

Supply Chain Management

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MGM 660

Lecture 10



Sourcing decisions in a supply chain

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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
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

- **Purchasing**, is the process by which companies acquire raw materials, components, products, services, or other resources from suppliers to execute their operations.
- **Sourcing** is the entire set of business processes required to purchase goods and services.
- For any supply chain function, the most significant decision is whether to outsource the function or perform it in-house.
- **Outsourcing** results in the supply chain function being performed by a third party.
- **Outsourcing decisions** are important and tend to vary across firms and industries.

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?

The Role of Sourcing in a Supply Chain

- **Recall** that the supply chain surplus is the difference between the value of a product for the customer and the total cost of all supply chain activities involved in bringing the product to the customer.
- **Outsourcing** makes sense if it increases the supply chain surplus (assuming we get to keep some of the increase) without significantly increasing risks.
- **A sourcing decision** should aim to increase the net value created by the supply chain.

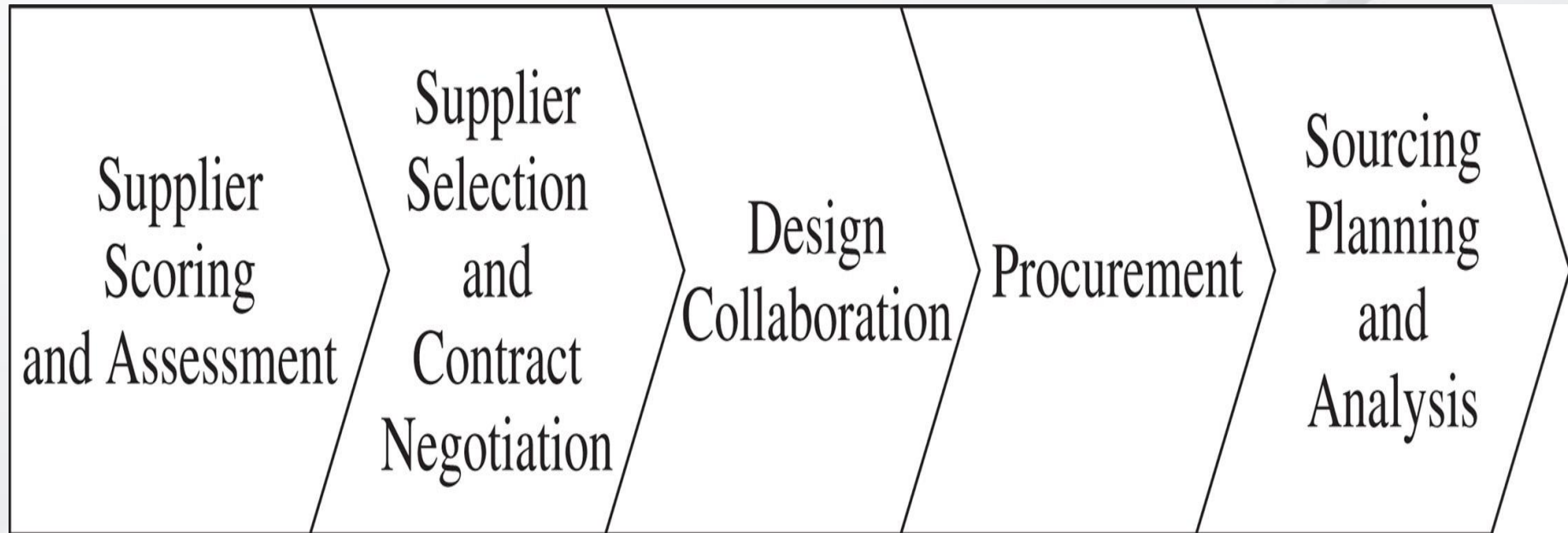
The Role of Sourcing in a Supply Chain

- **For example**, P&G has historically outsourced retailing of its products to others.
- The third parties increase the supply chain surplus by aggregating many products that customers need (not just P&G products) in a single retail store.
- This aggregation allows them to spread facility costs, selling costs, personnel costs, and transportation costs across many consumer goods manufacturers.
- This aggregation also allows the retailer to increase customer value by allowing them to purchase many products they need in a single visit to the store.

