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CERTIFIED IN PLANNING
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MODULE 5: EXTERNAL SUPPLY AND KEY SUPPORT FUNCTIONS

APICS

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Module 5 Overview

External Supply and Key Support Functions

- Section A: Suppliers and Procurement
- Section B: Purchasing and Maintenance
- Section C: Risk Management
- Section D: Sustainability Strategies
- Section E: Waste Hierarchy and Reverse Logistics

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SECTION A:
SUPPLIERS AND PROCUREMENT

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Section A Learning Objectives

- Insourcing versus outsourcing
- Procurement and purchasing objectives
- Sustainability specifications
- Criteria used in selecting suppliers
- Customer-supplier relationships
- Risk versus profit matrix for sourcing strategy
- Collaborative relationships with suppliers
- Contracts and negotiating with suppliers

Insource or Outsource/Externally Source? Factors to Consider

- Quality (gain expertise but potentially lose control)
- Speed (possible reduction in lead times but more complex scheduling)
- Dependability (need for communication)
- Flexibility (greater capacity and response to changes)
- Cost (lower capital and personnel costs but excess internal capacity)

Procurement and Purchasing Objectives

Procurement objectives

- Capable suppliers
- Right quantity and quality at right time
- Reduced cost, considering best cost and total cost of ownership
- Lower risks
- Responsible and sustainable procurement

Conventional purchasing objectives

- Obtain goods in desired quantity and with specified quality.
- Buy at best possible price (e.g., landed cost or total cost of ownership).
- Receive desired service level, including delivery lead time.
- Manage risks, e.g., damage and loss.
- Maintain reputation as good customer.
- Purchase with sustainable goals in mind.

Procurement and Purchasing Objectives

Supply chain management and lean procurement/purchasing objectives

- Invest in key suppliers.
  - Develop their potential.
  - Develop and maintain ongoing relationships.
- Fulfill social responsibility and sustainability goals.
- Use supplier relationship management (SRM).

Sustainable purchasing objectives

- Reduce overall use of materials, from production through disposal.
- Avoid use of limited or threatened resources.
- Avoid items that can harm workers and communities.
- Guarantee that sustainable product claims can be substantiated.

Types of Purchases

Capital expenditures (CAPEX)

- Property, plant, and equipment; uses a request-for-quote (RFQ) process

Operational expenditures (OPEX)

- Raw materials (includes subcomponents)
- Direct materials
- Indirect materials (maintenance, repair, and operating [MRO] supplies)
- Services (may be part of direct labor)

Value-Added Role of Procurement/Purchasing

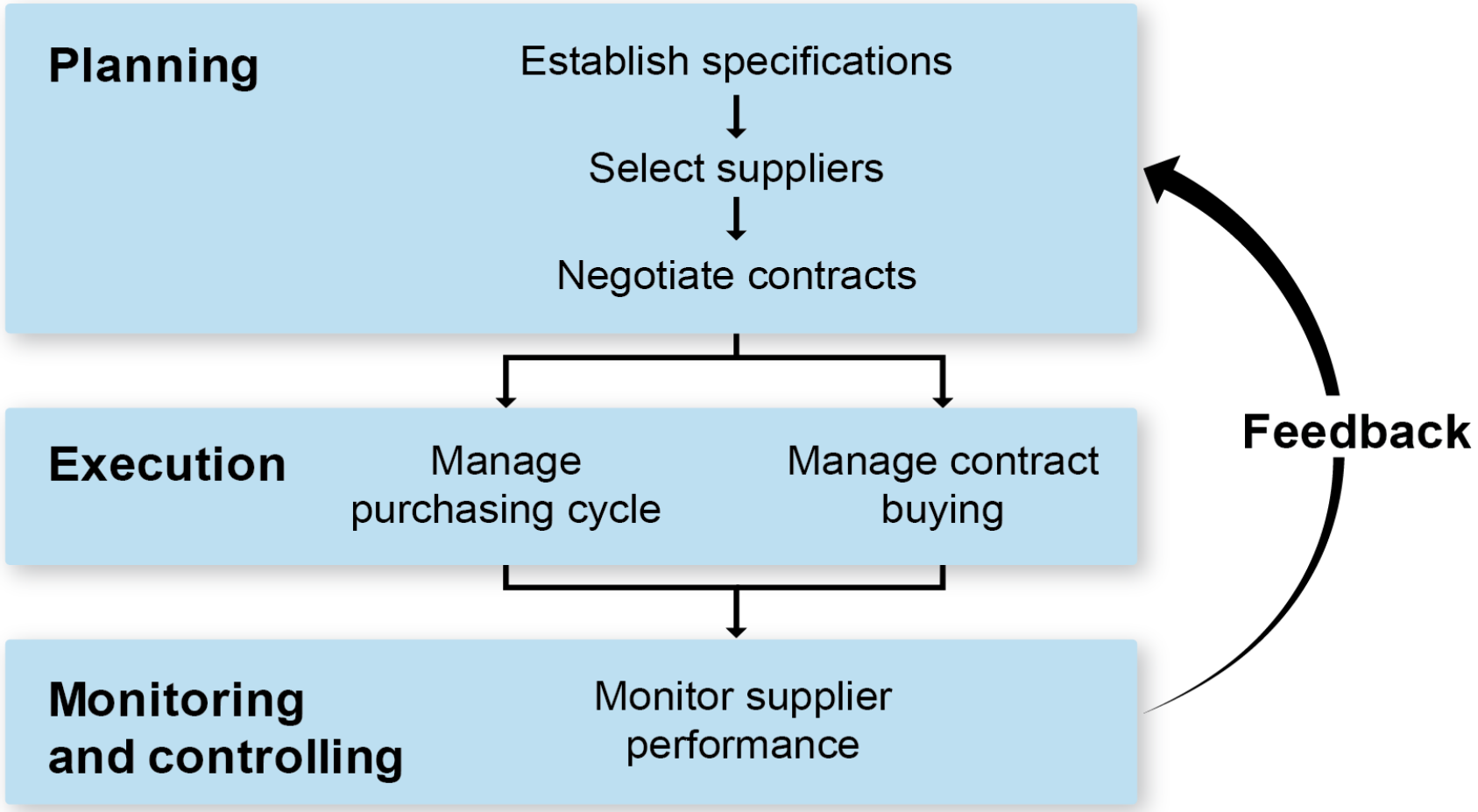
Which is more profitable, a 10% increase in sales or a 10% reduction in direct materials (or production) cost?

Scenario: $10/unit price, 1,000 units/month, $5/unit direct materials, $1/unit direct labor, $3,000 overhead

	Per Unit		As Is	To Be Scenarios	
	As Is	-10% DM		+10% Sales	-10% DM
Units			1,000	1,100	1,000
Sales Price and Revenue	$10	$10.00	$10,000	$11,000	$10,000
Direct Materials (DM)	$5	$4.50	$5,000	$5,500	$4,500
Direct Labor (DL)	$1	$1.00	$1,000	$1,100	$1,000
Overhead			$3,000	$3,000	$3,000
Gross Profit			$1,000	$1,400	$1,500
Gross Profit Margin			10%	13%	15%

Supply and Purchasing Planning

Procurement Process



Establish Specifications: Value Analysis for Functional Requirements

- Form, fit, function
- Purpose and how it integrates
- Quality
  - Fitness for use and value for money
  - Conformance to requirements
  - Allowed number of nonconforming items
  - Inspections or trust?
- Specifications for use
- Value analysis
- Description versus what it needs to do
  - Brand name
  - Characteristics
  - Engineering drawings
  - Miscellaneous attributes

Establish Specifications: Quantity and Price Requirements

- Quantity
  - Units per order
  - Order frequency
  - Best cost: economies of scale, full truckload discounts
- Price
  - What market will pay
  - Material and service costs face this constraint
  - Based on how much value it adds in eyes of consumer

Select Suppliers

Existing or new suppliers

- Preapproved suppliers
- Supplier search advice/sources:
  - Engineering and design function
  - Supplier salespersons
  - Internal salespersons
  - Internet, trade magazines, etc.

Selection criteria

Assign weight, rank suppliers per factor:

- Technical/manufacturing capabilities
- Location
- Price
- Reliability
- Supply chain maturity
- Service offerings/service level
- Management attitude and culture fit
- Financial stability
- Sustainability commitment

Supplier Relationship Management (SRM)

- Philosophy and related software
- Comprehensive approach to supplier interactions

Streamlined and effective

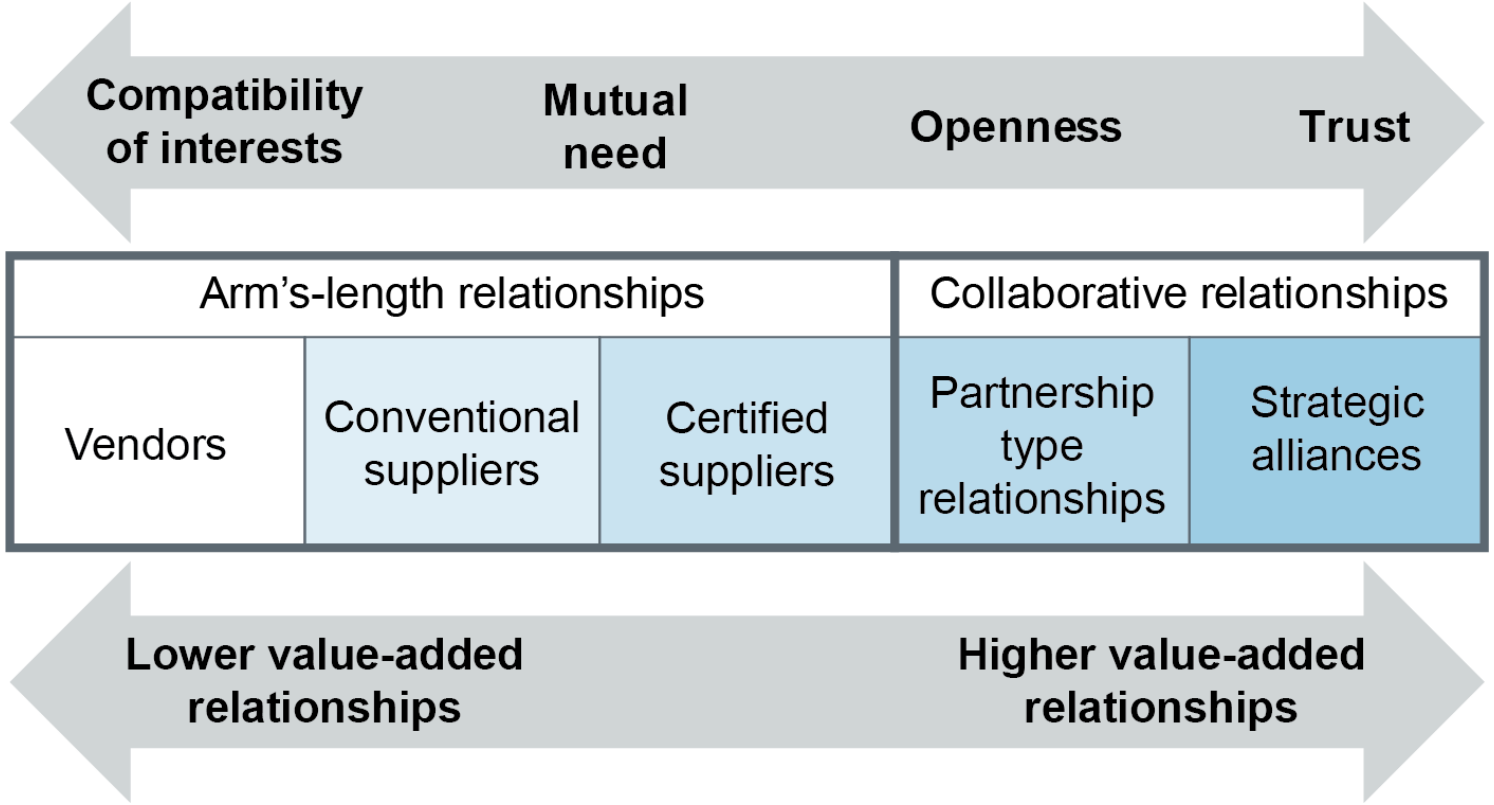
- Procurement planning
- New product introduction (NPI)
- Product life cycle changes
- Engineering change control
- Risk management
- Supply chain inventories
- Future demand

