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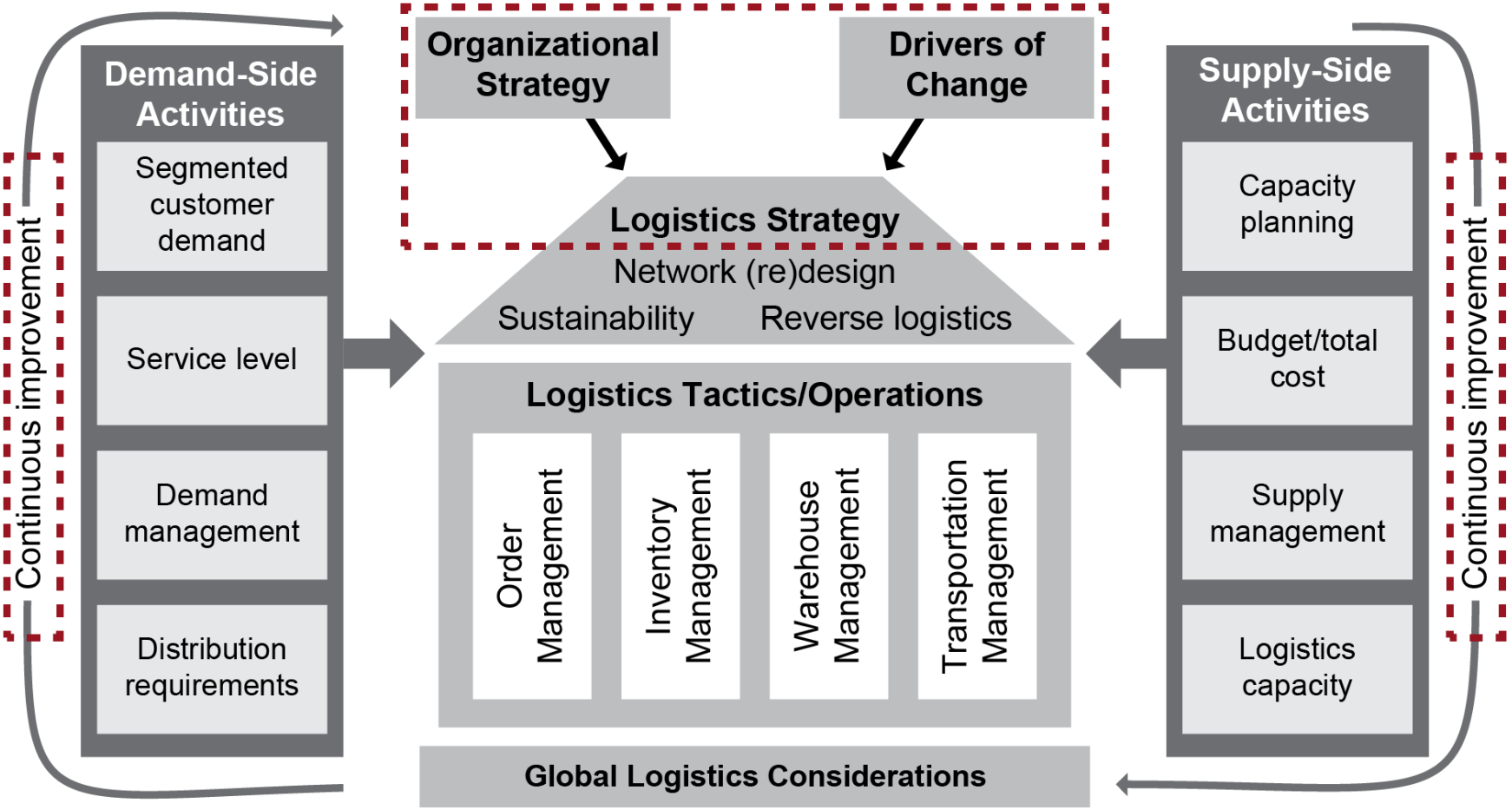
CERTIFIED IN LOGISTICS,
TRANSPORTATION AND DISTRIBUTION

MODULE 1:
LOGISTICS OVERVIEW AND STRATEGY

APICS

ASCM

Module 1 Overview



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MODULE 1, SECTION A:
LOGISTICS FUNDAMENTALS

APICS

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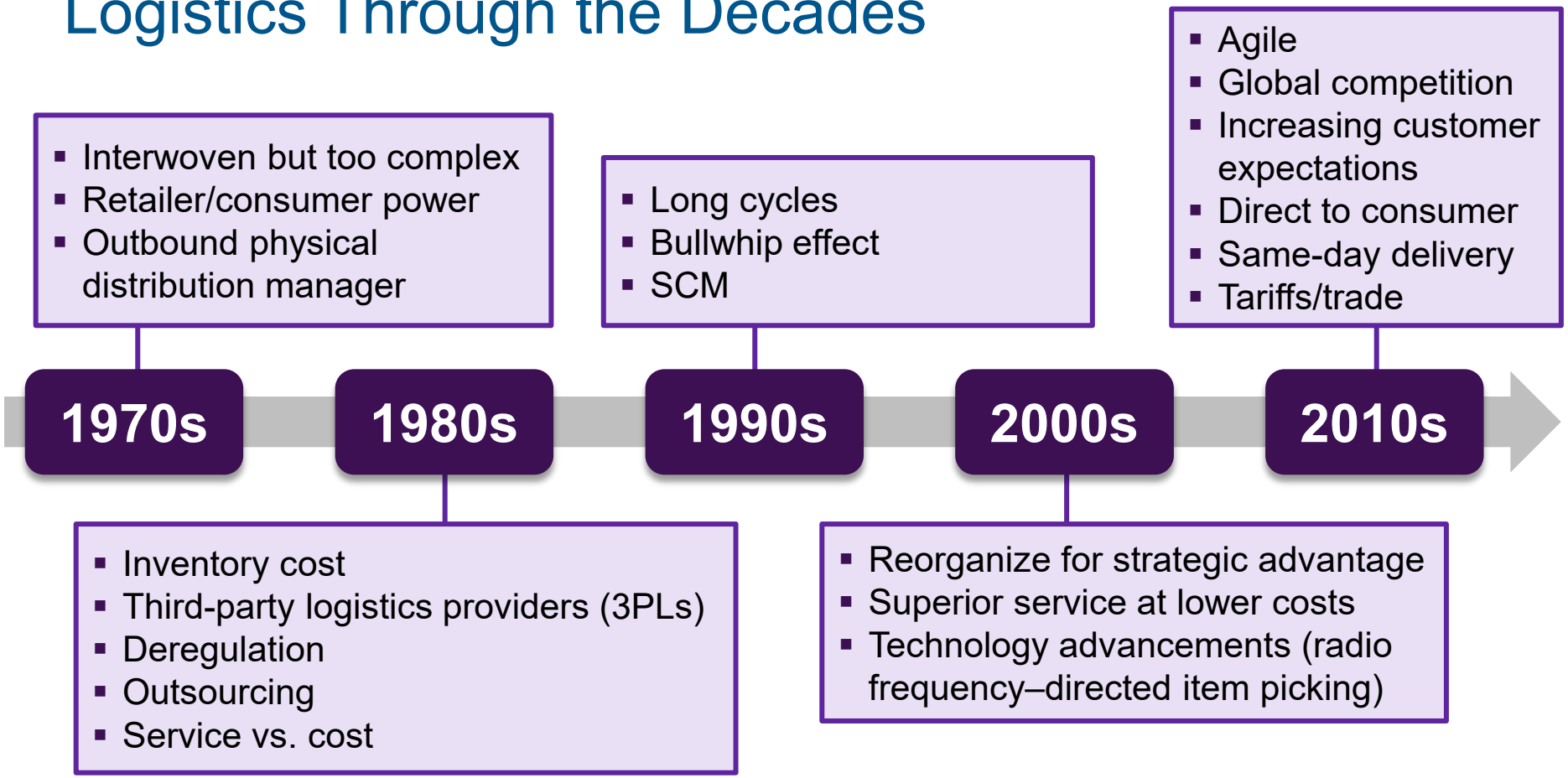
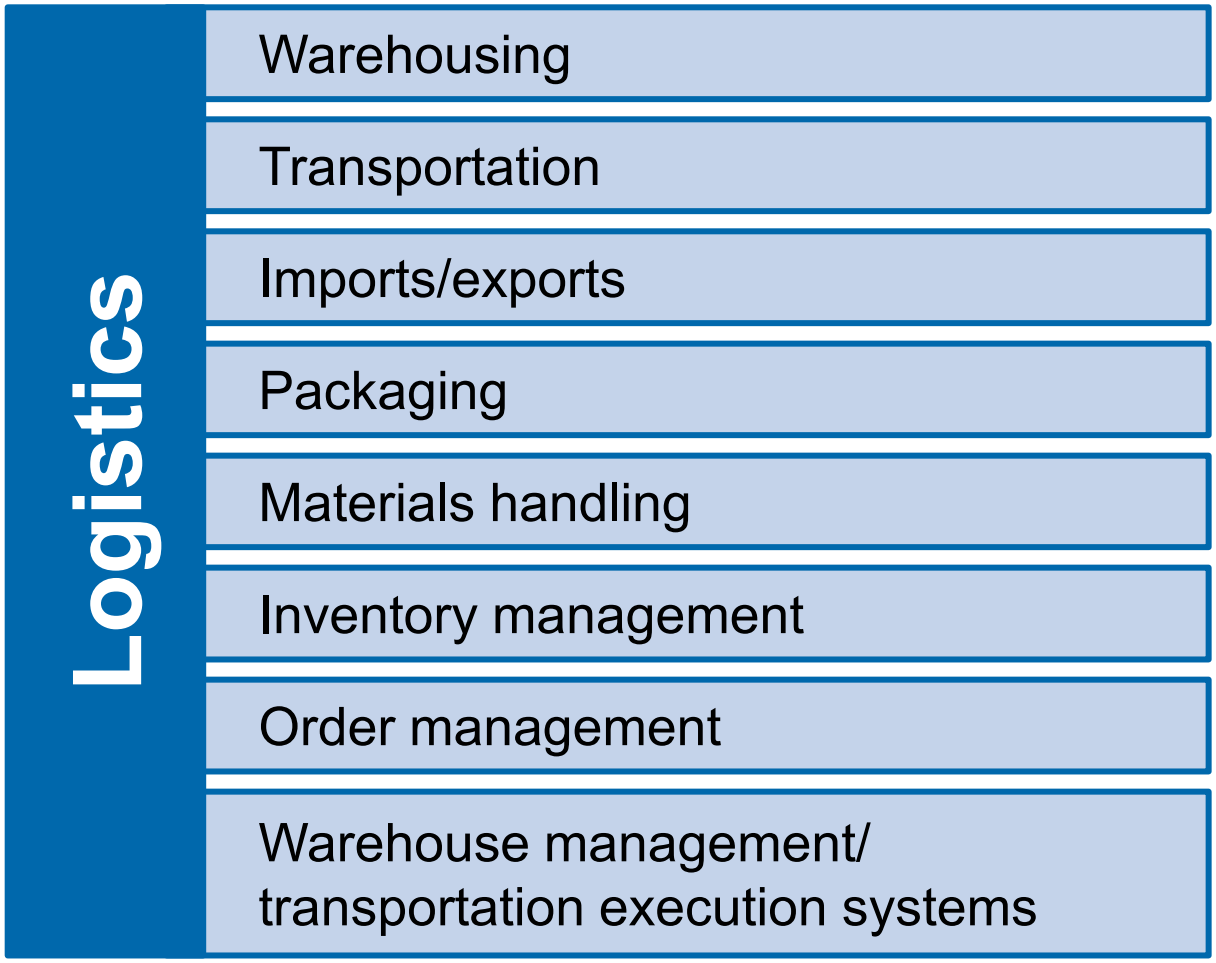
Logistics Through the Decades