The Role of Sourcing in a Supply Chain

- **Clearly**, outsourcing retailing to a third party increases the value created by the supply chain to a greater extent than if P&G managed its own retailing.
- **Good sourcing** decisions grow value by assigning each activity within the supply chain to the party that can add the most value.
- **Effective sourcing** processes within a firm can improve profits for the firm, as well as total supply chain surplus, in a variety of ways.
- The drivers of improved profits must be identified when making sourcing decisions

The Role of Sourcing in a Supply Chain



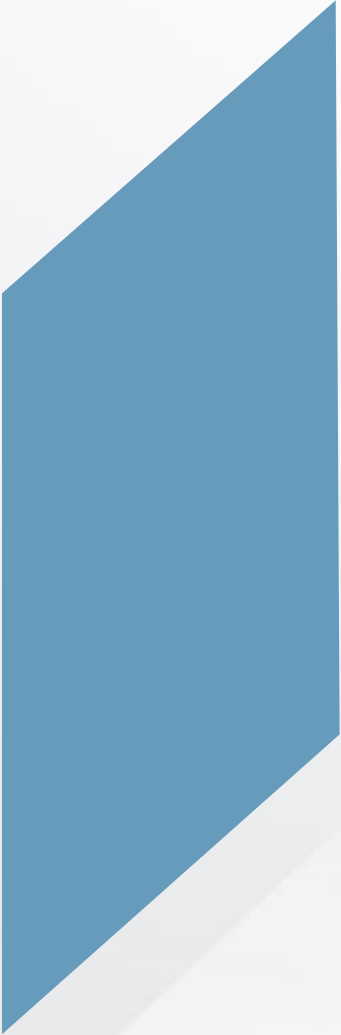
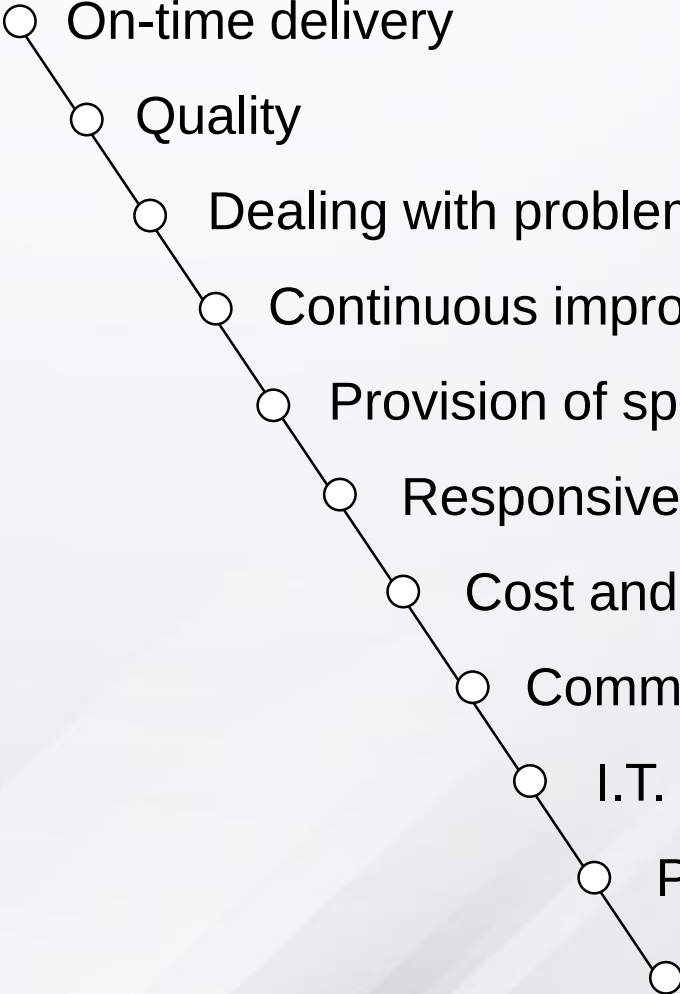
Supplier Scoring and Assessment

- Supplier performance should be compared on the basis of the supplier's impact on total cost.
- There are several other factors besides purchase price that influence total cost.

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

Supplier performance – Possible factors to evaluate

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- On-time delivery
 - Quality
 - Dealing with problems
 - Continuous improvement
 - Provision of spares
 - Responsiveness
 - Cost and price management
 - Communication
 - I.T. systems
 - Provision of clarification
 - Management of contract change

Supplier evaluation factors

- Quality and process control
 - Continuous improvement
 - Facility environment
 - Customer relationship
 - Delivery
 - Inventory and warehousing
 - Ordering
 - Financial conditions
 - Certifications
 - Price

Design Collaboration

- About 80% of the cost of a product is determined during design
- Suppliers should be actively involved at this stage
- **ESI has been defined as:**

A practice that brings together one or more selected suppliers with a buyer's product design team early in the product development process.