Procurement and Other Participants Need to Collaborate

- Traditionally, purchasing was sole responsibility of purchasing department, but this led to disconnects.
- Objectives for marketing, engineers, and production planners need to be met.

- Marketing: Reflect customer requirements (order qualifiers and winners).
- Engineers: Clearly specify requirements.
- Production planners/shop floor:
  - Right things received when needed.
  - Do rejects, scrap, rework, or inventory holding outweigh cost savings from cheaper supply or ordering in bulk?

Range of Supplier-Customer Relationships



Types of Sourcing

Sole sourcing

- Only source available
- High risk for buyer

Single sourcing

- Supplier reduction strategy
- More risk for buyer

Multi-sourcing

- Needed to manage risk or procurement needs

Single Sourcing Advantages Discussion

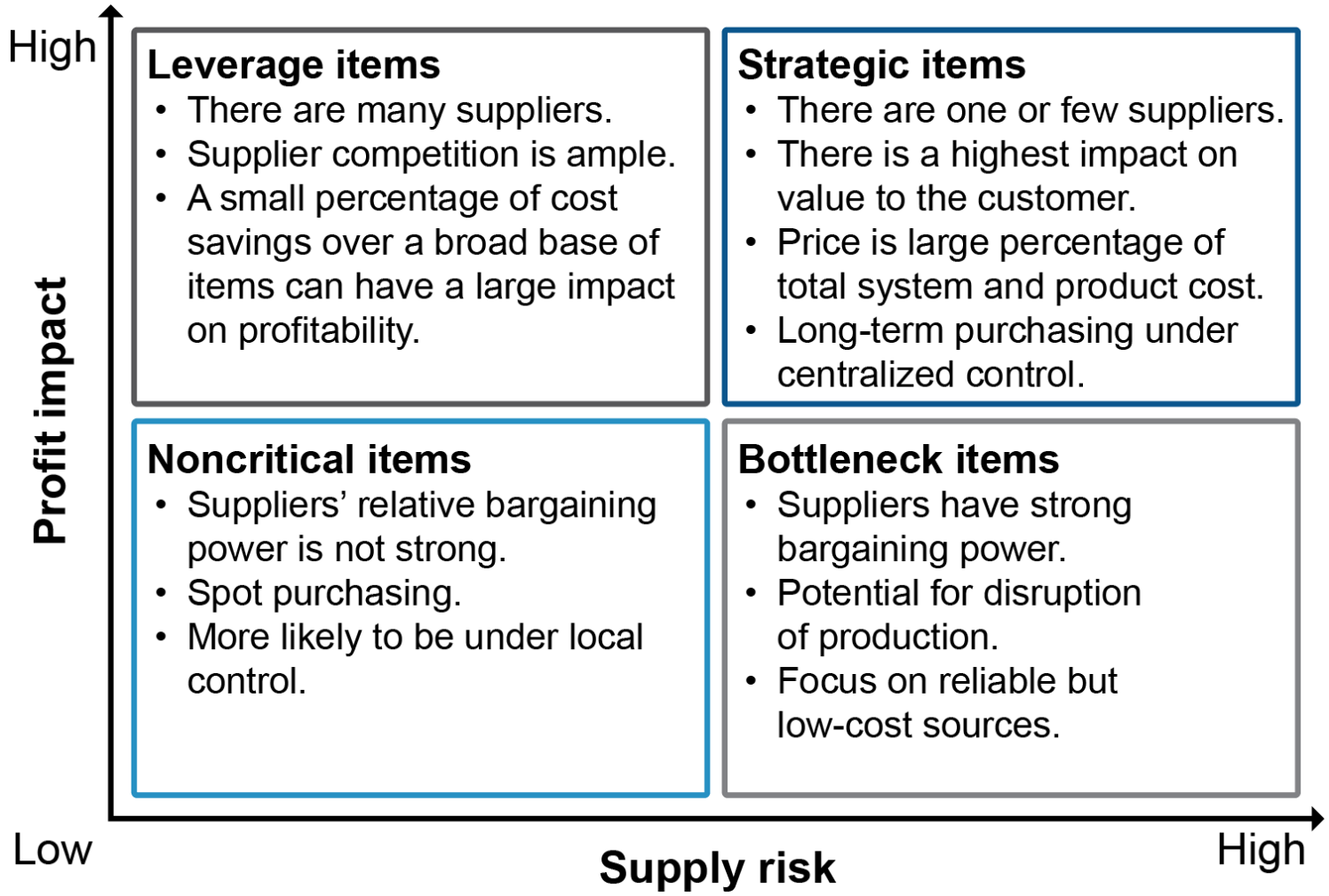
Advantage	Reason
Better pricing	▪ *It enables volume pricing.* ▪ *There is greater leverage over one supplier than over many.*
Improved quality	▪ *Supplier commitment is an incentive to improve yields and processes, reduce costs, and reduce rework and return rates.*
Increased buyer leverage	▪ *Buyer has greater influence on source of supply.*
Delivery	▪ *Supplier is motivated to deliver on time in order to maintain the relationship and income.*
Reliability	▪ *Reliability of both quality and on-time delivery can be negotiated as a service requirement for renewal of the partnership.*

Single Sourcing Disadvantages Discussion

Disadvantage	Reason
Cannot respond quickly to changes in demand	▪ *Supplier capacity may not be available due to full utilization.* ▪ *Supplier may be reluctant to commit capacity to one customer.*
Excess demand on supplier	▪ *Suppliers may have commitments to other customers that affect their capabilities.*
Possible loss of focus on market competitive price	▪ *Pricing may not remain competitive since price comparisons are not done as regularly.*
Susceptible to catastrophic event at the supplier	▪ *Buyer is susceptible to major events, such as bankruptcy, loss of goods and facilities, or other financial problems.*

Supplier Relationships and Strategies

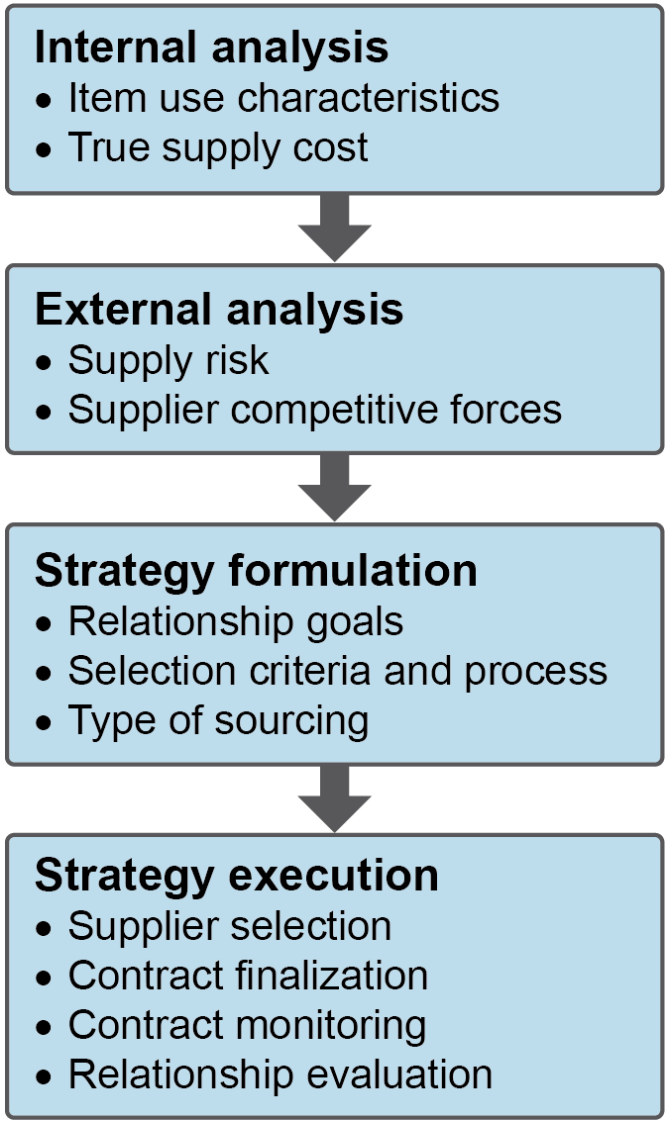
Risk versus Profit Matrix



Supplier Relationships and Strategies

Strategic Sourcing Process

Comprehensive approach to locate and source key materials suppliers, focusing on long-term relationships with trading partners to meet profitability and service goals



Sourcing Management

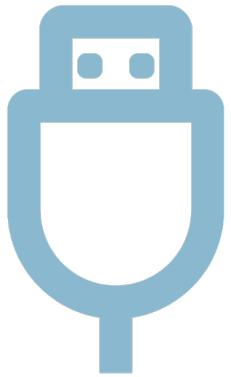
- Risks are high, but profit impact is low—bottleneck items.
- Goals
  - Reliability
  - Best total cost of ownership
- Results
  - Shorter relationships
  - Global supply networks

Factors to consider in using global suppliers:

- Currency exchange rates
- Transportation
- Longer lead time
- Difficulty in monitoring
- Cultural fluency

Tactical Buying

Purchasing process focused on transactions and nonstrategic material buying



- Presence of many competing suppliers allows competitive bidding.
- Standard products at comparable costs and reliable quality.
- Stable usage rates and schedules.