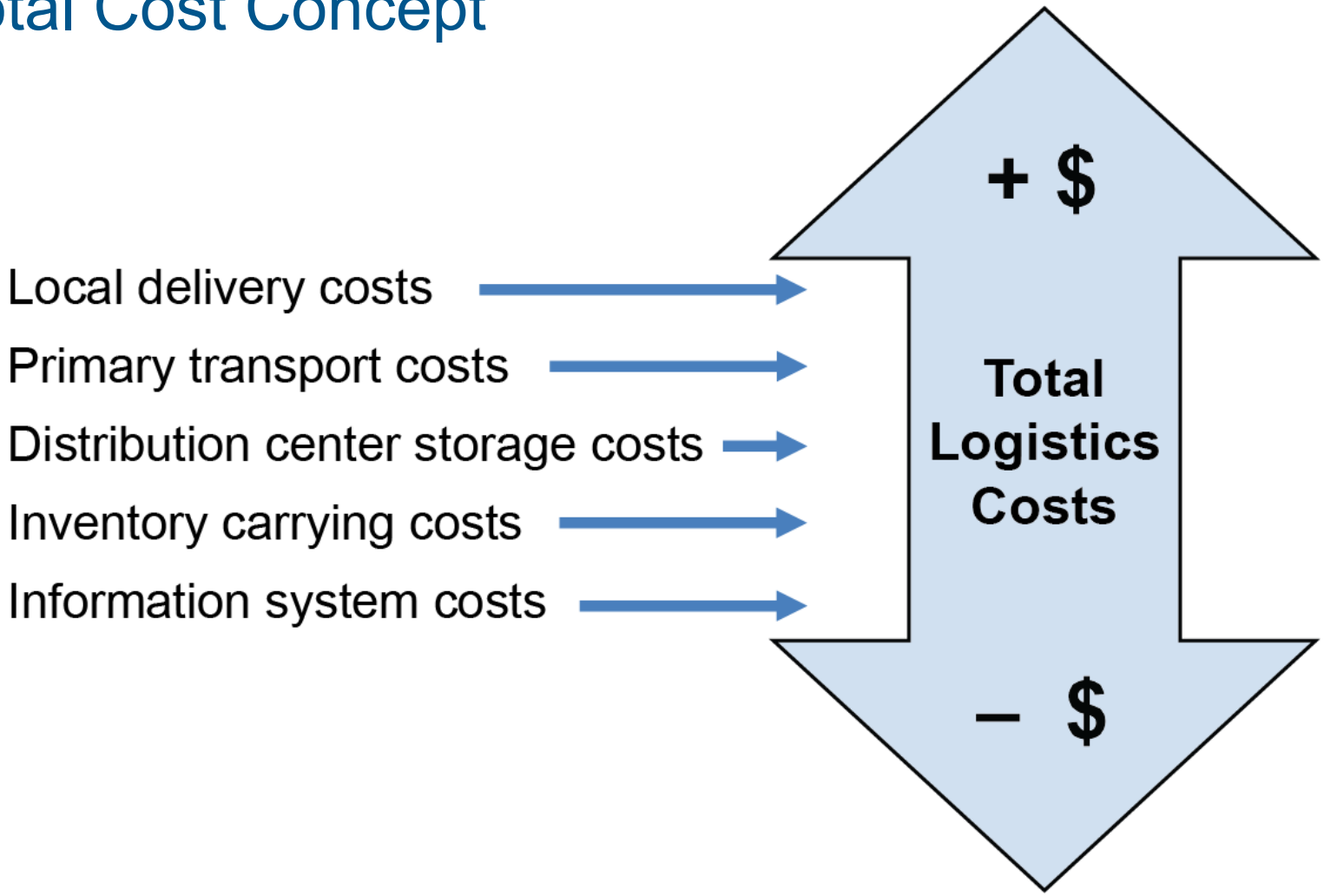
What Is Logistics?

- Designs, plans, executes, and controls forward and reverse movement, storage, and handling of goods
- Optimizes goals:
  - Effectively meet customer requirements
  - Efficiently minimize total system cost
- Logistics = physical supply + distribution
- Coordinates
  - Supply and demand
  - Subsystems and people

Topic 1: Logistics History, Definitions, and Scope



Total Cost Concept



Tradeoffs

Logistics Area	Common Tradeoffs
Warehousing	All three are interrelated: ▪ Slower transport requires more inventory and warehousing, long lead times. ▪ Faster transport reduces inventory and warehousing but increases transport costs. ▪ More warehouses, less transport cost, more inventory carrying cost. ▪ Close to suppliers, cheaper inbound and vice versa. ▪ DC layout and capabilities impact transport frequency and inventory.
Transportation	
Inventory management	

Tradeoffs

Logistics Area	Common Tradeoffs
Import/export	Lean or just in time (JIT): ↓ inventory ↑ transportation (fewer truckloads)
Packaging	Ocean and rail versus air
Demand management and forecasting	Early forecast timely, less accurate
Purchasing	Must consider transportation cost and lead time

Tradeoffs

Logistics Area	Common Tradeoffs
Production planning	Operating environment strongly affects finished goods inventory.
Materials handling	Equipment, automation impact DC capacity, labor, and cost.
Order management	Speeding this can reduce strain elsewhere.
Logistics information systems	Information replaces inventory (e.g., reroute).
Customer service management	Short lead time quotes require more DCs.

Tradeoffs With Other Stakeholders

Finance

- Desire to control logistics budget
- Productivity suffers due to low-value units
- Unit-driven budget: more units moved than planned (high productivity)

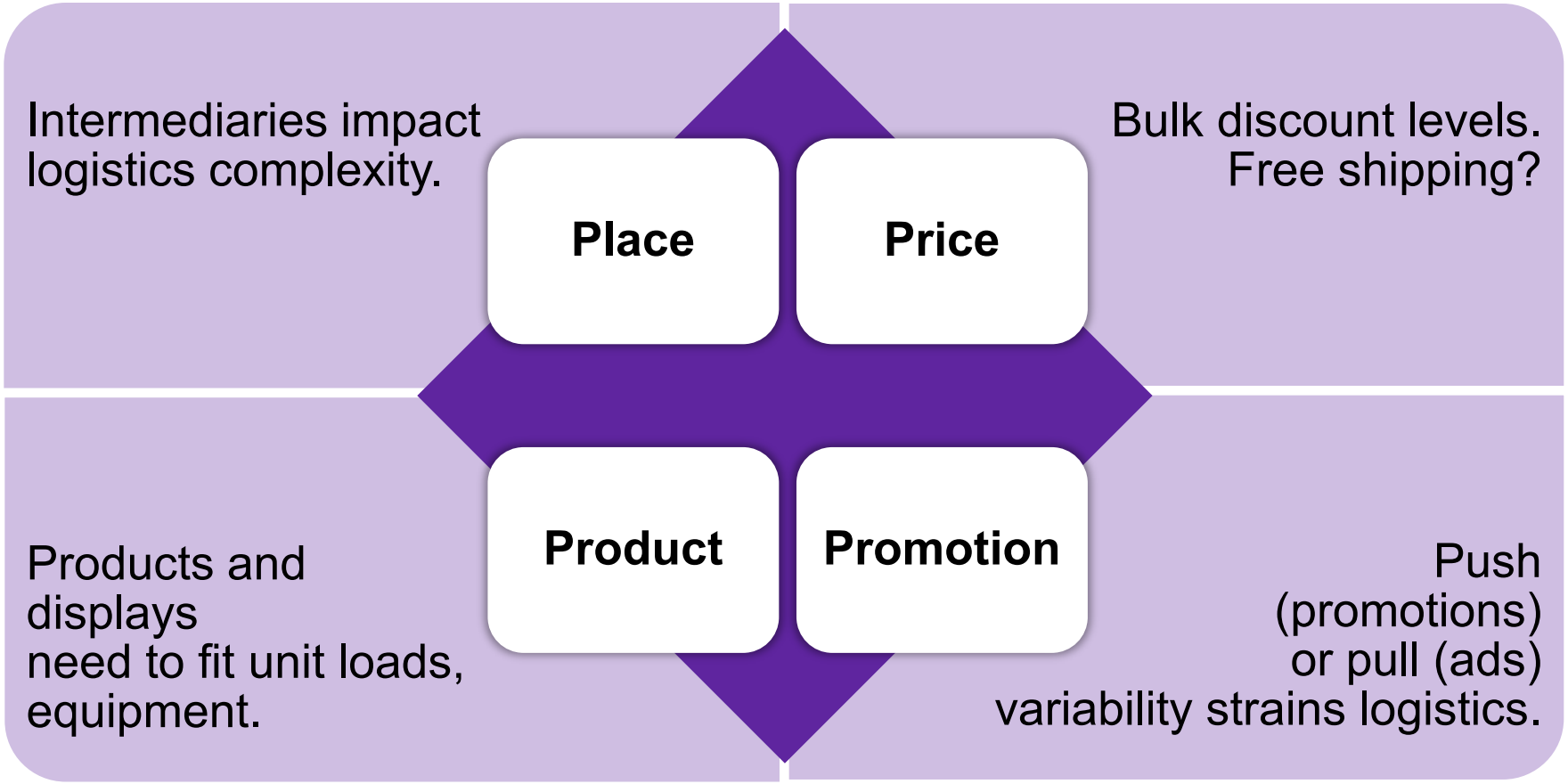
Production

- Desire for long production runs and few changeovers
- Account for inventory buildup

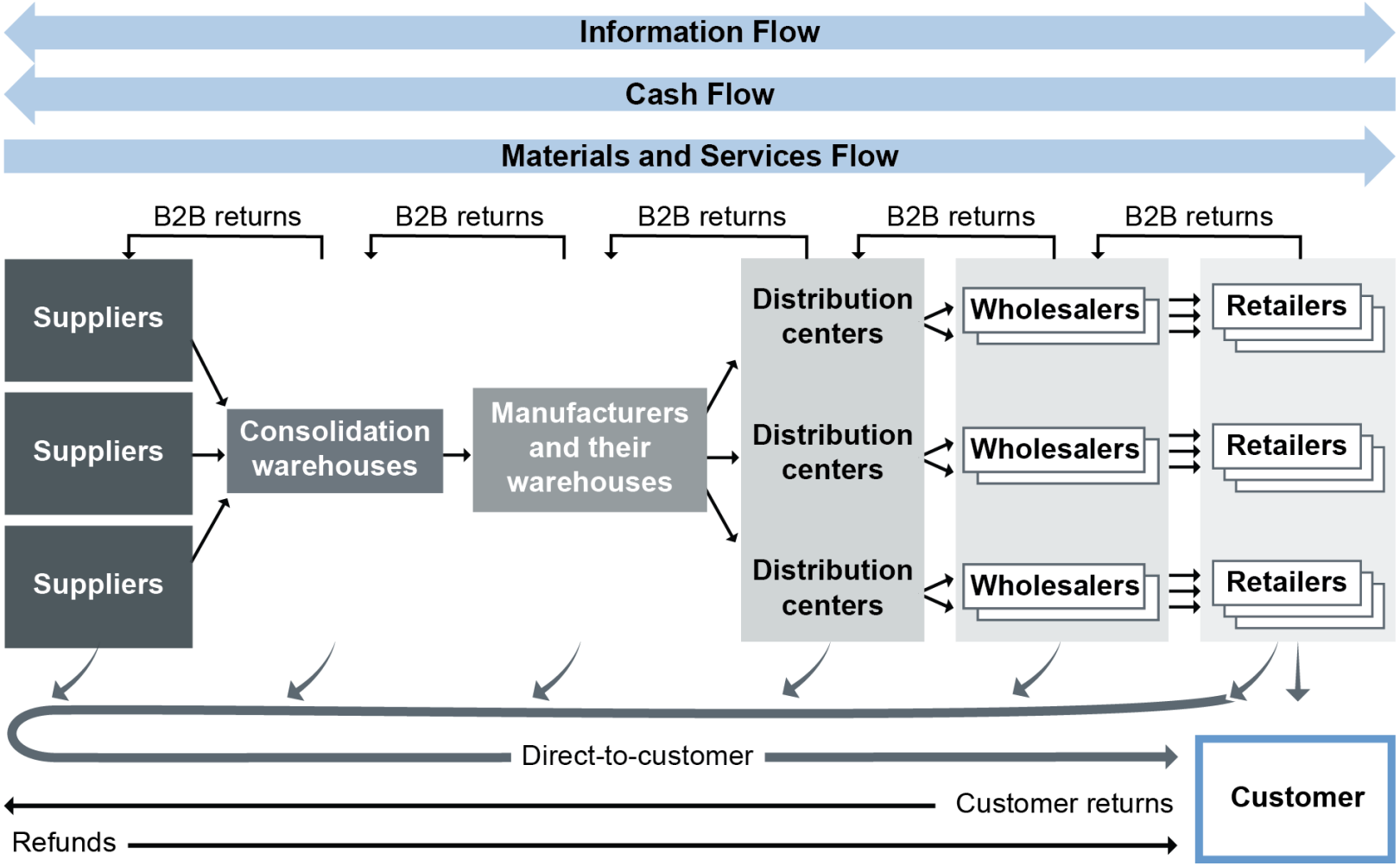
Sales/Marketing

- Desire for short lead times, no stockouts, no damaged goods
- Add DCs, inventory, and packaging
- Postponement

