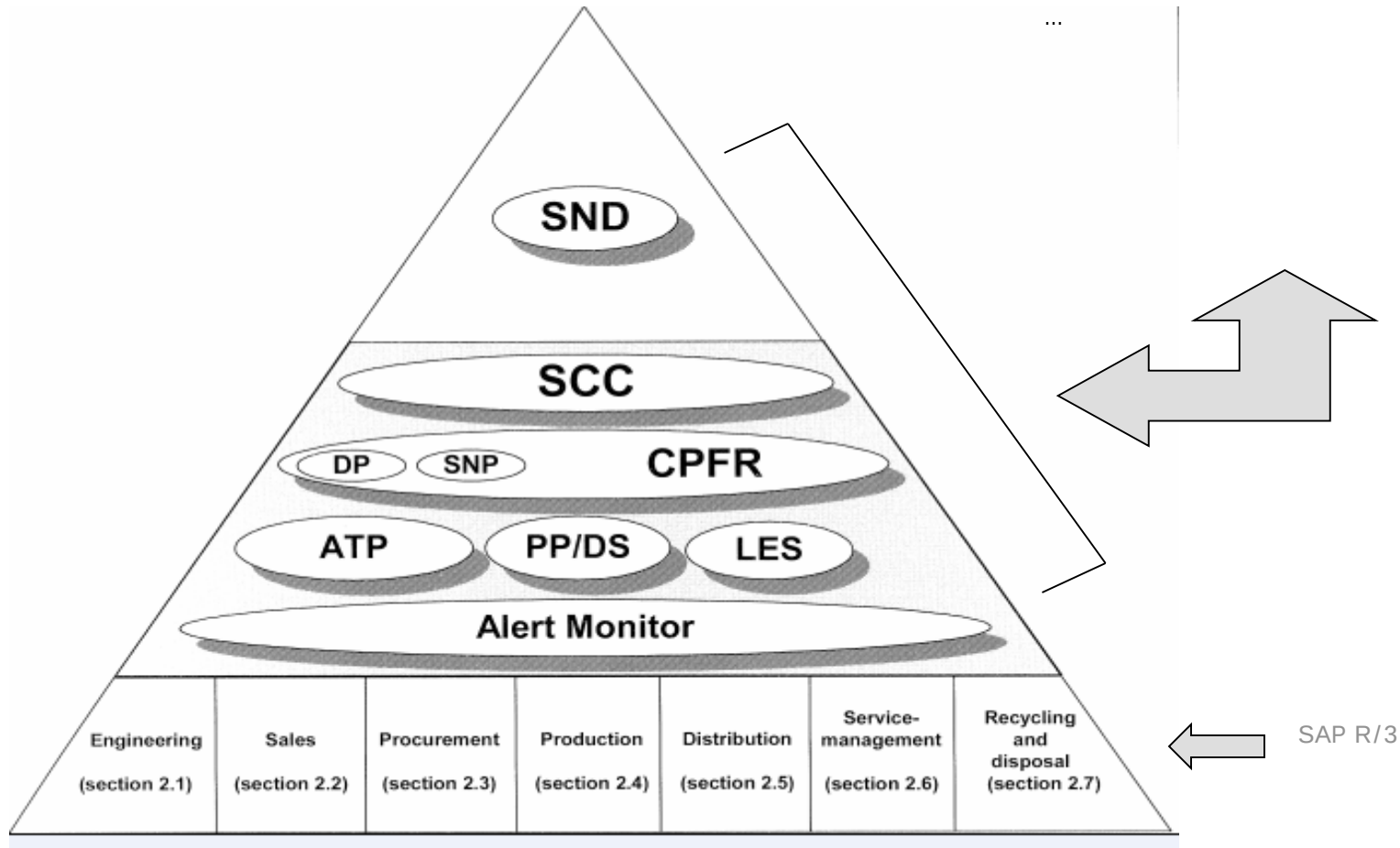
- Omni-functional
- Fully integrated
- Process-oriented
- Off-the-shelf

1

SAP Advanced Planner and Optimizer (APO)



Levels of SAP APO



Supply Network Design (SND)
 The Supply Chain Cockpit (SCC)
 Demand Planning (DP)
 Supply Network Planning (SNP)
 Collaborative Planning, Forecasting, and
 Replenishment (CPFR)

...

The Future of IT in the Supply Chain

- **Three important trends:**
 - ↗ The growth in software as a service (SaaS)**
 - ↗ Increased availability of real-time data**
 - ↗ Increased use of mobile technology**

SUPPLY CHAIN IT IN PRACTICE

Supply Chain IT in Practice

- **1. Select an IT system that addresses the company's key success factors**
- **2. Take incremental steps and measure value**
- **3. Align the level of sophistication with the need for sophistication**
- **4. Use IT systems to support decision making, not to make decisions**
- **5. Think about the future**