When to Use Strategic Sourcing and Tactical Buying

Tactical Buying	Criteria	Strategic Sourcing
Stable prices and favorable currency exchange rates	**Price**	Volatile prices and currency rates
Reliable availability	**Service**	Greater need for control over delivery
Standard, consistent quality levels	**Quality**	Greater need for quality control
Well established	**Technology**	Sharing necessary
Stable, flat, predictable	**Market trends**	Volatile, competitive rivalry

Alliances, Partnerships, and Joint Ventures

Can increase scope with less investment and risk

Strategic alliance	Strategic partnership	Joint venture
▪ Formal commitment to share information, participate in joint investments, and develop linked processes.	▪ Informal alliance with suppliers or buyers to increase performance.	▪ Two or more firms invest equity to create another entity and share in profits.

Concurrent Engineering (Participative Design/Engineering)

Benefits

- Better quality
- Shorter design phases and earlier market entry
- Increased revenue

Simultaneous participation in product design of all functional areas of a firm and often suppliers and customers

Logistics Improvement

Goal of outsourcing logistics

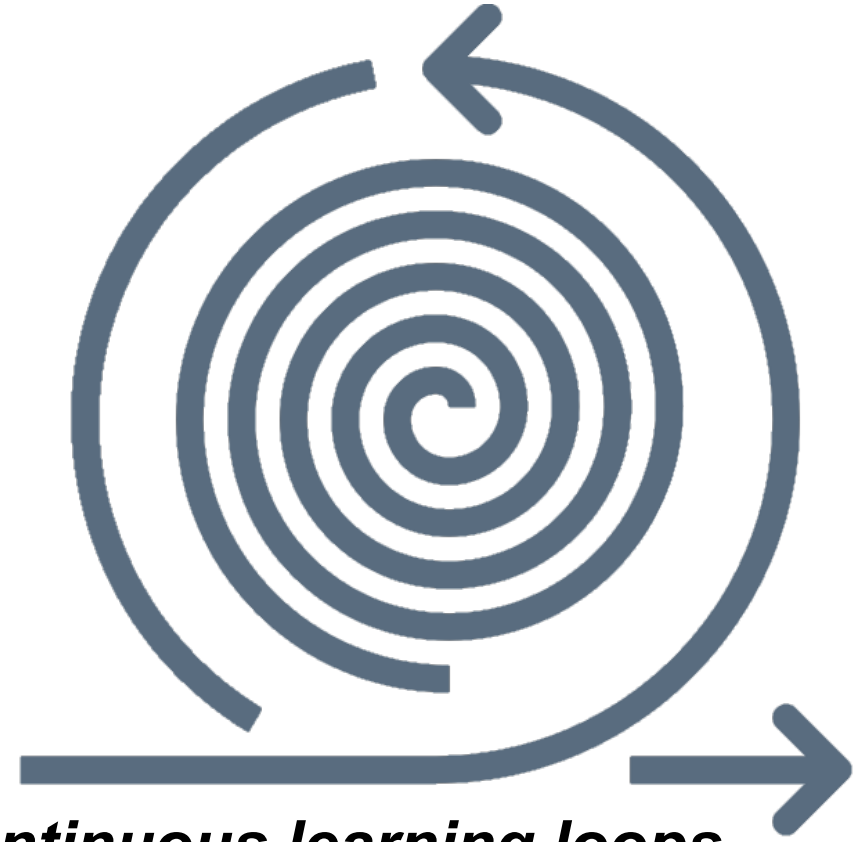
- Create competitive advantage.
- Lower costs and shorten lead times.
- Improve logistics upstream and downstream.

Benefits of 3PL

- Focus on core competencies.
- Divest transportation, warehousing, and/or order fulfillment to 3PL.
- Get 3PL's expertise in logistics.

Supply Chain Continuous Improvement

- Investing resources to achieve mutual goals—e.g., supplier quality accreditation
- Designing communication and business processes for better integration
- Achieving sustainable goals—e.g., reduced material use
- Providing training and technical support to supply chain partners



Continuous learning loops

Supplier Capability Assessment

- Both buyer and supplier have vested interest in fulfilling all requirements.
- Qualifying designs to ensure it fulfills buyer's requirements
- Qualifying manufacturing process
- Related terms
  - Functional requirements
  - Critical to quality (CTQ)
  - First pass yield
  - First-article inspection

Capable Suppliers and Contracts

Supplier Certification

- Certified as to effective procedures related to customer's requirements
- Tiers
  - Approved supplier
  - Preferred supplier (must select if able to deliver)
  - Approved or preferred may be "qualified supplier" meaning certified
- Lower cost of quality (e.g., no inspection cost)
- Stable processes, quality system, no lot rejections, etc.

Capable Suppliers and Contracts

Supplier Contract Types

- Buy-back
- Revenue-sharing
- Pay-back
- Cost-sharing
- Pricing agreements
- Capacity reservation

Negotiating Contracts

- May use competitive bidding and pick low price instead for commodities
- Type of contract to pursue
- Relative negotiating power (good alternatives?)
- Best alternative to negotiated agreement (e.g., cost of doing it in house, others on short list)

Negotiate on

- Terms and conditions
- Delivery and quantity
- Quality
- Price.

Negotiating Prices

- Acquisition costs can account for half of COGS.
- Volume discounts may help lower unit cost.
- Break-even point formula

$$\text{Price per Unit} \times \text{Number of Units Sold} = \text{Fixed Cost} + (\text{Variable Costs per Unit} \times \text{Number of Units})$$

- Solved for number of units (X)

$$X = \frac{\text{Fixed Cost}}{(\text{Price per Unit} - \text{Variable Cost per Unit})}$$

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SECTION B:
PURCHASING AND MAINTENANCE

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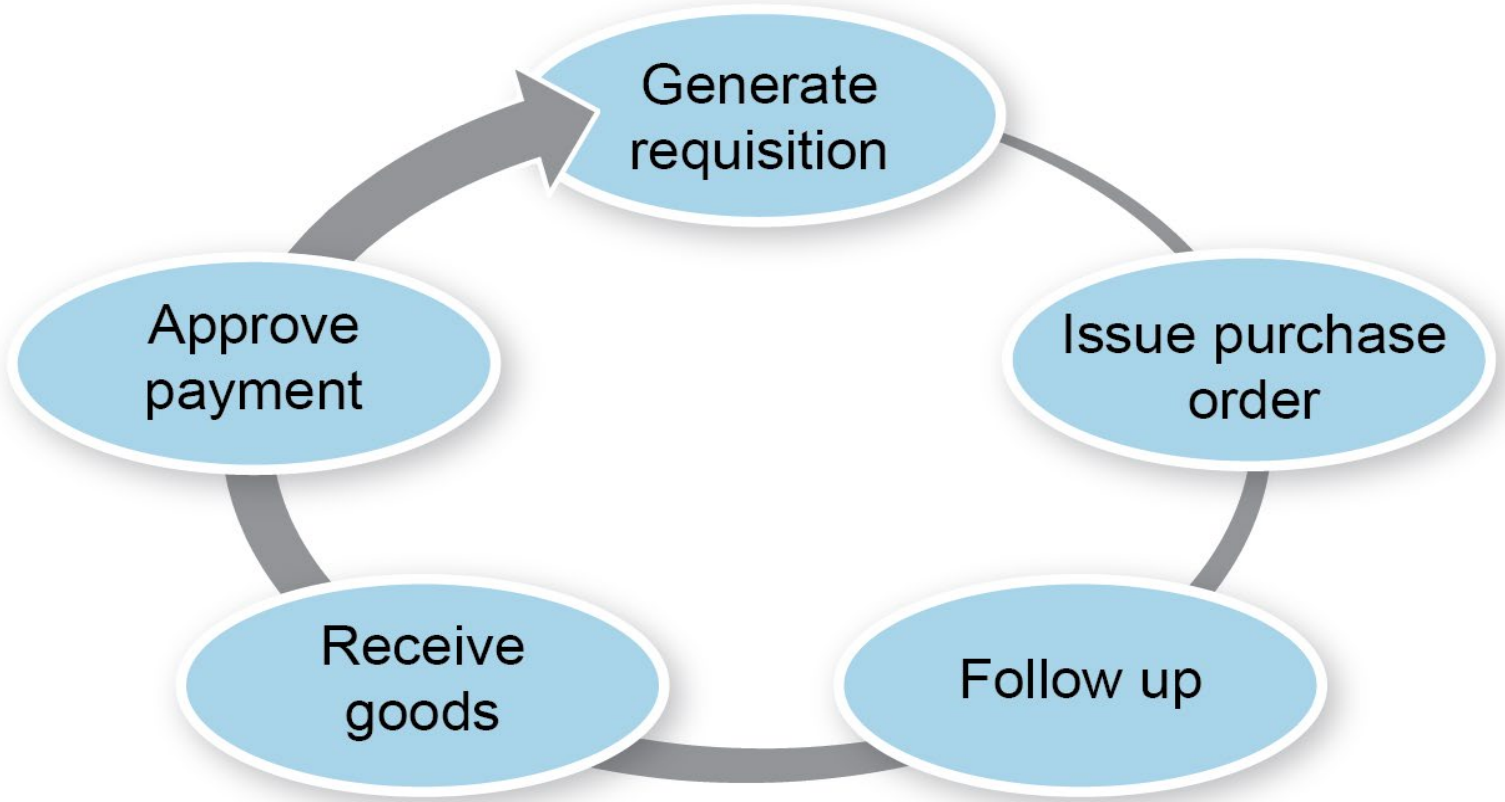
Section B Learning Objectives

- Purchasing process
- Purchase orders and blanket orders
- Releasing or requesting materials and services
- Vendor involvement in inventory management
- Logistics
- Supplier performance and evaluation

Purchasing Cycle

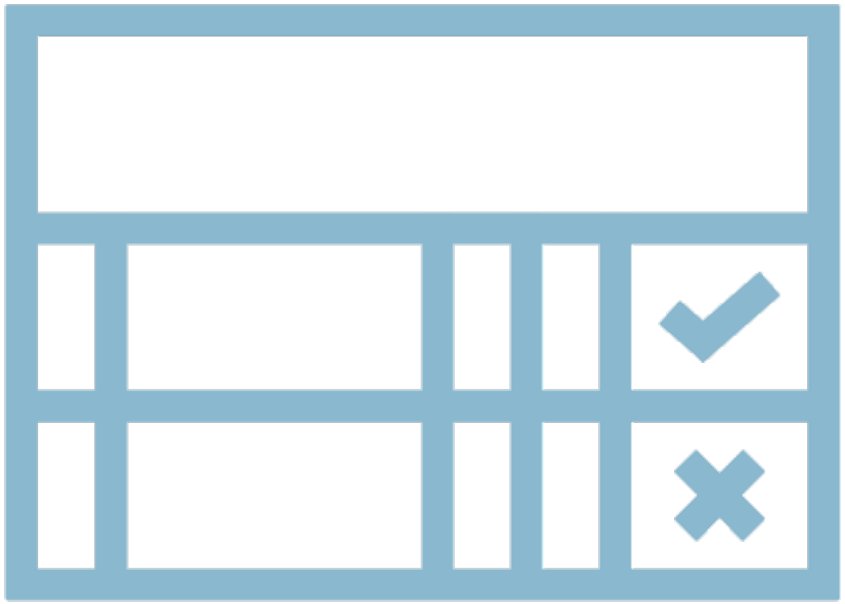


Contract Buying and Other Ordering Approaches

- Purchasing cycle
  - Purchase order
- Contract buying
  - Blanket purchase order
  - Lean purchasing
- Managed inventories
  - Vendor-managed inventory
  - Consignment inventory

Supplier Success: Best Practices

- Continual coordination with suppliers
- Consistent supplier performance criteria and practices across the organization
- Visibility into supplier systems and exception alerting
- Use of current technology to automate communication and control
- Use of performance scorecards with most suppliers



Rating System Requirements

Effective supplier performance rating systems

- Communicate metrics to suppliers
- Collaborate on ways to achieve performance targets
- Use short feedback loops aimed at improving supplier performance
- Select metrics aligned with organization's strategic goals.