The objective is to utilise the supplier's expertise and experience in developing a product specification that is designed for effective and efficient product roll-out.

- A supplier sends product in response to orders placed by the buyer
- Orders placed and delivered on schedule at the lowest possible overall cost

Sourcing Planning and Analysis

- Analyze spending across various suppliers and component categories
- Identify opportunities for decreasing the total cost

Cost of Goods Sold

- Cost of goods sold (COGS) represents well over 50 percent of sales for most major manufacturers.
- Purchased parts a much higher fraction than in the past.
- Companies have reduced vertical integration and outsourced.

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

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

Factors Influencing Growth of Surplus by a Third Party

- **Scale**

- Large scale it is unlikely that a third party can achieve further scale economies and increase the surplus

- **Uncertainty**

- If requirements are highly variable over time, third party can increase the surplus through aggregation

- **Specificity of assets**

- If assets required are specific to a firm, a third party is unlikely to increase the surplus

Factors Influencing Growth of Surplus by a Third Party

		Specificity of Assets Involved in Function	
		Low	High
Firm scale	Low	High growth in surplus	Low to medium growth in surplus
	High	Low growth in surplus	No growth in surplus unless cost of capital is lower for third party
Demand uncertainty for firm	Low	Low to medium growth in surplus	Low growth in surplus
	High	High growth in surplus	Low to medium growth in surplus

Risks of Using a Third Party

1. The process is broken
2. Underestimation of the cost of coordination
3. Reduced customer/supplier contact
4. Loss of internal capability and growth in third-party power
5. Leakage of sensitive data and information
6. Ineffective contracts
7. Loss of supply chain visibility
8. Negative reputational impact

Third- and Fourth-Party Logistics Providers

- **Third-party logistics (3PL)** providers performs one or more of the logistics activities relating to the flow of product, information, and funds that could be performed by the firm itself
- **A 4PL (fourth-party logistics)** designs, builds and runs the entire supply chain process

Third- and Fourth-Party Logistics Providers

Service Category	Basic Service	Some Specific Value-Added Services
Transportation	Inbound, outbound by ship, truck, rail, air	Tendering, track/trace, mode conversion, dispatch, freight pay, contract management
Warehousing	Storage, facilities management	Cross-dock, in-transit merge, pool distribution across firms, pick/pack, kitting, inventory control, labeling, order fulfillment, home delivery of catalog orders
Information technology	Provide and maintain advanced information/computer systems	Transportation management systems, warehousing management, network modeling and site selection, freight bill payment, automated broker interfaces, end-to-end matching, forecasting, EDI, worldwide track and trace, global visibility
Reverse logistics	Handle reverse flows	Recycling, used-asset disposition, customer returns, returnable container management, repair/refurbish
Other 3PL services		Brokering, freight forwarding, purchase-order management, order taking, loss and damage claims, freight bill audits, consulting, time-definite delivery
International		Customs brokering, port services, export crating, consolidation
Special skills/handling		Hazardous materials, temperature controlled, package/parcel delivery, food-grade facilities/equipment, bulk

Using Total Cost to Score and Assess Suppliers

Performance Category	Category Components	Quantifiable?
Supplier price	Labor, material, overhead, local taxes, and compliance costs	Yes
Supplier terms	Net payment terms, delivery frequency, minimum lot size, quantity discounts	Yes
Delivery costs	All transportation costs from source to destination, packaging costs	Yes
Inventory costs	Supplier inventory, including raw material, in process and finished goods, in-transit inventory, finished goods inventory in supply chain	Yes
Warehousing cost	Warehousing and material handling costs to support additional inventory	Yes
Quality costs	Cost of inspection, rework, product returns	Yes
Reputation	Reputation impact of quality problems	No
Other costs	Exchange rate trends, taxes, duties	Yes
Support	Management overhead and administrative support	Difficult
Supplier capabilities	Replenishment lead time, on-time performance, flexibility, information coordination capability, design coordination capability, supplier viability	To some extent

Supplier Selection – Auctions and Negotiations

- Supplier selection can be performed through competitive bids, reverse auctions, and direct negotiations
- Supplier evaluation is based on total cost of using a supplier
- Auctions:
 - **Sealed-bid first-price auctions**
 - **English auctions**
 - **Dutch auctions**
 - **Second-price (Vickery) auctions**

Supplier Selection – Auctions and Negotiations

- **Factors influence the performance of an auction**
 - Is the supplier's cost structure private (not affected by factors that are common to other bidders)?
 - Are suppliers symmetric or asymmetric; that is, ex ante, are they expected to have similar cost structures?
 - Do suppliers have all the information they need to estimate their cost structure?
 - Does the buyer specify a maximum price it is willing to pay for the supply chain?