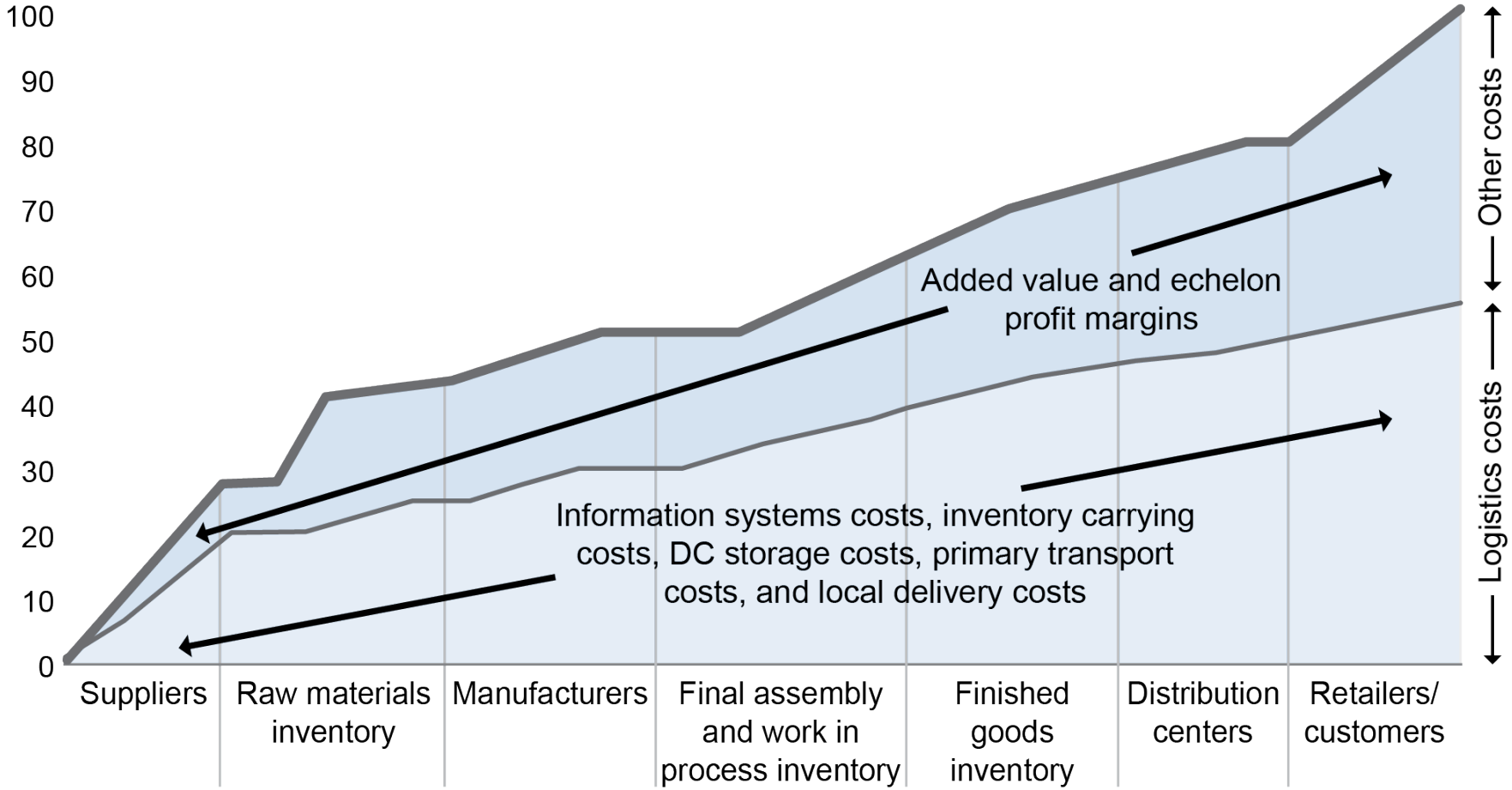
Tradeoffs Related to the 4Ps of Marketing



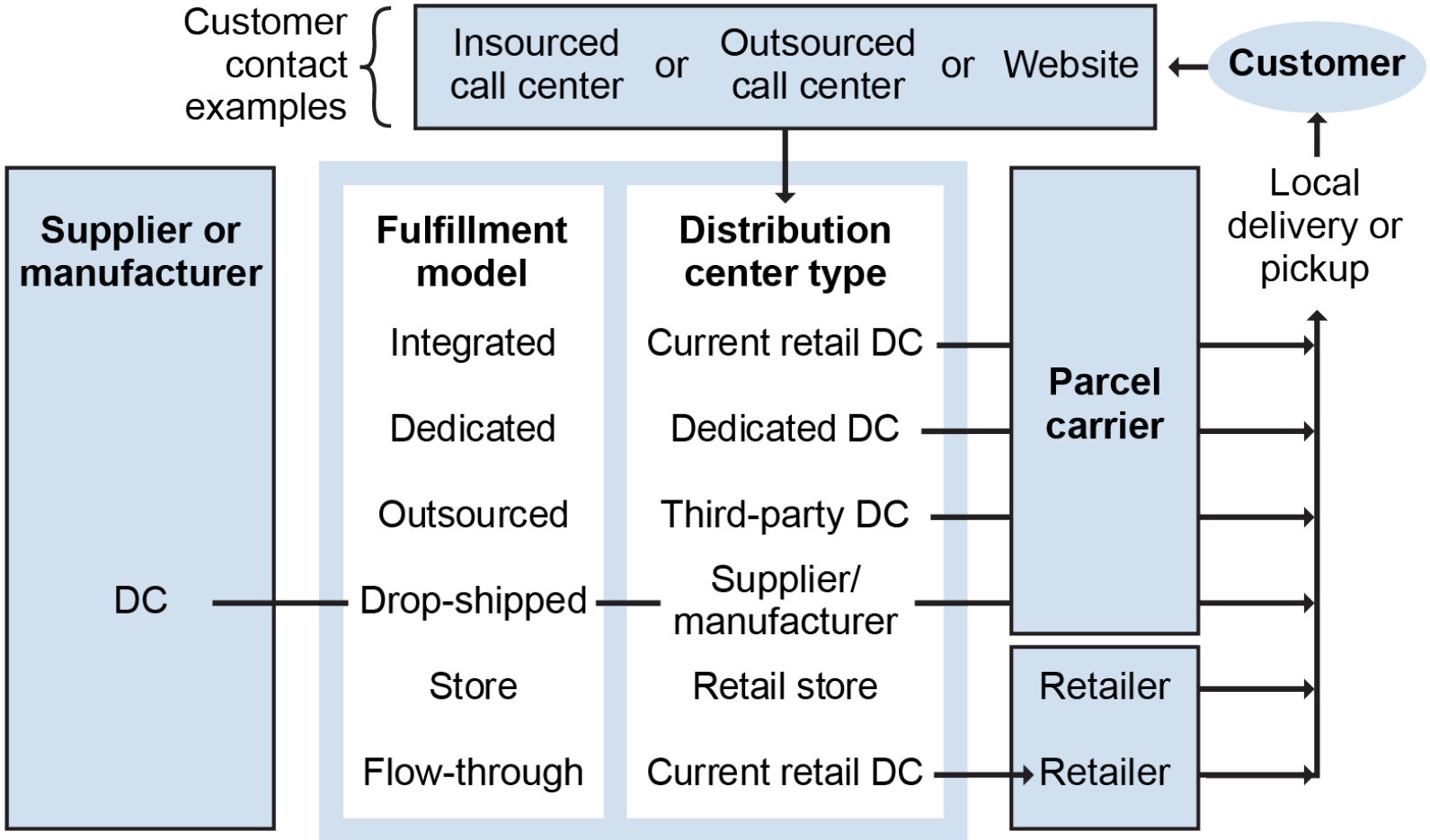
Flows of Goods/Services, Information, and Cash