Supplier Performance Metrics

Quantitative	Qualitative
▪ Certifications ▪ Product quality ▪ On-time delivery performance ▪ Cost ▪ Environmental, social, and governance (ESG) ▪ Technological capabilities ▪ Data quality	▪ Willingness to share information and collaborate ▪ Buyer's experience of service ▪ Responsiveness to requests

GRI Standards for Sustainable Supply Chains

Sustainability reporting framework	Performance indicators
▪ People: Treatment of workers and community well-being ▪ Planet: Energy, emissions, carbon footprint, waste, and pollution ▪ Profit: Reputation and liability for supplier behavior	▪ General: Supplier locations and conflict-of-interest measures ▪ Economic: Degree of local sourcing ▪ Environmental: Energy, greenhouse gases, environmentally screened suppliers ▪ Social: Health, labor practices, human rights, and societal impact

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SECTION C:
RISK MANAGEMENT

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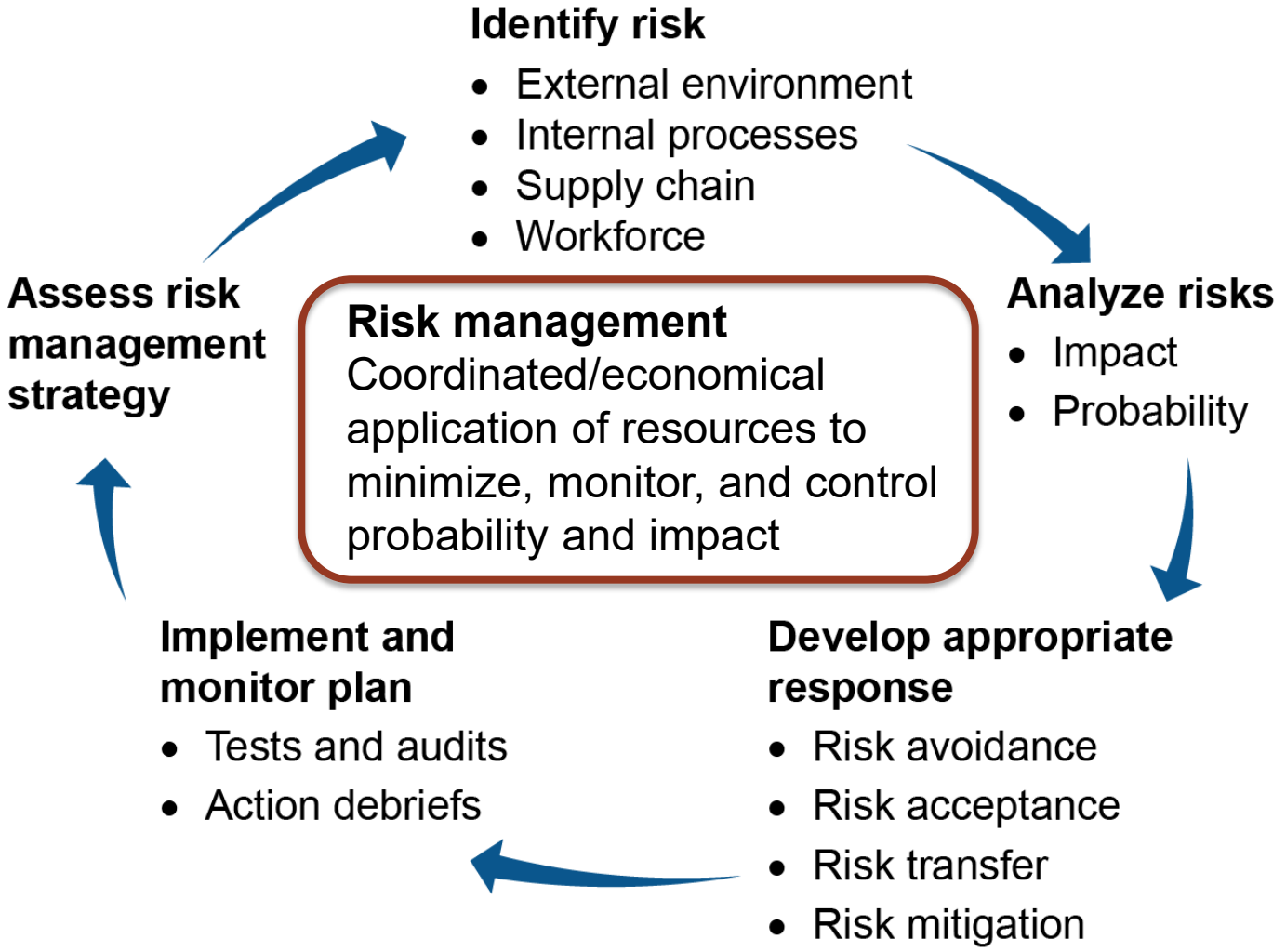
Section C Learning Objectives

- Risk management process and strategies
- Supply chain mapping and event monitoring
- Risk tools such as failure mode and effects analysis (FMEA)
- Business continuity planning (BCP)
- Security requirements and regulations

Risk Management Process



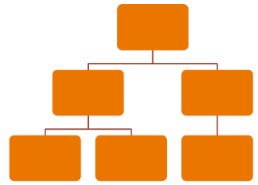
Failure Mode and Effects Analysis (FMEA)

Failure	Probability of Occurrence	Severity of Failure	Probability of Escape from Detection	RPN
Goods not secured	5	6	2	60
Goods incorrectly secured	8	4	5	160
Goods incorrectly loaded	7	4	7	196

FMEA = Evaluate a design process to identify and rank potential failures.

Types of Risks

- External
  - Currency rates, theft, civil unrest
- Environmental
  - Natural disasters, fire and flood, environmental requirements
- Technical
  - Equipment or IT failure, power outage
- Organizational
  - Inadequate resources, unethical acts, poor supplier performance