Supplier Selection – Auctions and Negotiations

- Collusion among bidders
- Second-price auctions are particularly vulnerable
- Can be avoided with any first-price auction

Basic Principles of Negotiation

- The difference between the values of the buyer and seller is the *bargaining surplus*
- The goal of each negotiating party is to capture as much of the bargaining surplus as possible
 - Have a clear idea of your own value and as good an estimate of the third party's value as possible
 - Look for a fair outcome based on equally or equitably dividing the bargaining surplus
 - A win-win outcome

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

- Independent actions taken by two parties in a supply chain often result in profits that are lower than those that could be achieved if the supply chain were to coordinate its actions
- 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

Expected manufacturing profit = $O^* (c - v) - (b - s_M)$

 ' expected overstock at retailer

Buyback Contracts

- **Holding-cost subsidies**

- Manufacturers pay retailers a certain amount for every unit held in inventory over a given period
- Encourage retailers to order more

- **Price support**

- Manufacturers share the risk of product becoming obsolete
- Guarantee that in the event they drop prices they will lower prices for all current inventories

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

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

Contracts to Coordinate Supply Chain Costs

- Differences in costs at the buyer and supplier can lead to decisions that increase total supply chain costs
- A quantity discount contract may encourage the buyer to purchase a larger quantity which would result in lower total supply chain costs
- Quantity discounts lead to information distortion because of order batching

Contracts to Increase Agent Effort

- In many supply chains, agents act on behalf of a principal and the agents' efforts affect the reward for the principal
- A two-part tariff offers the right incentives for the dealer to exert the appropriate amount of effort
- Threshold contracts increase information distortion
- Offer threshold incentives over a rolling horizon

Contracts to Induce Performance Improvement

- A buyer may want performance improvement from a supplier who otherwise would have little incentive to do so
- A shared-savings contract provides the supplier with a fraction of the savings that result from performance improvement
- Effective in aligning supplier and buyer incentives when the supplier is required to improve performance and most of the benefits of improvement accrue to the buyer

Design Collaboration

- 50-70% of spending at a manufacturer comes from procurement
- 80% of the cost of a purchased part is fixed in the design phase
- Design collaboration with suppliers can result in reduced cost, improved quality, and decreased time to market
- Design for logistics, design for manufacturability
- *Modular, adjustable, dimensional customization*

The Procurement Process

- The process in which the supplier sends product in response to orders placed by the buyer
- Main categories of purchased goods
 - Direct materials
 - Indirect materials
- Procurement process for direct materials should be designed to ensure that components are available in the right place, in the right quantity, and at the right time
- Focus for indirect materials should be on reducing transaction cost

Differences Between Direct and Indirect Materials

	Direct Materials	Indirect Materials
Use	Production	Maintenance, repair, and support operations
Accounting	Cost of goods sold	Selling, general, and administrative expenses (SG&A)
Impact on production	Any delay will delay production	Less direct impact
Processing cost relative to value of transaction	Low	High
Number of transactions	Low	High

Designing a Sourcing Portfolio: Tailored Sourcing

- **Options with regard to whom and where to source from**
 - Produce in-house or outsource to a third party
 - Will the source be cost efficient or responsive
 - Onshoring, near-shoring, and offshoring
- Tailor supplier portfolio based on a variety of product and market characteristics

Designing a Sourcing Portfolio: Tailored Sourcing

	Responsive Source	Low-Cost Source
Product life cycle	Early phase	Mature phase
Demand volatility	High	Low
Demand volume	Low	High
Product value	High	Low
Rate of product obsolescence	High	Low
Desired quality	High	Low to medium
Engineering/design support	High	Low

Designing a Sourcing Portfolio: Tailored Sourcing

	Onshore	Near-shore	Offshore
Rate of innovation/product variety	High	Medium to High	Low
Demand volatility	High	Medium to High	Low
Labor content	Low	Medium to High	High
Volume or weight-to-value ratio	High	High	Low
Impact of supply chain disruption	High	Medium to High	Low
Inventory costs	High	Medium to High	Low
Engineering/management support	High	High	Low

Risk Management in Sourcing

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

Making Sourcing Decisions in Practice

1. Use multifunction teams
2. Ensure appropriate coordination across regions and business units
3. Always evaluate the total cost of ownership
4. Build long-term relationships with key suppliers

Summary of Learning Objectives

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Essential Reference

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Chapter 15.



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