Cumulative Logistics Cost Reveals Waste



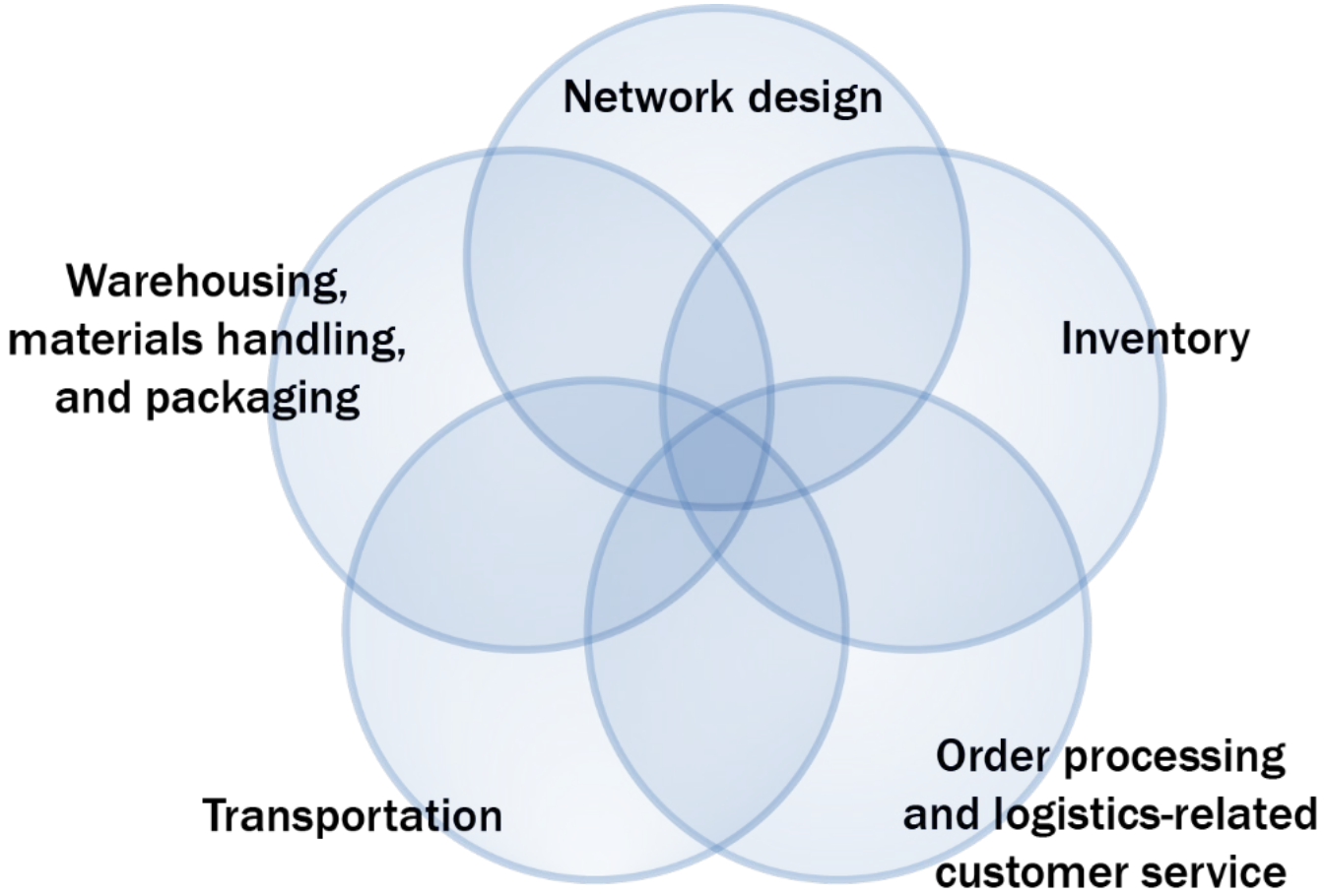
Direct-to-Consumer



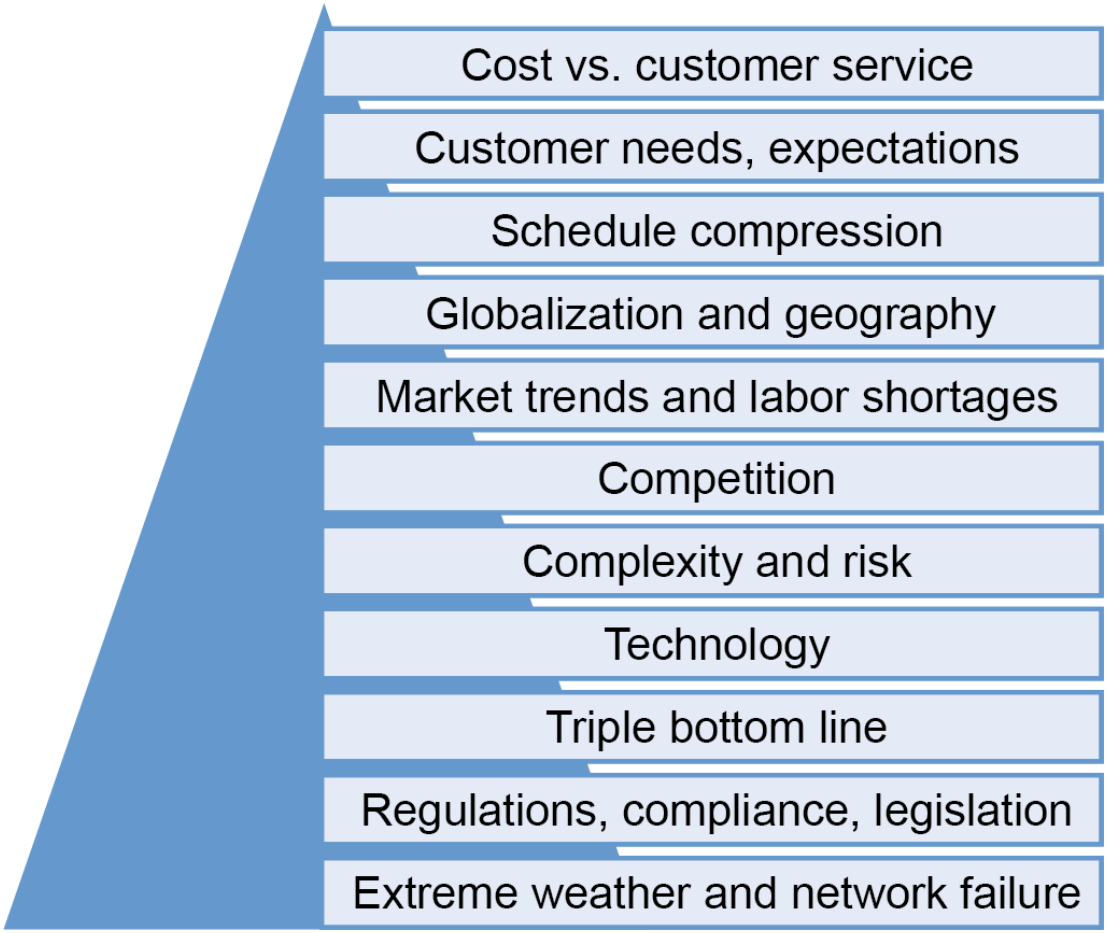
Various Forms of Logistics Utility

- Time
- Place
- Possession
- Form
- Quantity
- Information
- Service

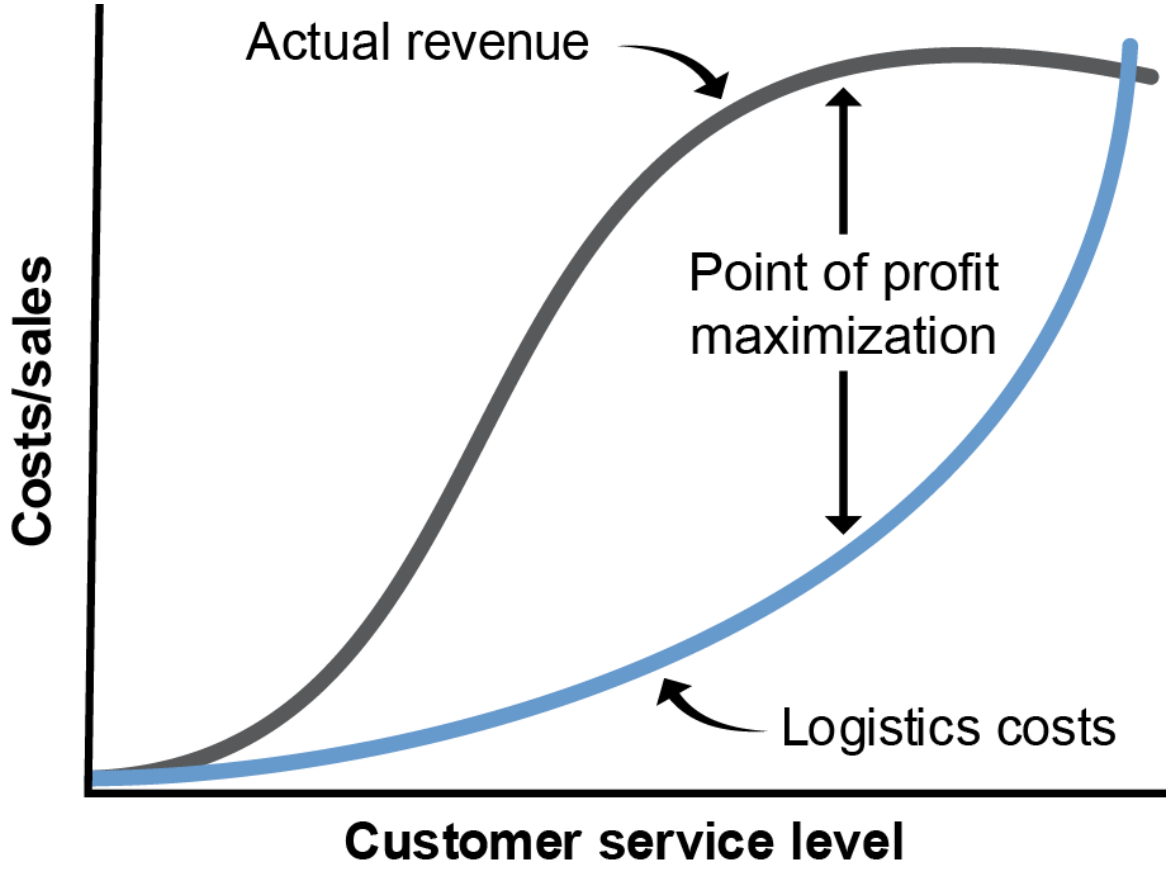
Grouping Components for Integration



Drivers of Logistics



Cost-Revenue Tradeoffs



Source: Professor M. C. Holcomb, University of Tennessee. Used with permission.

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MODULE 1, SECTION B:
THE ROLE, VALUE, AND COST OF LOGISTICS

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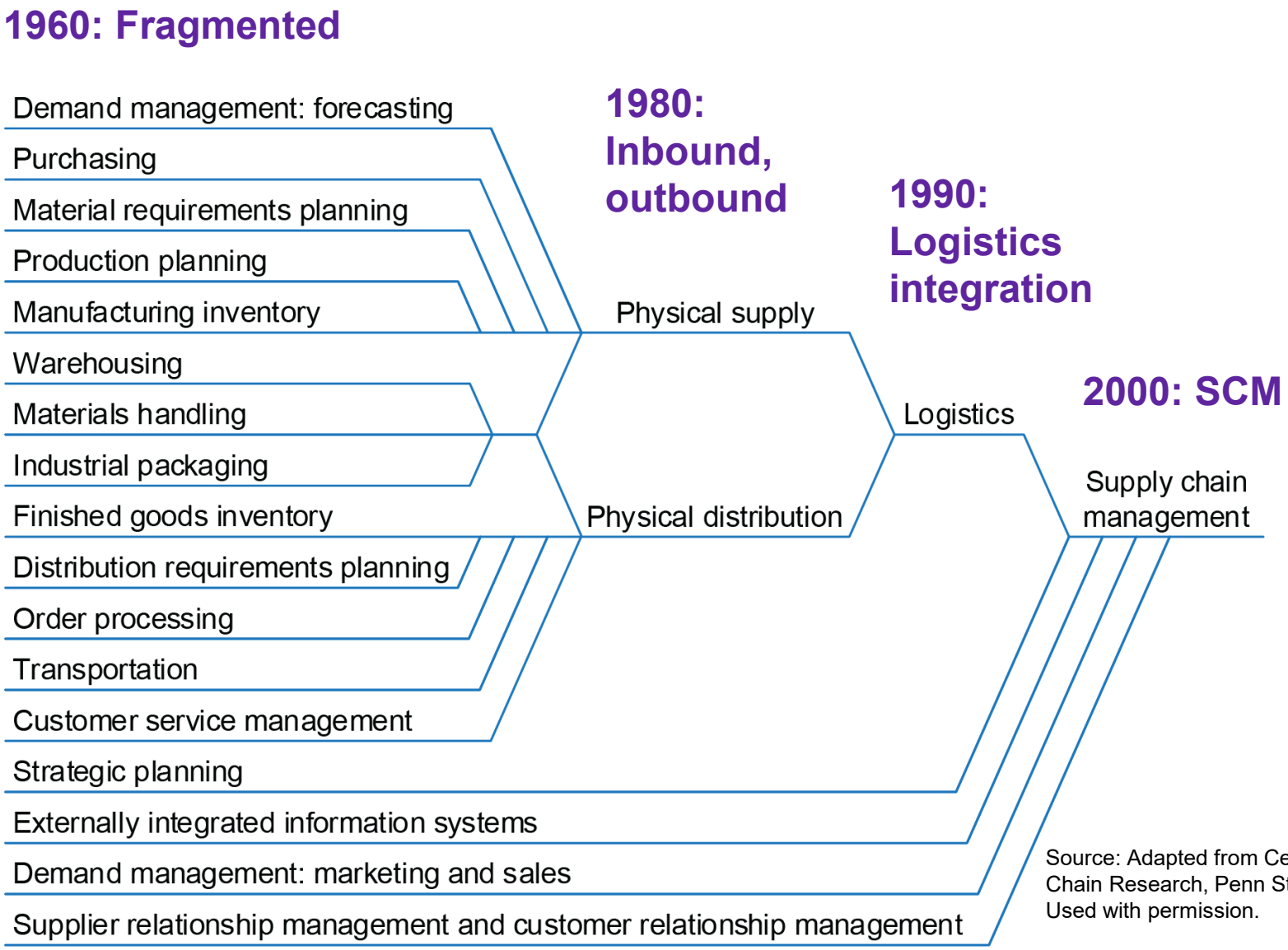
SCM and Logistics

SCM = Suppliers + Logistics + Customers

Topic 1: Supply Chain Management and the Role of Logistics



Source: Adapted from Center for Supply Chain Research, Penn State University. Used with permission.

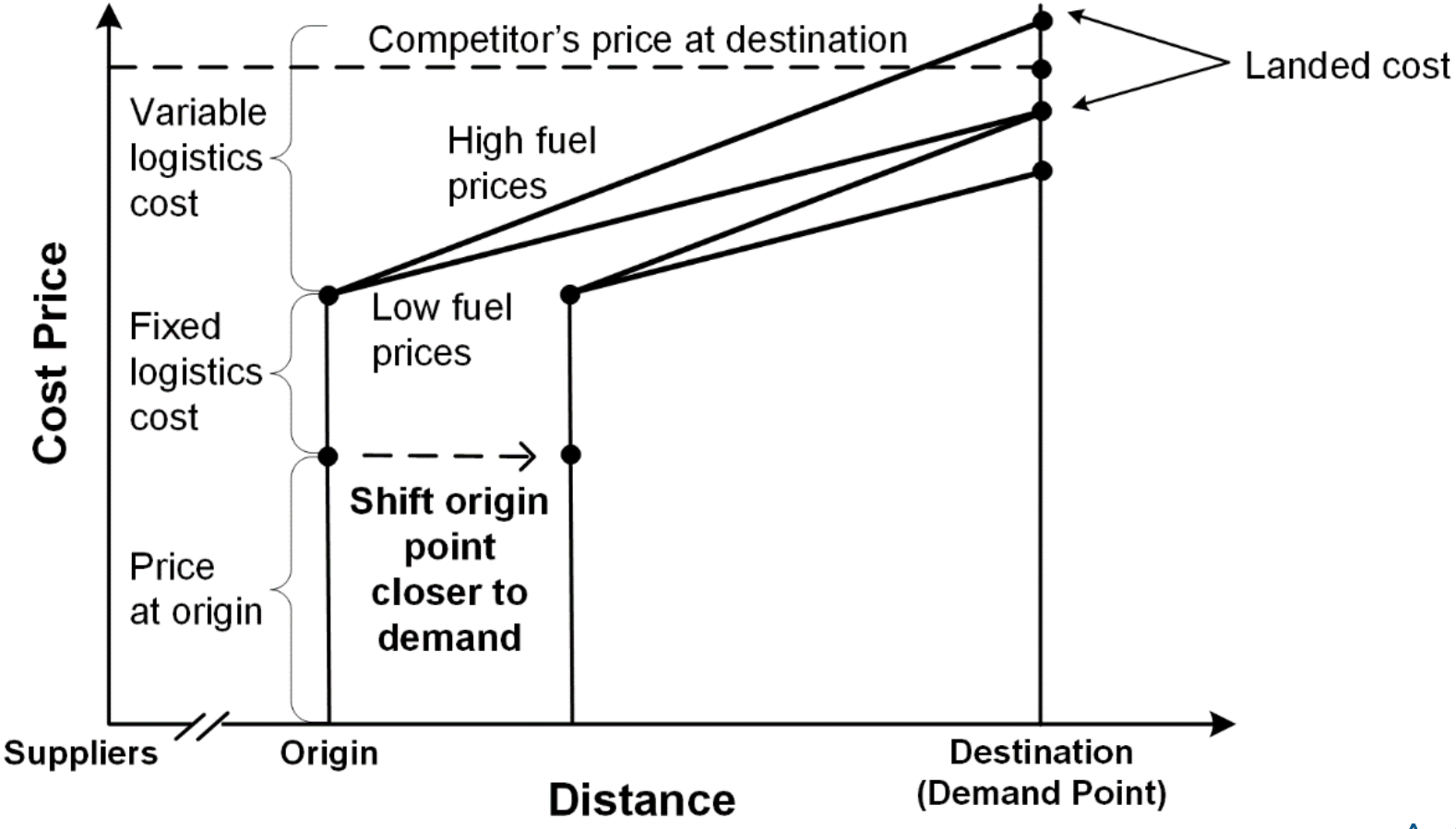
Economic Impact of Logistics

Logistics as percentage of GDP

- Highlights comparative advantage between countries
  - China: 17.8% in 2012 to 14 to 15% range in 2017
- How
  - Country's investment in infrastructure
  - Changes in regulations
  - Reduced aggregate inventory levels
- Leaders: Hard to improve what is already efficient

Economic Impact of Logistics

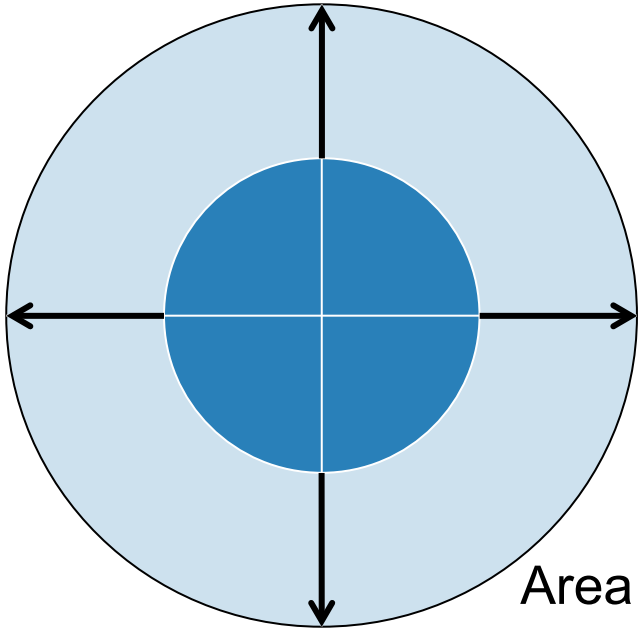
Fixed and variable costs impact place utility.