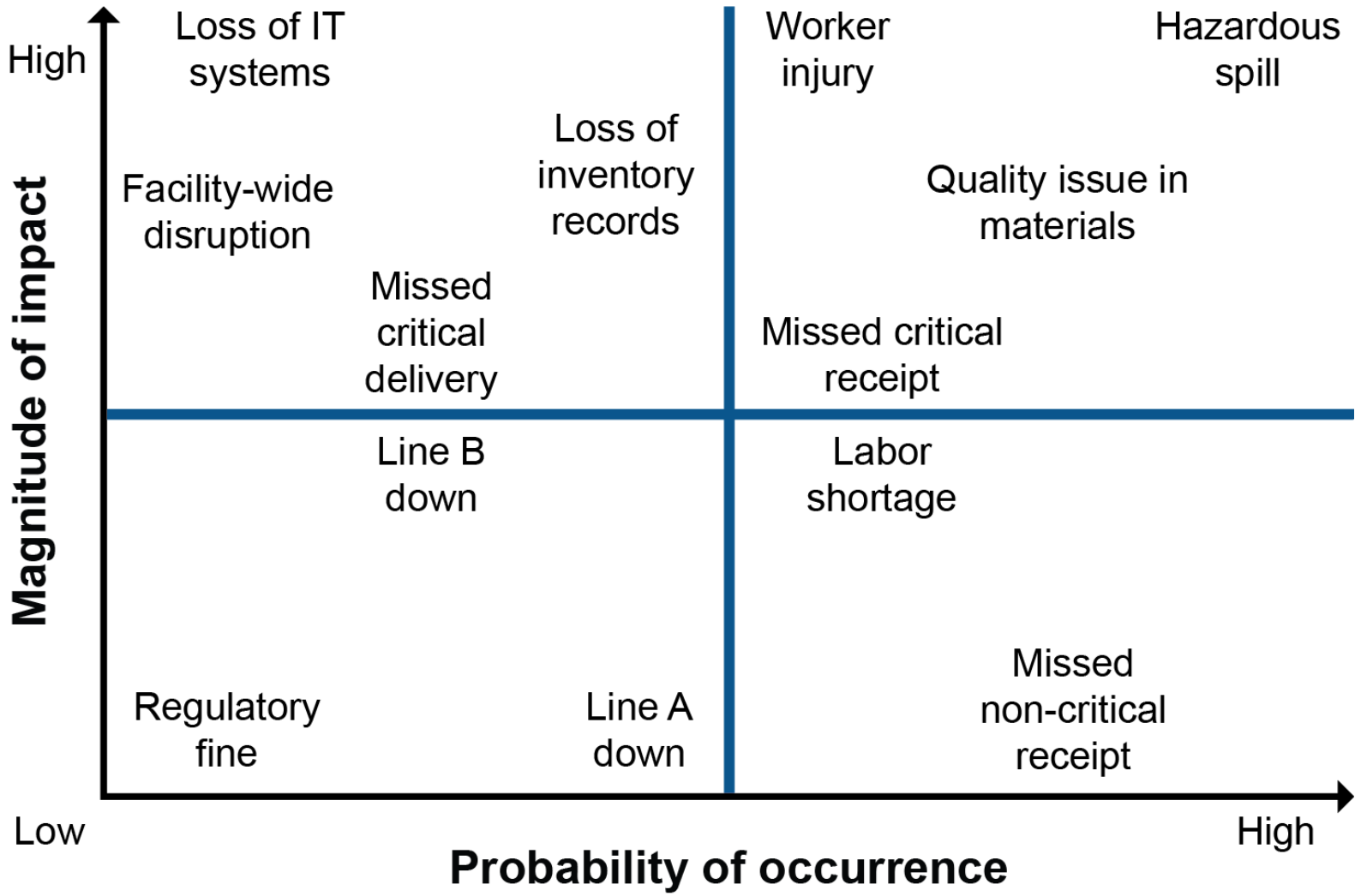


Supply Chain and Legal/Regulatory Risks

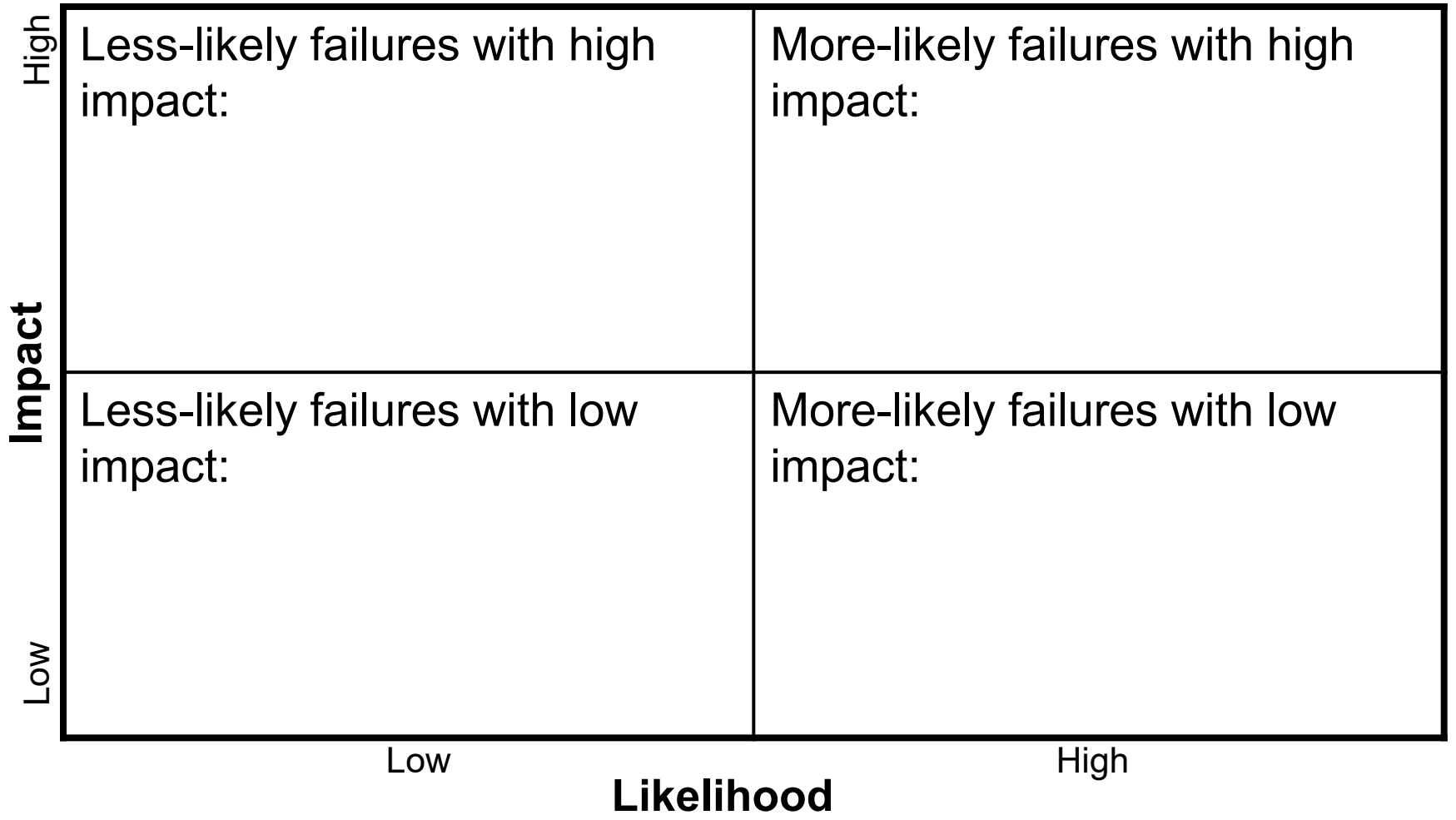
Supply chain risks	Legal and regulatory compliance risks
▪ Natural events ▪ Technical problems ▪ Forecast inaccuracy ▪ Price increases ▪ Loss of intellectual property ▪ Loss of real property or value ▪ Loss of reputation	▪ Compliance risk ▪ Contract risk ▪ Trademark/patent infringement ▪ Bribery and corruption

Identifying, Assessing, and Managing Risks

Risk Matrix



Risk Matrix Discussion



Responses to Risk

Response depends on

- Risk's magnitude (probability and impact)
- Probability of risk management strategy success and its cost
- Secondary risks created by the response
- Organization's risk tolerance.

Risk acceptance	Risk avoidance	Risk mitigation	Risk transfer
▪ Decision to take no action ▪ Inability to plan response	▪ Changing plan to eliminate risk or protect objectives from its impact	▪ Reducing probability and/or impact	▪ Transferring all/part of risk to third party (e.g., insurer, supplier)

Recovery Strategies

- Planning first response (e.g., protocols such as product recalls or managing spills/emissions)
- Training and equipping employees (e.g., protective gear)
- Identification of alternative resources (e.g., workplaces, temporary workers)
- Debriefing, analysis, and prevention

Business continuity planning

- Framework for resilience

Contingency planning

- Alternate plans to facilitate success if certain risk events occur

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SECTION D:
SUSTAINABILITY STRATEGIES

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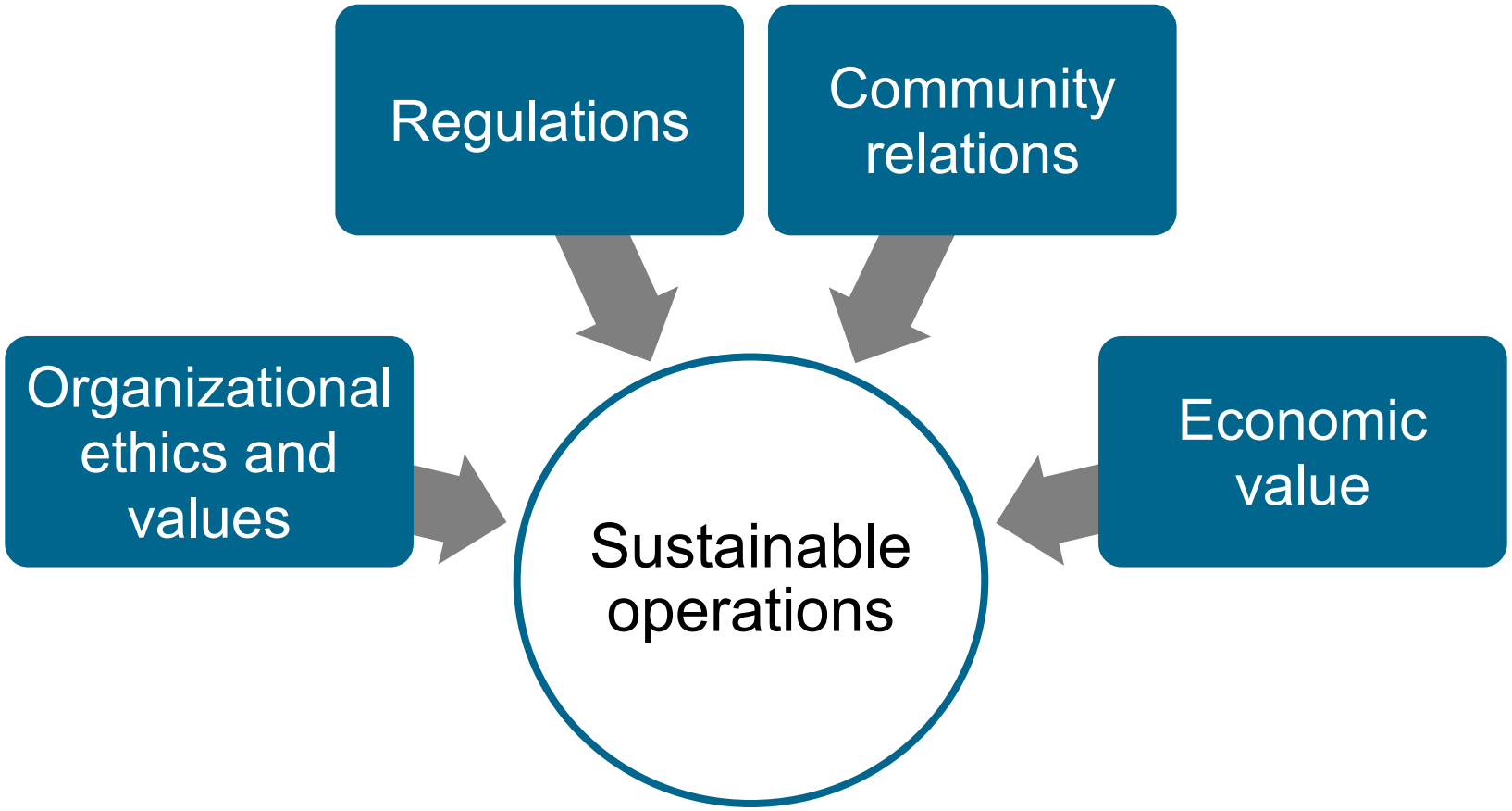
Section D Learning Objectives

- Definition of sustainability and social responsibility
- Forces driving interest in sustainability
- Perspectives represented by triple bottom line and tensions these perspectives cause
- Sources of guidance in developing a sustainability strategy
- Sustainability strategy objectives
- Role of measurement and auditing in sustainability
- Global Reporting Initiative (GRI)

Sustainability and Social Responsibility

- Sustainability: “Activities that provide present benefit without compromising the needs of future generations.”
- Social responsibility: “Commitment…to behave ethically and to contribute to community development…improving the workforce’s quality of life.”
- Ethical obligations.
- Short- and long-term effects of a firm’s actions.
- Holistic sense of effects on the environment, the firm, and society.

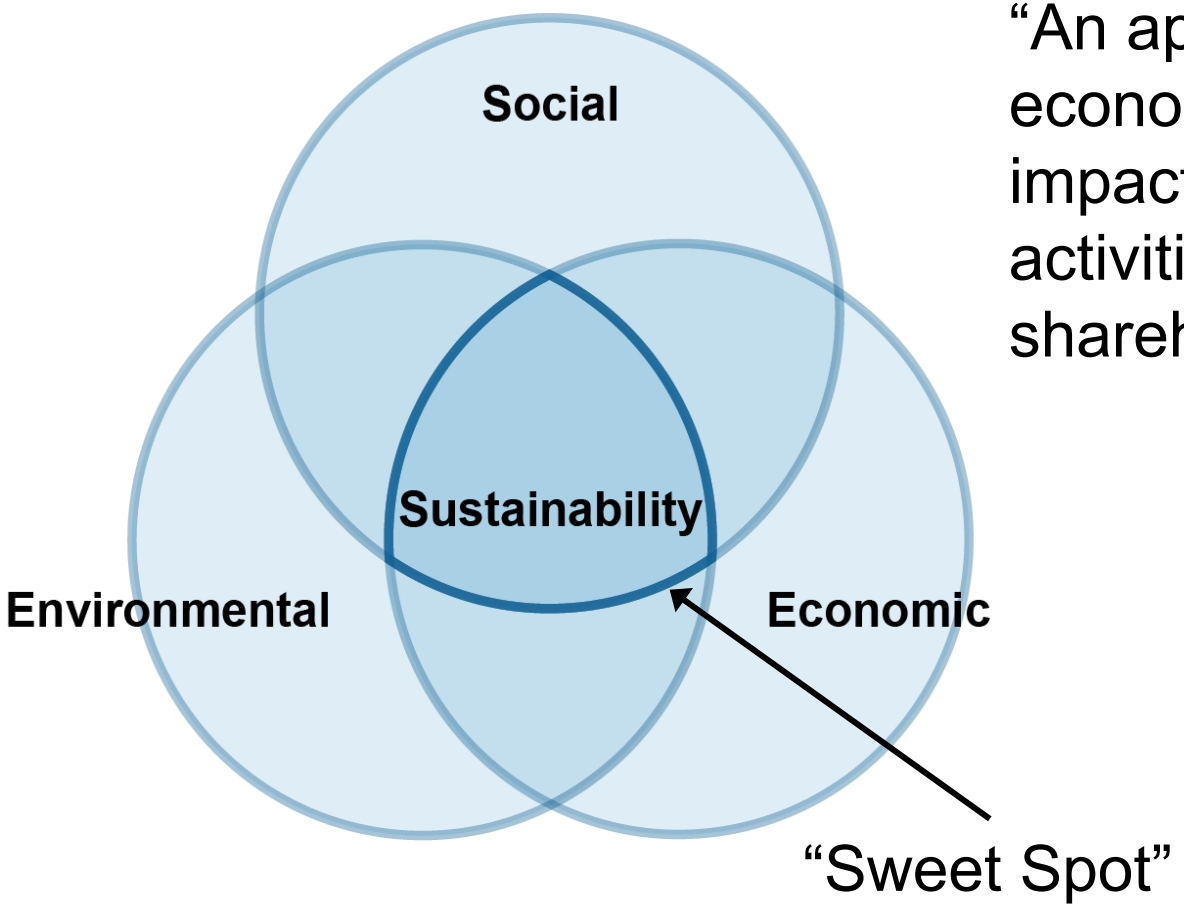
Forces Driving Sustainability Strategies



Areas of Focus in Sustainability

- Ethics
- Governance
- Transparency
- Business relationships
- Financial return
- Community involvement/economic development
- Value of products and services
- Employment practices
- Protection of environment

Triple Bottom Line



"An approach that measures the economic, social, and environmental impact of an organization's activities...creating value for both its shareholders and society."

Choosing a Strategic Focus

- Align sustainability strategy with issues significant to the organization.
  - Issues important to society but not directly influenced by the firm
  - Value chain issues directly affected by the firm
  - Issues with strategic effects

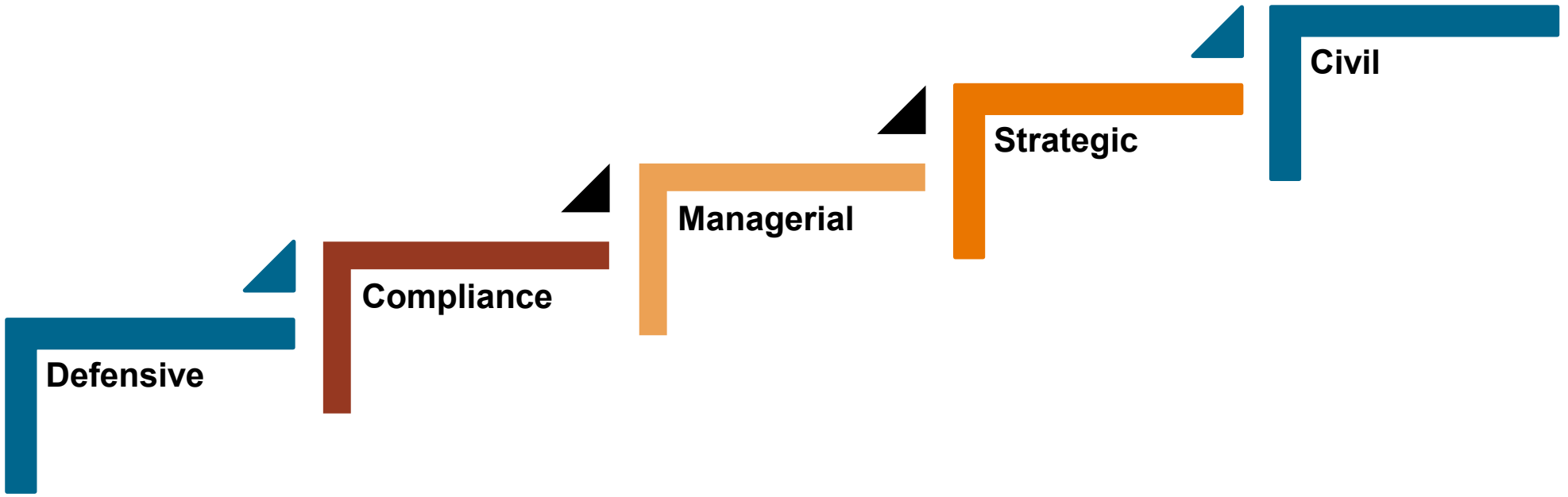
Choosing a Strategic Focus Exercise

Value Chain Activity	Impact on Society
Human resource management	▪ Health-care benefits ▪ Safe working conditions ▪ Compensation policies ▪ Education and training
Procurement	▪ Supply chain practices (child labor, conflict diamonds, and so on) ▪ Use of natural resources
Marketing and sales	▪ Truthful advertising ▪ Policies on advertising to children ▪ Privacy

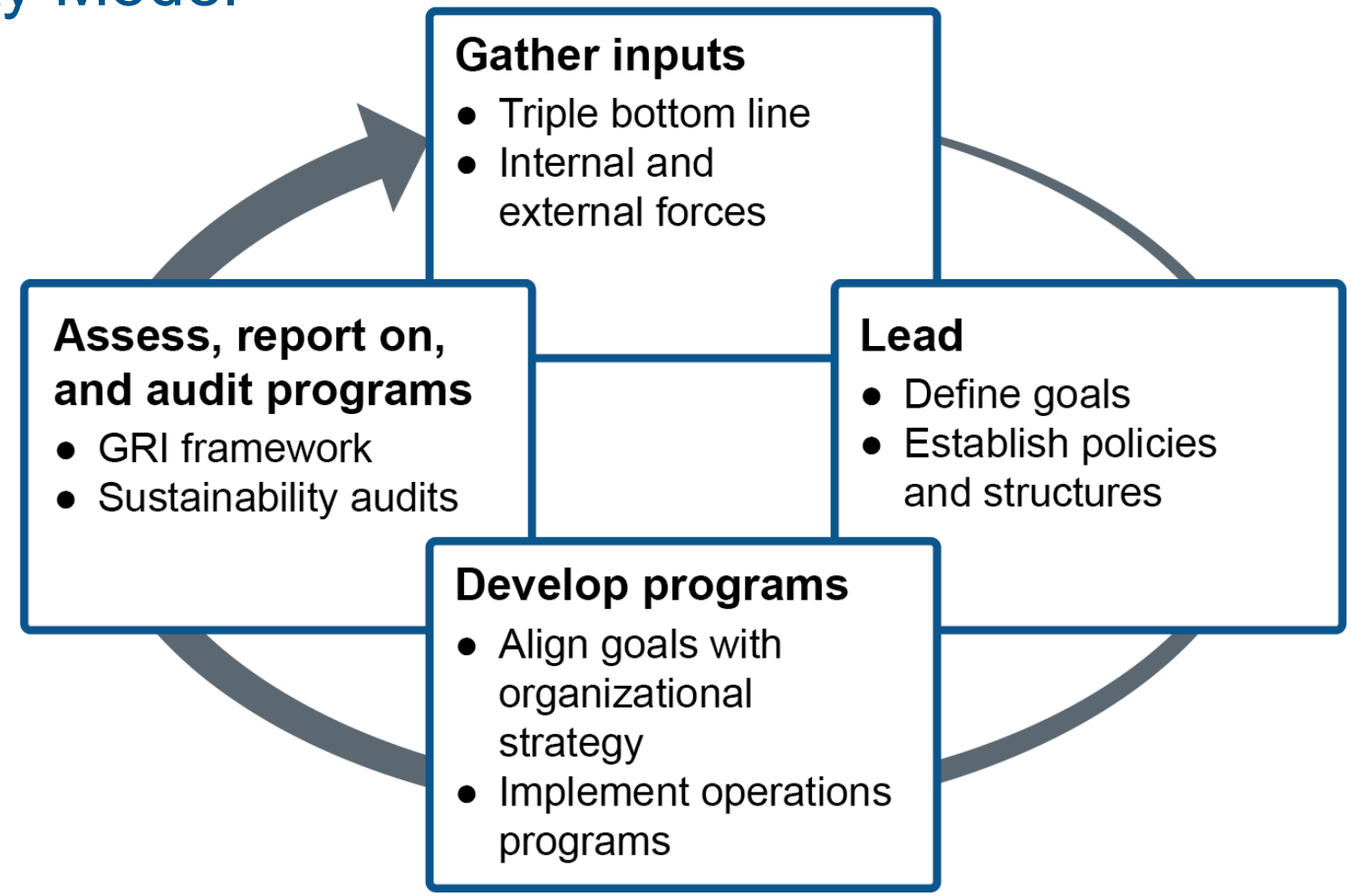
Benefits of Taking a Strategic Approach

- High-level strategic approach enlists top management support.
- Sustainability strategies can be integrated and coordinated across all parts of the organization.
- The organization takes a more proactive and long-term perspective.