Economic Impact of Logistics

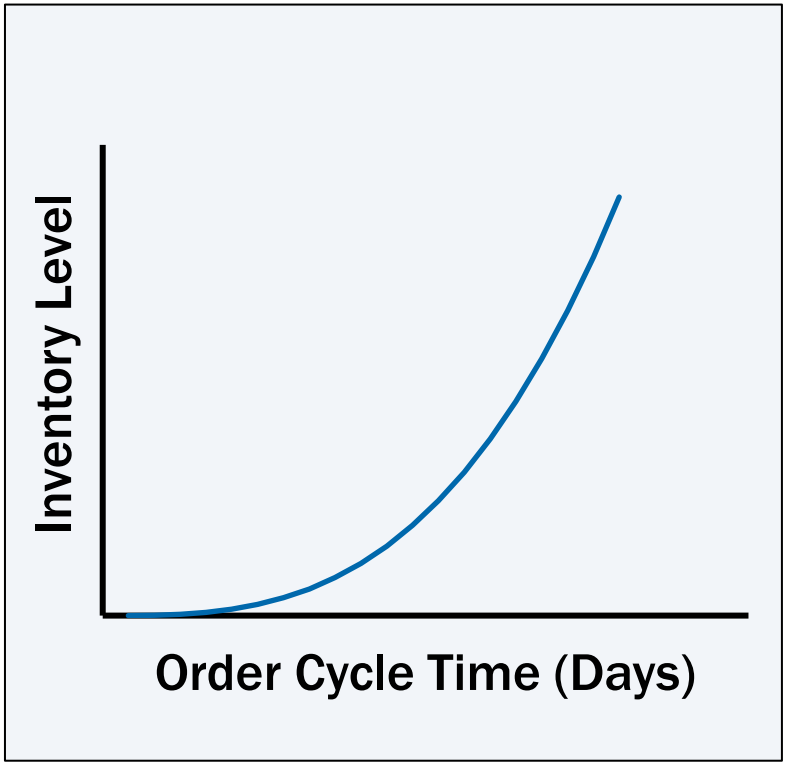
Law of squares (Lardner's law)

½ Transport Costs = Radius × 2



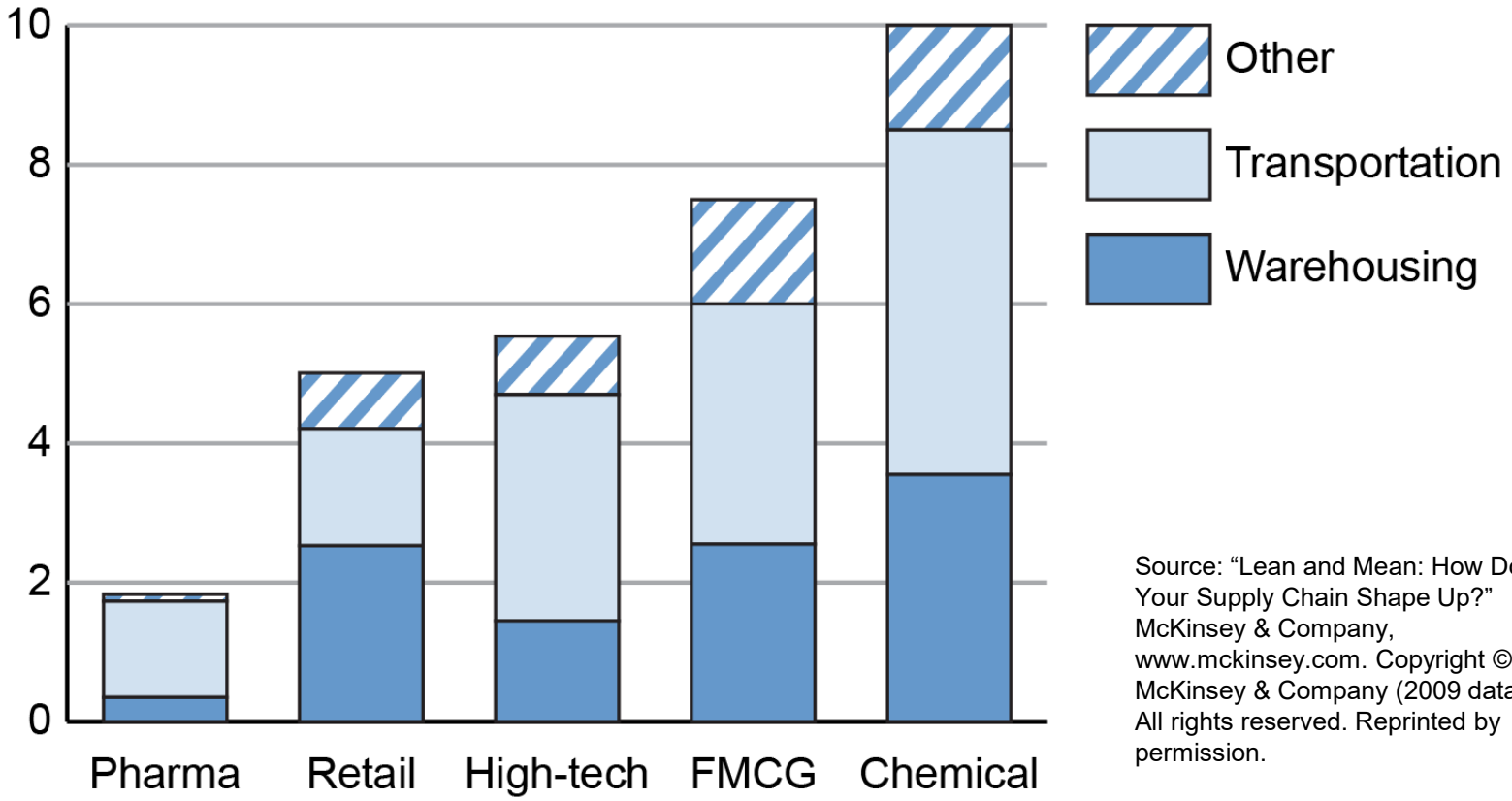
Area × ~4

Inventory level vs. cycle time



Economic Impact of Logistics

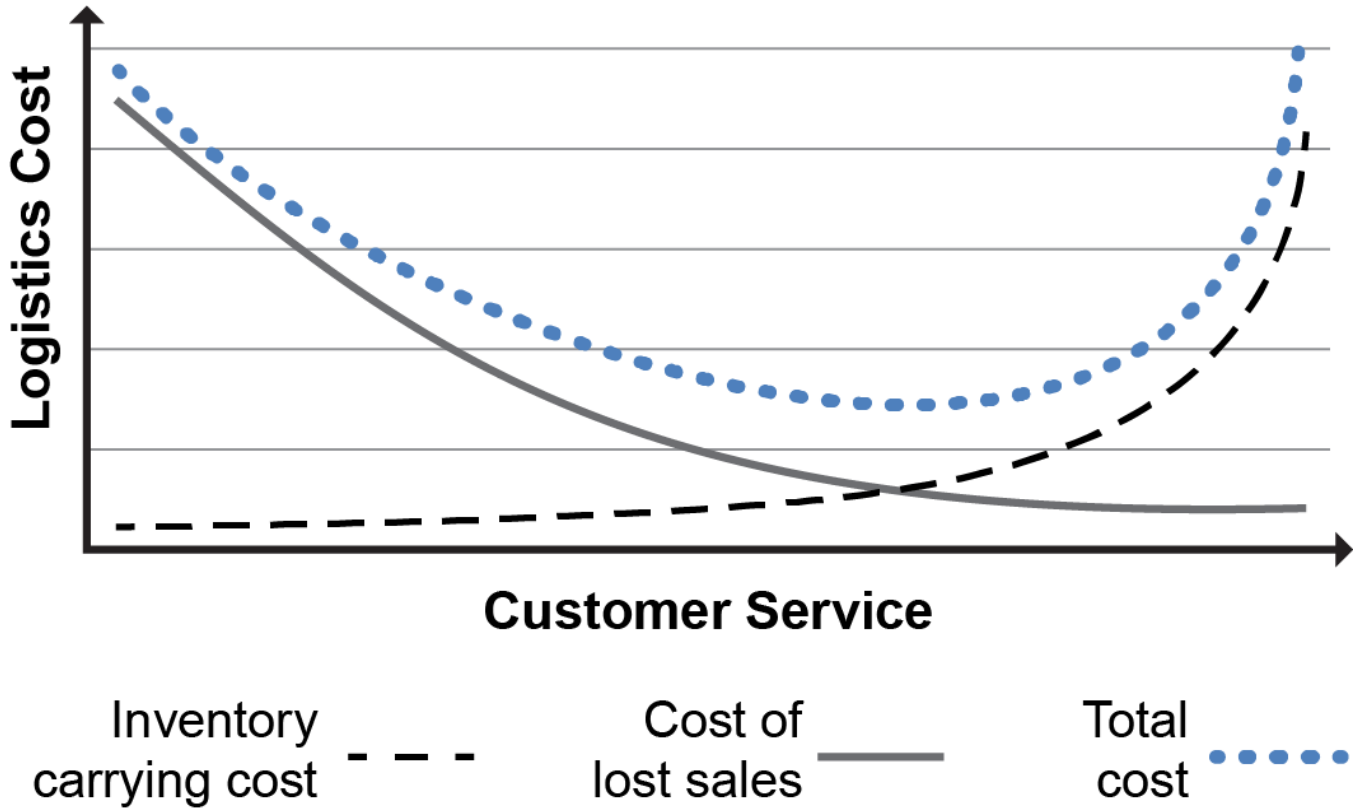
Logistics as percentage of sales by industry



Source: "Lean and Mean: How Does Your Supply Chain Shape Up?" McKinsey & Company, www.mckinsey.com. Copyright ©2010 McKinsey & Company (2009 data). All rights reserved. Reprinted by permission.

Economic Impact of Logistics

Inventory carrying cost vs. cost of lost sales



Economic Impact of Logistics

- Transportation is largest cost area.
- Macroeconomic data obscures differentiating information:
  - Logistics as percentage of sales varies by industry.
  - Average doesn't show high vs. low performers.
  - Small vs. large firms (economies of scale).
  - Substitution effect.
- Valuable inventory.
  - Costs more.
  - Lower logistics cost as percentage of sales.
- Dense, fragile.

Economics of Supply and Demand

Comparative advantage

Analyze spatial relationships between suppliers, producers, and key markets.

- Compare costs
  - Transportation
  - Labor
  - Warehousing
- Sourcing for strategic reasons
  - Availability of raw materials
  - Establishing sales market (i.e., “locally sourced”)

Spatial Relationship Competitive Analysis

Example:

	Local Producer	Low-Labor-Cost Producer	Cost Advantage (Local Perspective)
Production	€10/unit	€5/unit	– €5/unit
Inbound physical supply	€2/unit	€3/unit	€1/unit
Outbound physical distribution	€1/unit	€6/unit	€5/unit
Total logistics	€3/unit	€9/unit	€6/unit
Total landed	**€13/unit**	**€14/unit**	**€1/unit**

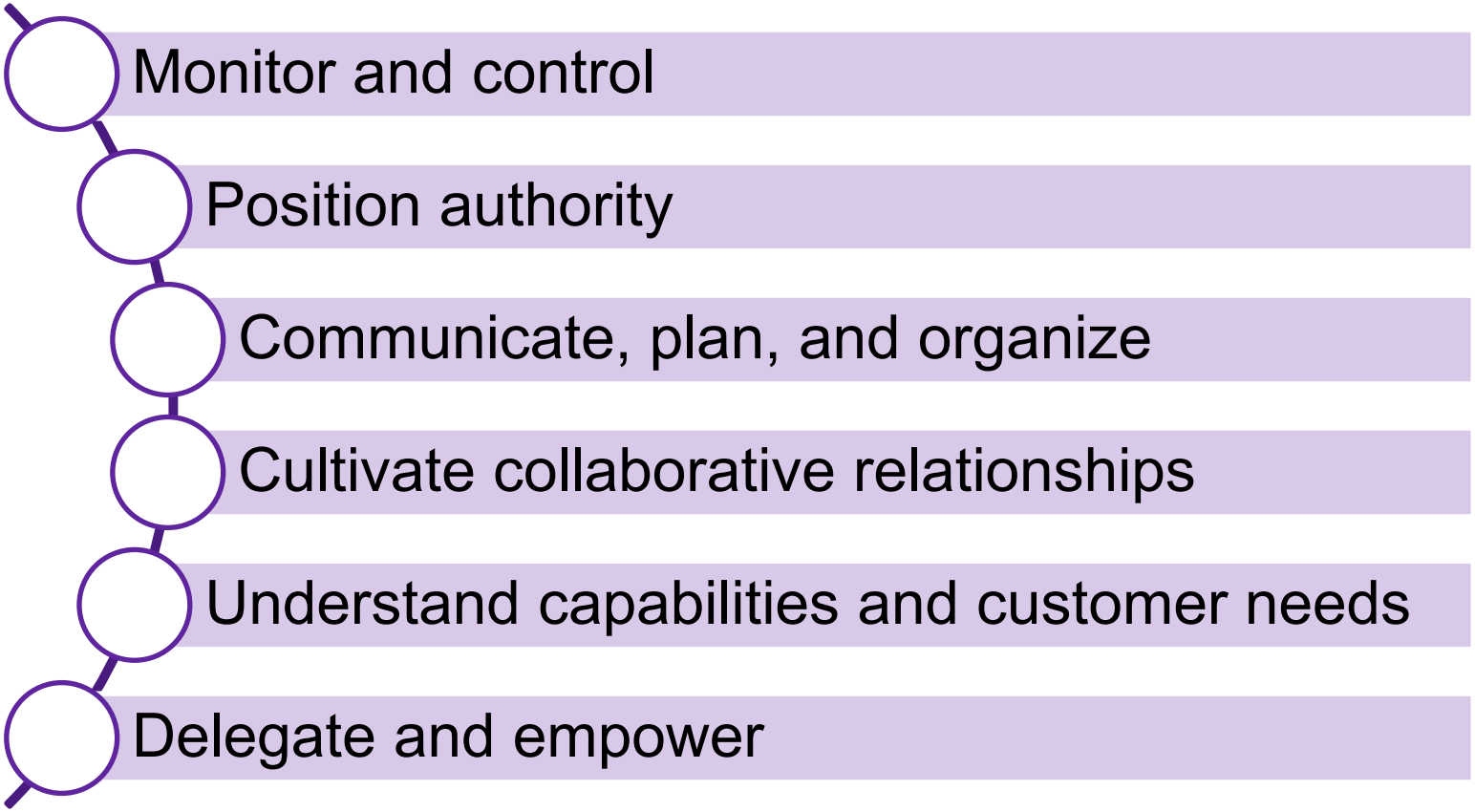
Globalization

- Global volatility
  - Supply
  - Demand
  - Commodity prices
  - Direct sales
- Service expectations and buying power
- Local final assembly
- Larger containerships
- Skilled labor in low-labor-cost countries
- EU passport-free zone
- Intermodal tools
- Barriers
  - Broker research
  - Culture
  - Terrorism responses
  - Infrastructure

e-Commerce

- Growth rate faster than for retail
- Truckload (TL) and less-than-truckload (LTL) logistics under pressure as parcel delivery grows in demand
- Use retail centers for online fulfillment
- Narrow evening delivery window
- Kiosks