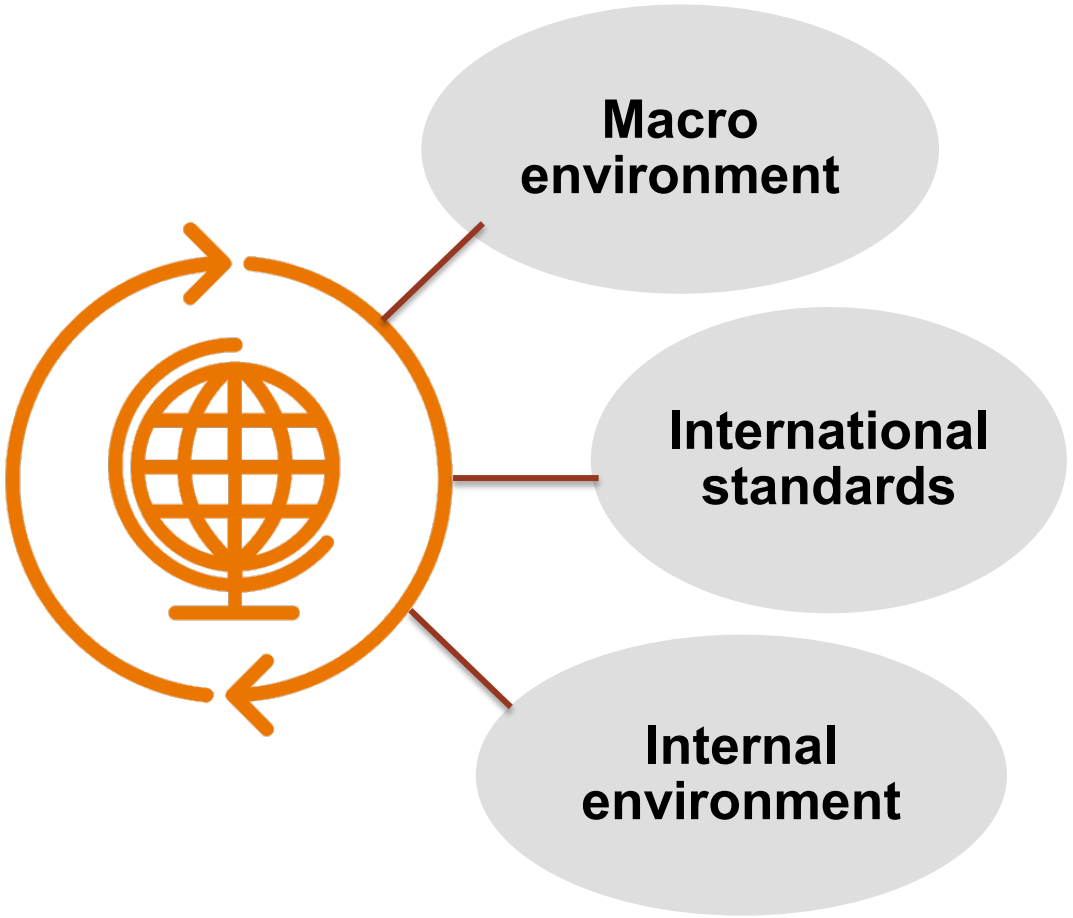
Organizational Maturity in Sustainability Strategies



Sustainability Model



Inputs to Sustainability Strategy



- STEEPLE analysis

- ASCM Enterprise Standards
- ISO 14000/26000
- SA 8000
- UN Global Compact

- Culture and strategy
- Value chain
- Resources/expertise

Role of Leadership in Sustainability

- Provide overarching vision.
- Set and endorse strategy and goals.
- Communicate and engage stakeholders.
- Align culture and resources with goals.
- Support accountability for investments.

United Nations Global Compact Principles

Category	Principle	
Human Rights	1	Support and protect internationally proclaimed human rights.
	2	Ensure non-complicity in human rights abuses.
Labour	3	Uphold freedom of association, right to collective bargaining.
	4	Eliminate forced and compulsory labour.
	5	Abolish child labour.
	6	Eliminate discrimination in employment and occupation.
Environment	7	Support precautionary approach to environmental challenges.
	8	Promote greater environmental responsibility.
	9	Encourage development and diffusion of environmentally friendly technologies.
Anti-Corruption	10	Work against corruption in all of its forms, including extortion and bribery.

Identifying and Managing Risks to Sustainability

Supply chain

Environmental and ethical practices

Processes

Effect on health and well-being of communities and employees

Environmental effects of byproducts and emissions

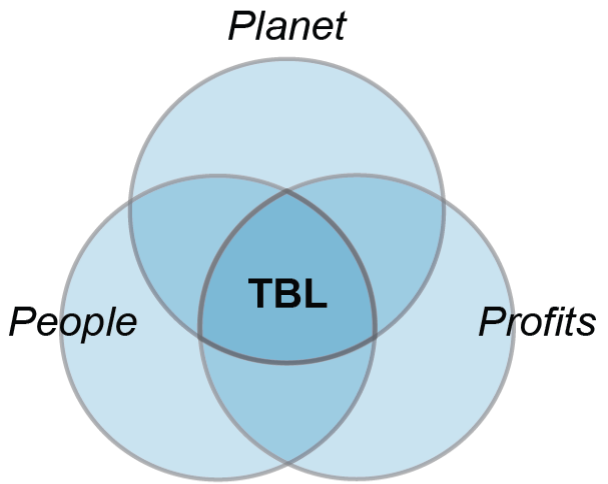
Products

Product designs (waste, depletion of resources)

Effect on customer well-being

Facilities

Impact on local resources, plants and animal communities



Measuring Sustainability Performance

Accountability and Continuous Improvement	
Sustainability audits ▪ Internal and external	Global Reporting Initiative (GRI) ▪ GRI Standards

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SECTION E:
WASTE HIERARCHY AND REVERSE LOGISTICS

APICS

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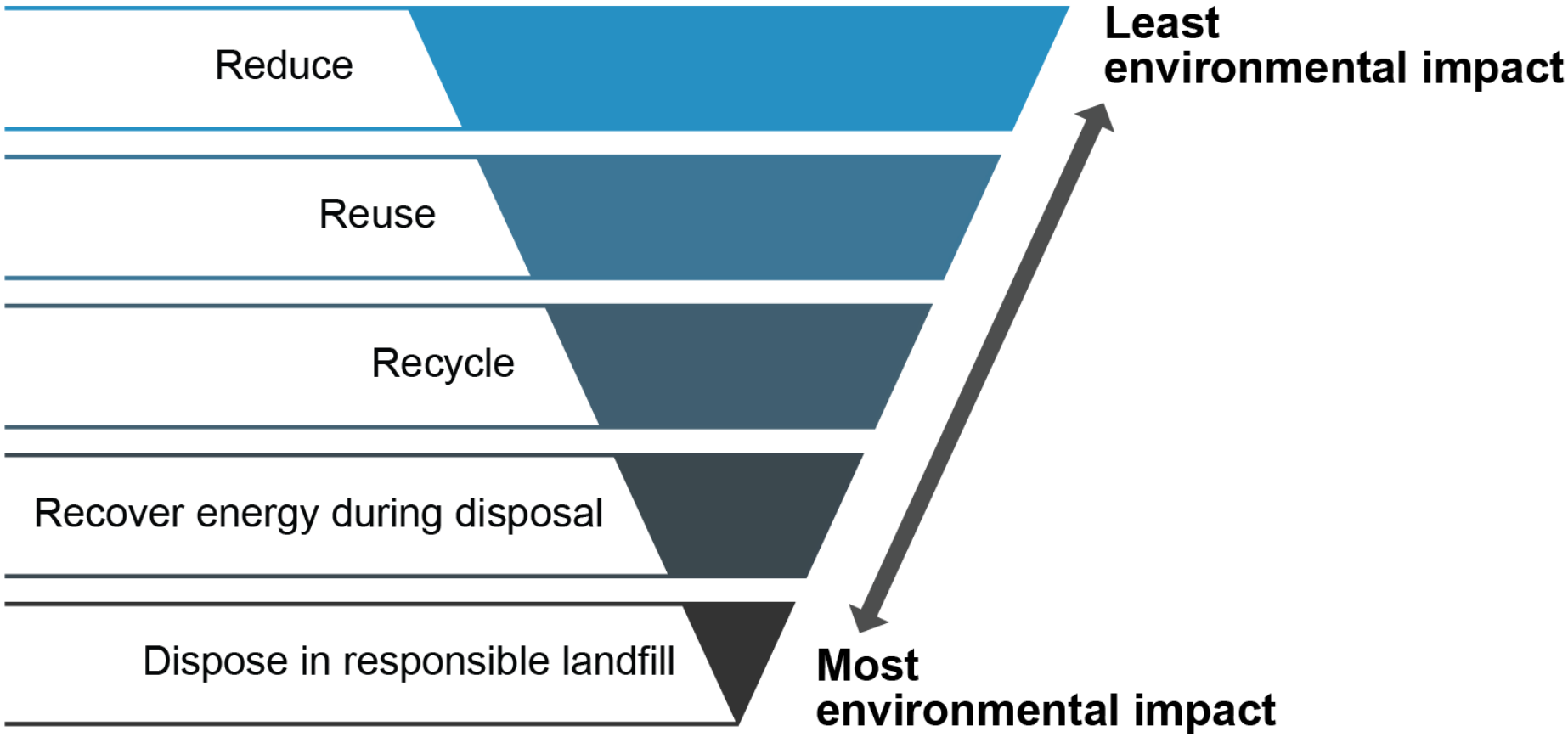
Section E Learning Objectives

- Role of waste hierarchy and total cost of ownership in sustainability
- Circular economy (reduce, reuse, recover)
- Minimize materials/enable recycling in products, packaging, processes
- Reverse logistics goals, policies, and process
- Reverse logistics as part of distribution network design
- Alternative reverse logistics providers (e.g., third-party logistics providers)
- Sustainable disposition process

Waste Hierarchy

Toward More Sustainable Options



Waste Hierarchy

Toward a Circular Economy

- Reduced extraction from earth
- Reduced disposal into landfills

- Extends from raw material extraction to final disposition.
- Minimize changes to materials during life cycle.
- Increase number of industries benefiting from materials in some form throughout their life cycle.