Creating Value Through Management

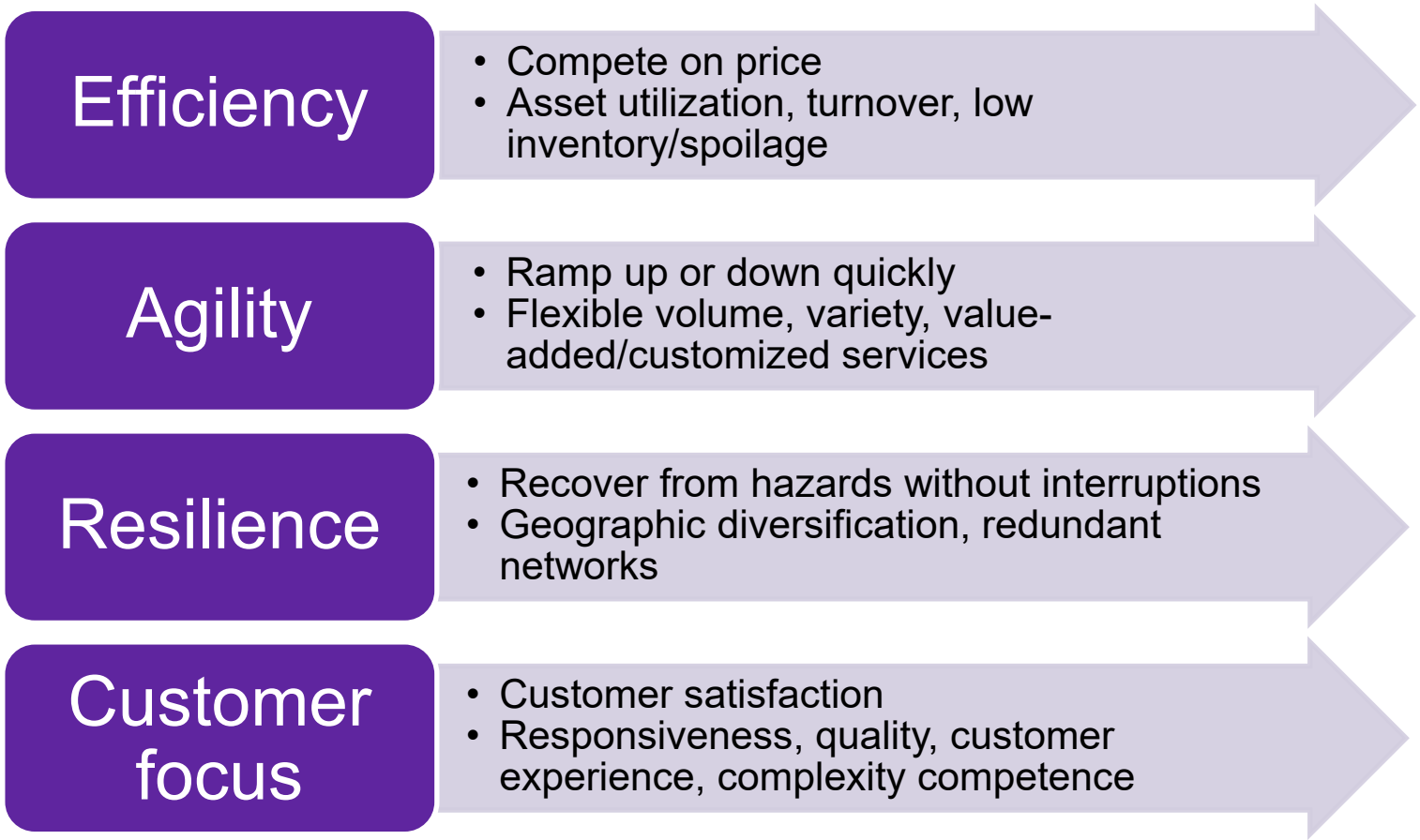


Creating Value Through Leadership

- Ability to influence the actions of others
- Vision
- Inspire others

Trait Model		Process-Based Model
▪ Charisma, passion, decisiveness ▪ Do candidates have technical experience?	**vs.**	▪ Process improvement ▪ Delegate to right team ▪ Admit mistakes ▪ Can candidates challenge status quo?

Creating Competitive Advantage



How Can a Supply Chain Increase Profits?

Two basic ways:

1) Increase end-to-end sales revenue (throughput).
2) Reduce costs.

However, **increasing sales** will also increase an organization's variable costs such as production, material, and selling costs.

Reduce Logistics Costs, Increase Satisfaction

- Find cuts that affect service priorities least.
- Labor and monitoring/controlling savings.
- Increase inventory turnover.
- Innovate to find lowest total cost.
- Discover customers' true pain points.

Traditional Cost Accounting

- Logistics need: How much does it cost to pick and pack each unit?
- Traditional: Costs obscured
  - Aggregated by account
  - Accounts include non-logistics costs

Cost Terminology

Fixed cost

Variable cost

Direct costs

(direct material, direct labor)

Indirect costs

Contribution Margin Analysis

Amounts shown in thousands USD

Warehouse Product Line Analysis				
	Product Line A	**Product Line B**	**Total**	**Eliminate Line B**
Revenue	1,000	500	1,500	1,000
- Variable Cost of Goods Sold	- 400	- 250	- 650	- 400
Variable Gross Profit	600	250	850	600
- Variable Direct Costs	- 50	- 50	- 100	- 50
Contribution Margin	550	200	750	550
- Fixed Direct Costs	- 160	- 70	- 230	- 160
Net Segment Contribution	390	130	520	390
- Indirect Fixed Costs			- 300	- 300
Net Profit			220	90
Contribution Margin Ratio	55%	40%	50%	55%
Net Segment Contribution Ratio	39%	26%	35%	39%

Cost Allocation

- Cost allocation assigns all costs.
  - Net profit: Segment sales volume ÷ total volume.
  - May not be fair and equitable?
    - For example, if one-third of sales, does it consume one-third of warehouse space? One-third of transportation volume?

Activity-Based Costing (ABC)

- Direct costs
  - Can be specifically traced
  - If economically feasible
- Cost object
- Activity drivers
  - Unloading: Quantity or unit type (e.g., pallet)
  - Palletizing: Quantity of cartons
  - Put-away: Quantity or cubic volume
  - Order picking: Quantity, visits to pick location, lines on order
  - Transportation: Number of deliveries or distance

Excess Capacity in ABC Process

- Some unused capacity is needed.
- ABC costing process:
  - Doesn't charge excess capacity to any given cost object.
  - Recorded as indirect costs.
  - Capacity utilization levels can be determined for each activity.

Throughput Accounting (TOC Accounting)

Throughput

- Sales Revenue – True Variable Costs
- Count only actual capacity used

Inventory

- Minimize investment in assets
- Avoids incentives to build up inventory

Operating expense

- Money spent in generating goal units
- Net Profit = Throughput – Operating Expenses

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MODULE 1, SECTION C:
LOGISTICS STRATEGY WITHIN THE SUPPLY CHAIN

APICS

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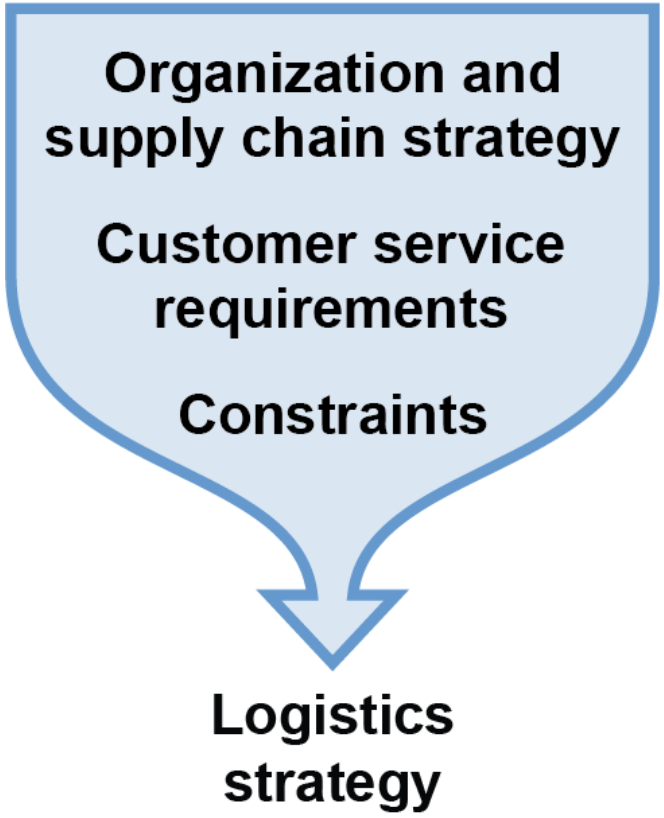
Planning and Control Horizons

Level	Elements Planned or Controlled	
Strategic *Planning horizon:* 3–5 years+ *Purpose:* Planning	• Capital expenditures, operating costs • Customer service levels • Distribution channels • Supply locations • Manufacturing locations	• Warehouse types, sizes, numbers, locations • Modes and delivery • Make-or-buy • Inventory
Tactical *Planning horizon:* 6–12 months *Purpose:* Planning and control	• Warehouse layout, hardware, control • Materials-handling process, equipment • Order processing	• Mode, carriers, routes, schedules • Vehicle type, quantity • Metrics and process • Service process
Operational *Planning horizon:* Daily *Purpose:* Control	• Receiving • Storage • Order picking, packing • Replenishment • Load planning	• Routing, scheduling • Personnel • Order documentation • Inventory level • Maintenance, repair

Inputs to Logistics Strategy



Generic Logistics Strategies

Process strategy

Market strategy

Information strategy

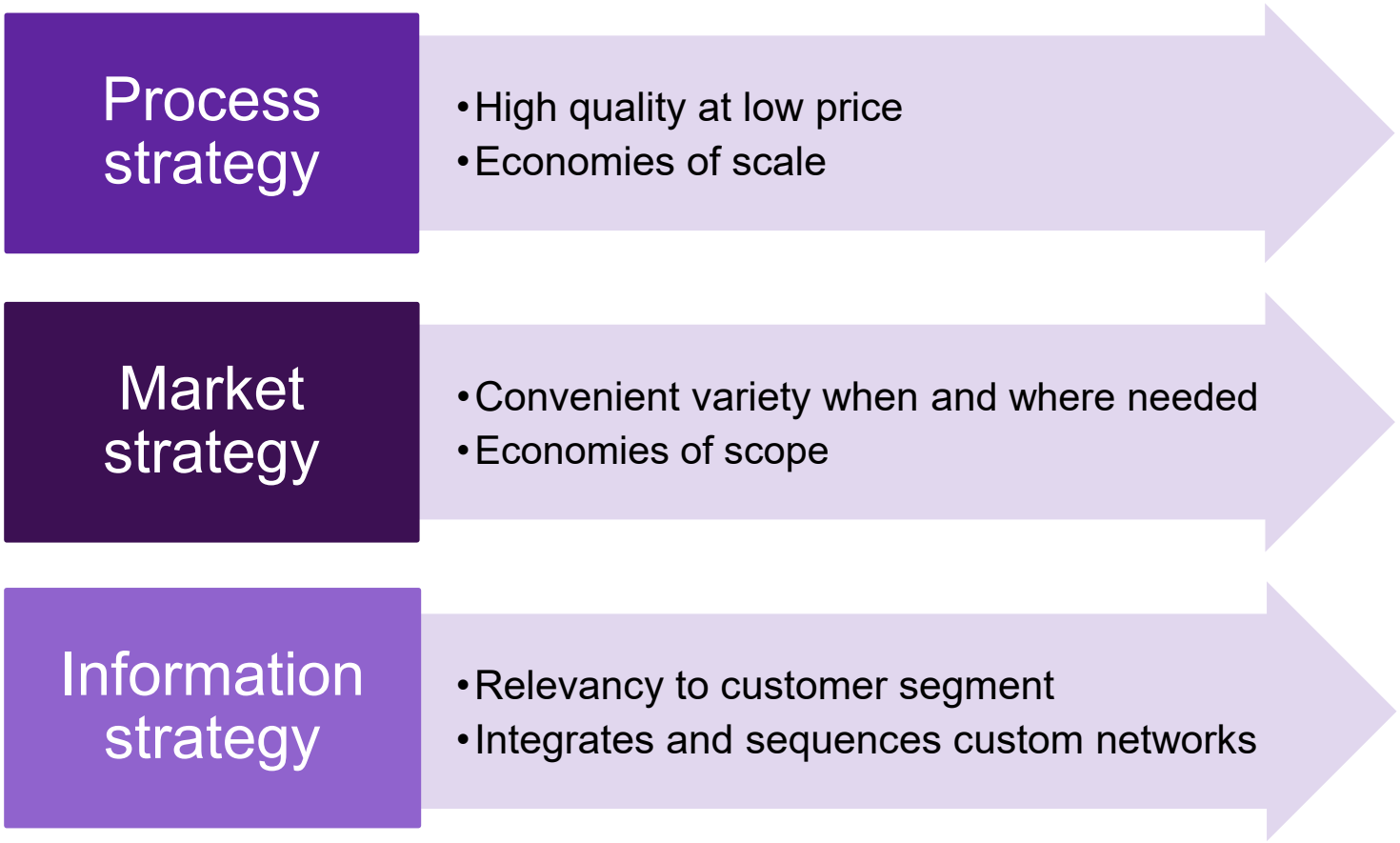
Logistics Goals and Objectives

- **Goals:** Broad plan to realize strategy (e.g., parties, channels add value or are eliminated)
- **Objectives:** Categorized, comprehensive
  - Network integration
  - Variance reduction
  - Agility
  - Product life cycle support and reverse logistics
  - Quality
  - Customer service and responsiveness

SMART

Specific, **M**easurable, **A**ttainable, **R**elevant, **T**ime-bound

Value Proposition for Generic Strategies



Value Propositions for Logistics

Logistics Goals and Objectives	Value Proposition
Network integration	Achieve lowest total cost at acceptable service level.
Variance reduction	Shorten order cycles.
Agility	Postpone operations.
Product life cycle support	Be agile to help meet variations in demand.
Reverse logistics	Proactively manage returns to manage profitability.
Quality	Invest in quality.
Customer service and responsiveness	Establish a base logistics service to set expectations.

Optimizing Logistics

Three basic categories:

1 Availability

- Faster shipping
- Frequent deliveries
- Safety stock

2 Operational performance

- Delivery consistency
- Flexibility for requests
- Responsiveness to changes in demand

3 Service reliability

- Training
- Performance measurement
- Continuous improvement
- Recovery, repair, and replacing lost customers

Innovate for Low-Cost Transport, Warehouse

- Longer line hauls, more full loads
- Shipment consolidators
- Delaying shipments to consolidate loads
- Partnering with others with same origin-destination pairings
- Long-term package service contracts
- Spot stocking
- Dwell reduction
- Demurrage charges elimination

Labor and Technology Optimization

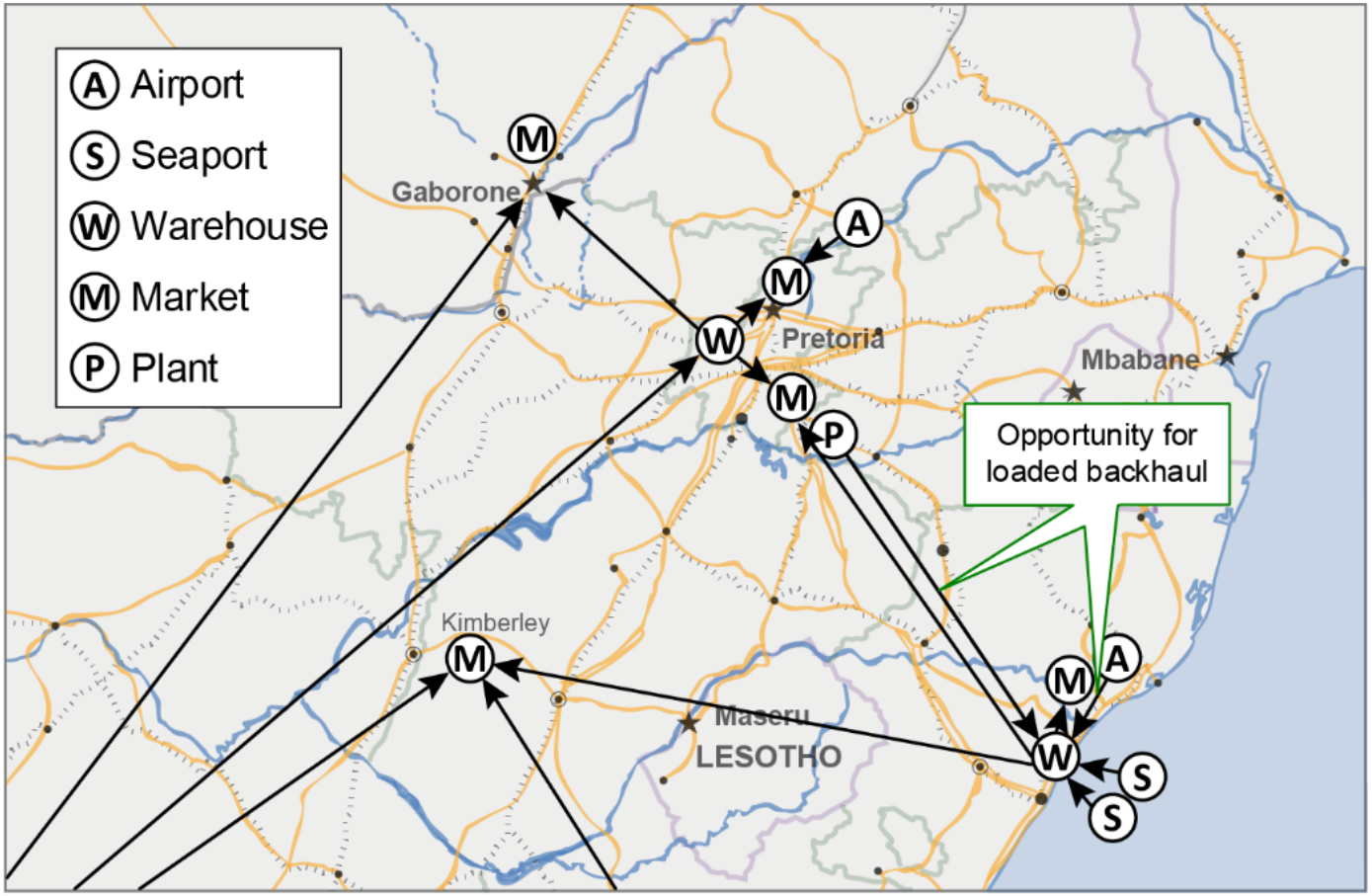
Labor

- Preventive investments
- Empowered workforce
- Cross-training
- Worker safety measures
- Rules
- Tracking technology

Technology

- On-demand role-based access
- Accurate and timely
- Know desired results
- Understand actual product capabilities and drawbacks
- Training and change management

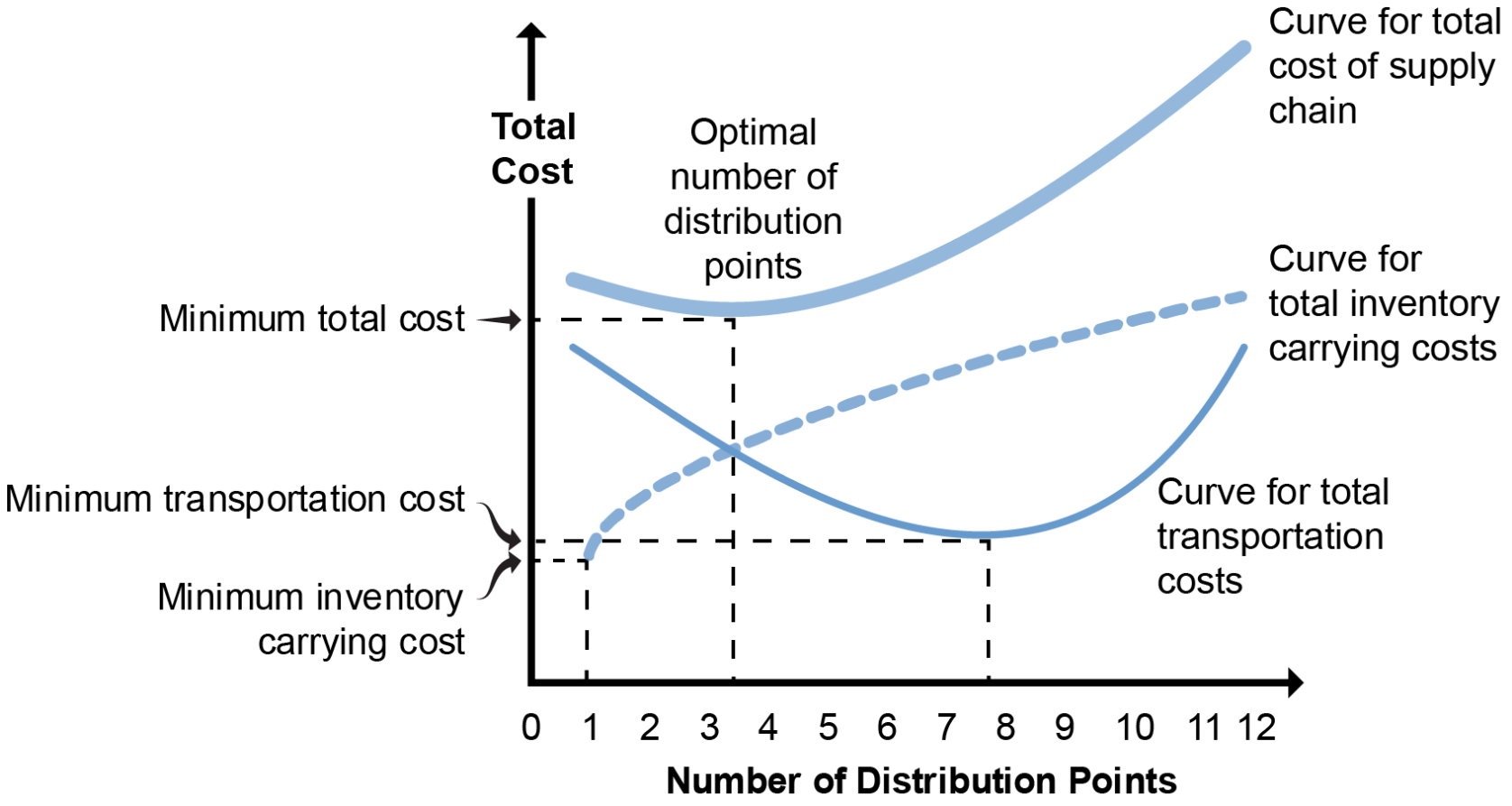
Nodes and Links



Total Cost of Ownership (TCO)

Pre-transaction components	• Identifying need and sources, suppliers; educating on operations
Transaction components	• Purchase price, landed costs (transportation, tariffs, duties, taxes, inventory carrying costs, 3PL fees)
Post-transaction components	• Life cycle, MRO, cost of quality, sustainability, customer service and reputation

Cost of Distribution Centers



TCO Supplier Comparison

CPC # PO33293	Description: 3/8" Copper Tubing Type M, 10 feet long			
Suppliers	**A (Brazil)**	**B (Korea)**	**C (China)**	**D (U.S.A)**
Landed costs				
Price per unit	USD 9.800	USD 9.600	USD 8.200	USD 11.200
Inbound transportation	1.200	1.600	1.650	0.211
Total landed costs	11.000	11.200	9.85	11.411
Life-cycle costs				
Contracting	0.200	0.200	0.200	0.200
Business unit purchasing	1.488	0.880	0.990	0.790
Logistics administration	2.120	2.570	2.100	1.110
Receiving	0.027	0.032	0.054	0.012
Inspection	0.050	0.070	0.110	0.080
Cost of internal quality	0.430	0.540	0.520	0.780
Inventory carrying	1.200	1.600	1.650	0.08
Accounts payable	0.050	0.050	0.050	0.050
Exchange rate factor	0.057	2.000	0.003	0.000
Outbound transportation	0.100	0.100	0.100	0.100
Waste disposal	0.054	0.054	0.054	0.054
Cost of external quality	0.068	0.064	0.062	0.080
Total LCC	5.844	8.160	5.893	3.336
TCO (Landed + LCC)	USD 16.844	USD 19.360	USD 15.743	USD 14.747

Make-or-Buy Considerations

- Is the activity a core competency?
- What are the consequences of losing related skills or knowledge, and how will this impact the customer experience?
- What is the landed cost (or TCO)?
- What is the break-even point?

Core Competency Analysis

- Skills of workers and organization
- Collective learning and collaboration
- Not directly related to product or market
- Rarely good reason to contract out core competency

Is the competency a core competency?

- Not if others do it better or the same for less
- External opinions counter internal bias

Should it be a core competency?

- Need must exist

TCO Factors Favoring Make or Buy

Favoring "make"

- Control
- Customer focus and responsiveness
- Risk management

Favoring "buy"

- Better agility
- Better resilience
- Reduced capital expenditures
- Better focus on core competencies
- New ways of thinking
- Access to new markets
- Expertise/management of complexity

Break-Even Analysis

"A study of the number of units, or amount of time, required to recoup an investment."