Waste Hierarchy

Sustainability in Product/Process Design

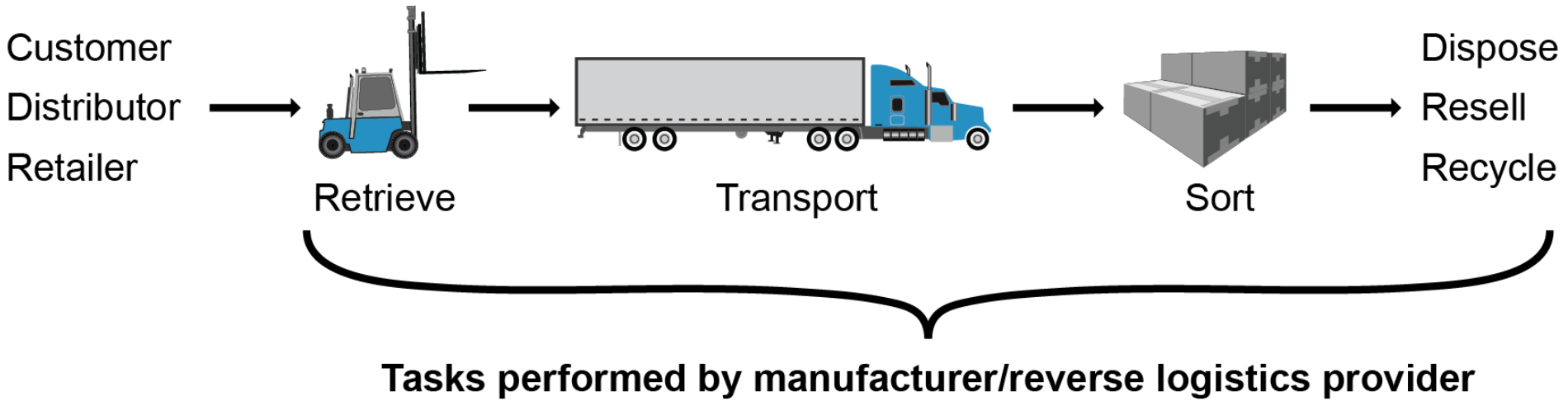
- Fewer hazardous materials in BOMs
- Recycled materials in BOMs
- Design for disassembly
- Less packaging
- Recycled packaging
- Reverse logistics as part of product/service package
- Easy recycling
- Total cost of ownership (TCO)
  - More-sustainable material higher in unit cost could be lower in cost in long run than less-sustainable option with hidden costs.

Waste Hierarchy Policy for Supply Chain Partners

Prevent	▪ Prohibit specific hazardous materials. ▪ Promote using pricing incentives.
Reduce	▪ Lot-size return policy. ▪ Requirement for customer service to discuss return. ▪ Incentives to be efficient and use of efficient modes. ▪ Efficient DC layout, materials handling, and energy use.
Reuse	▪ For example, stackable totes.
Recycle	▪ Sustainable procurement policy.
Recover	▪ For example, refrigerant recovery.
Dispose	▪ Responsible disposal policy.

Reverse Logistics

"A complete supply chain dedicated to the reverse flow of products and materials for the purpose of returns, repair, remanufacture, and/or recycling" (*ASCM Supply Chain Dictionary*)



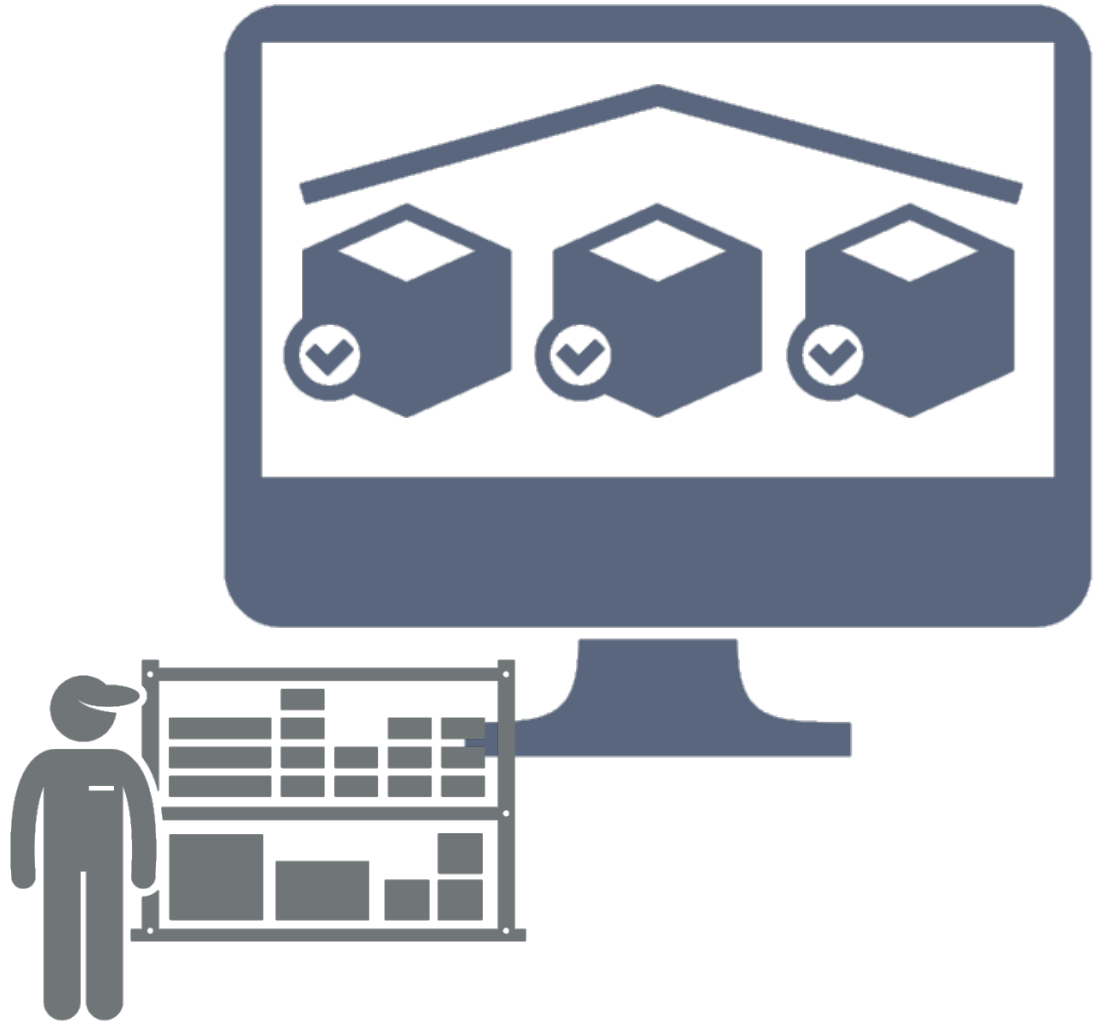
Reverse Logistics Design

- Design must not be an afterthought.
  - Customer service (marketing in reverse).
  - Reverse product flows in warehouses and transportation (may not use the same nodes; dedicated reverse logistics warehouses can specialize).
  - Unpackaging, disassembly, remanufacturing, and/or recycling.
- Reverse information flows and reverse logistics information systems.
- Reverse cash flows.
- Location of reverse logistics activities and services/capacity to provide.

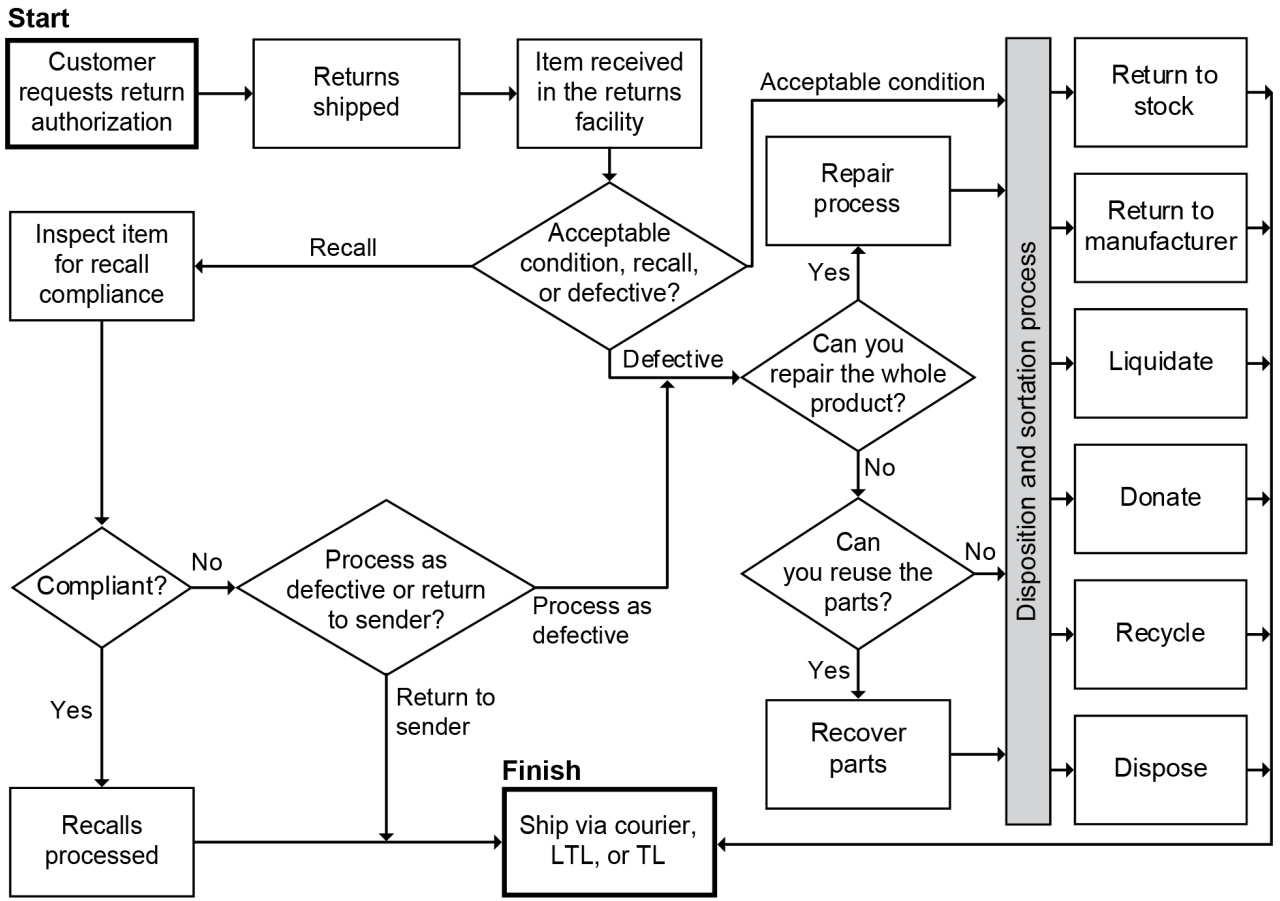
Reverse Logistics and Product Disposition

Who Performs Reverse Logistics?

- Producer “owns” reverse logistics entirely.
- Parts of the process are contracted out (e.g., transportation, warehousing).
- Producer contracts entire process to reverse 3PL/4PL.



Disposition of Returned Products



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