– *APICS Dictionary* definition

Make Fixed Cost + (Make Variable Cost per Unit × Q) =
Buy Fixed Cost + (Buy Variable Cost per Unit × Q)

Q = Quantity in units

Contracting Process

1. Begin with the end in mind and document plans.
2. Analyze strategic imperatives.
3. Analyze costs and the as-is state.
4. Select providers.

Step 4: Provider Selection

A. Clarify the requirements and the scope of activities.
B. Identify the type of provider being sought.
C. Locate and research potential providers.
D. Prepare an RFP or ITT or equivalent.
E. Evaluate and compare responses.
F. Select a contractor and negotiate.
G. Finalize contract and contract terms and conditions; sign contract.

Contracting Process (continued)

5. Implement the contract.
6. Reorganize internal processes and transition staff.
7. Manage contract relationships.

Budgeting Methods and Types

Budgeting methods

- Static budget (fixed)
- Flexible budget (expense)
- Rolling budget (continuous)

Budget types

- Master budget
- Income statement
- Balance sheet
- Statement of cash flows

Three budgets are particularly important to logistics:

- Capital budget
- Operating budget
- Cash budget

Budgeting Process

1. Set objectives and policies.
2. Analyze capacity and available resources in gap analysis.
3. Update parameters, get consensus on assumptions, set expectations.
4. Coordinate subbudget development and negotiate.
5. Get final approval.
6. Distribute and communicate importance of budget.

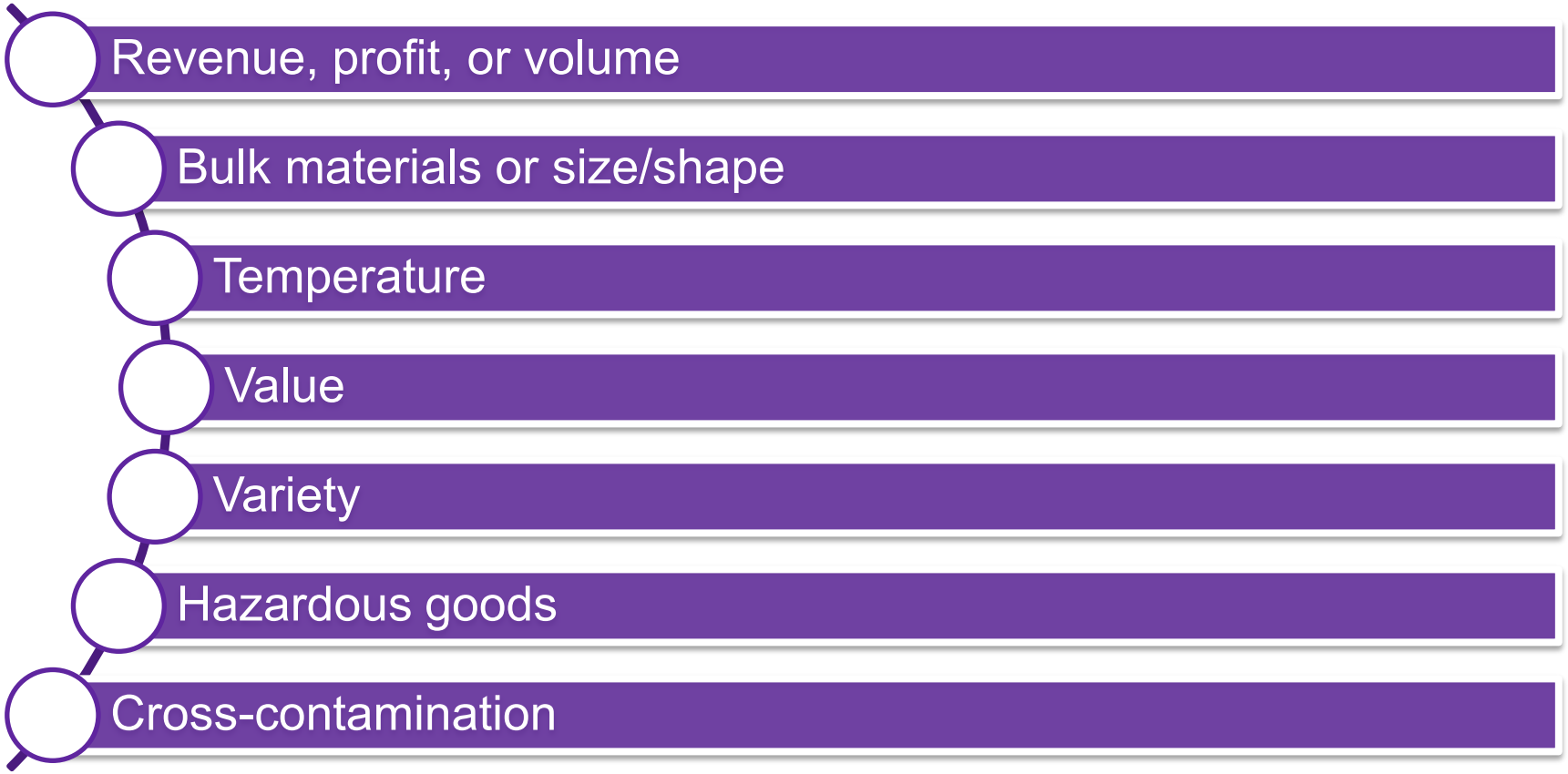
Cash Budgets and Payment Terms Policy

- Actual cash inflows/outflows adequate per period?
- Payment terms: How long until paid/how long to pay.
  - Cash in advance (early), on delivery (late).
  - Open account: window (early pay discount or full).
- Prioritize payment terms in negotiations.
  - Strategy should drive choices, can be segment-specific.
  - Will early cash be utilized, or will late cash require financing?
  - International: Slow transport intensifies impact.

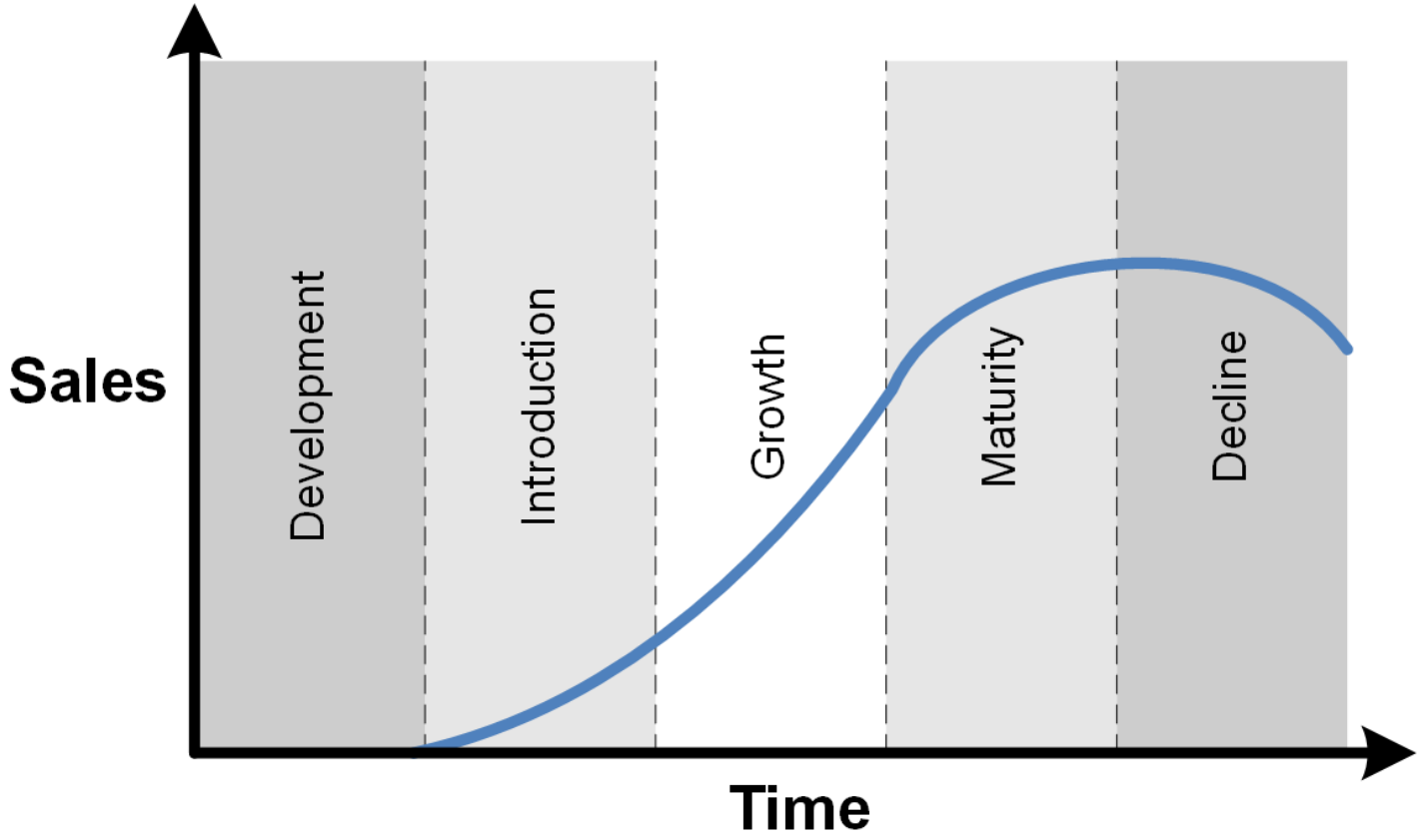
Customer and Delivery Channel Segmentation

- Customer segmentation
  - What services does each segment want?
- Delivery channel segmentation
  - Omni-channel
  - Simple

Product Segmentation



Product Life Cycle



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MODULE 1, SECTION D:
LOGISTICS FRAMEWORK

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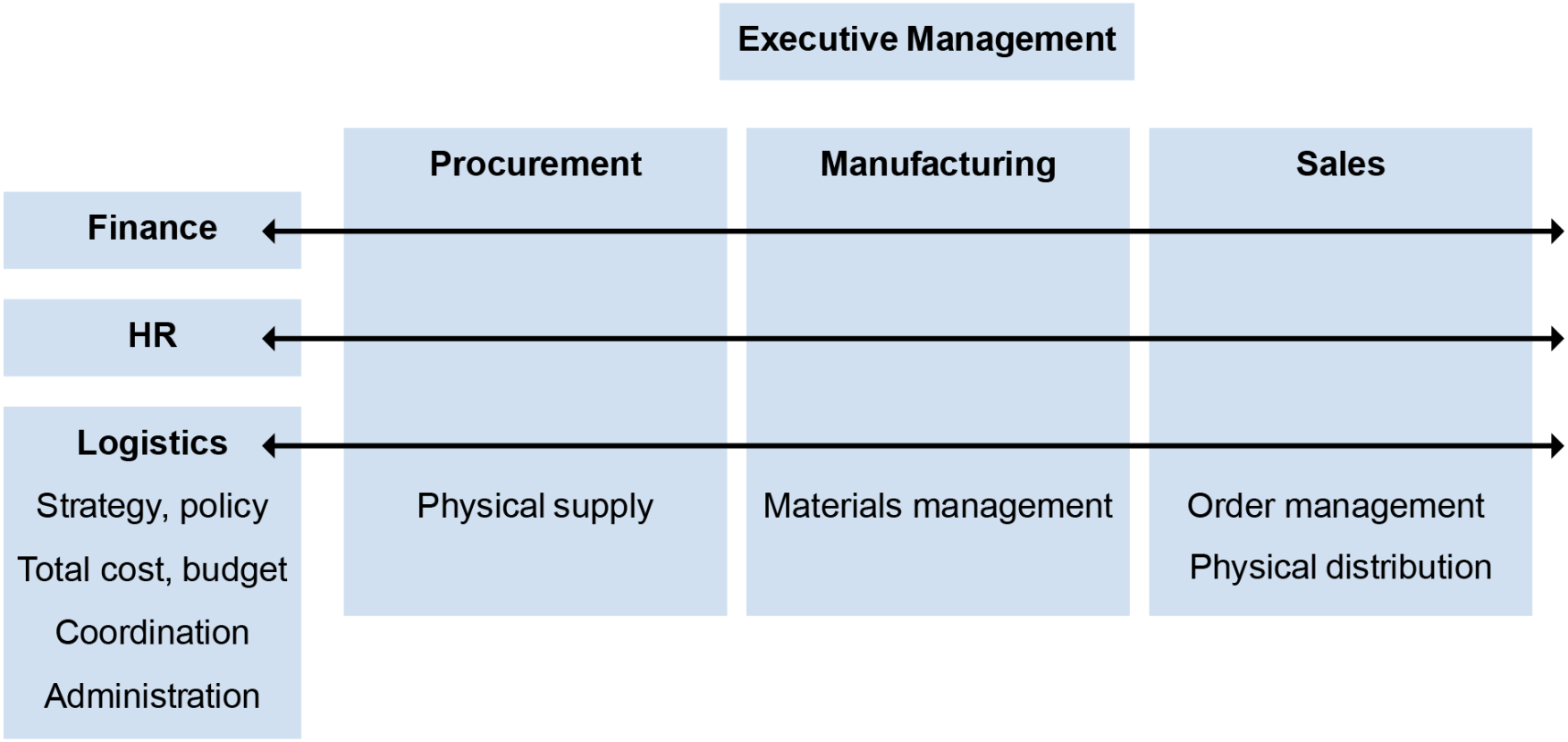
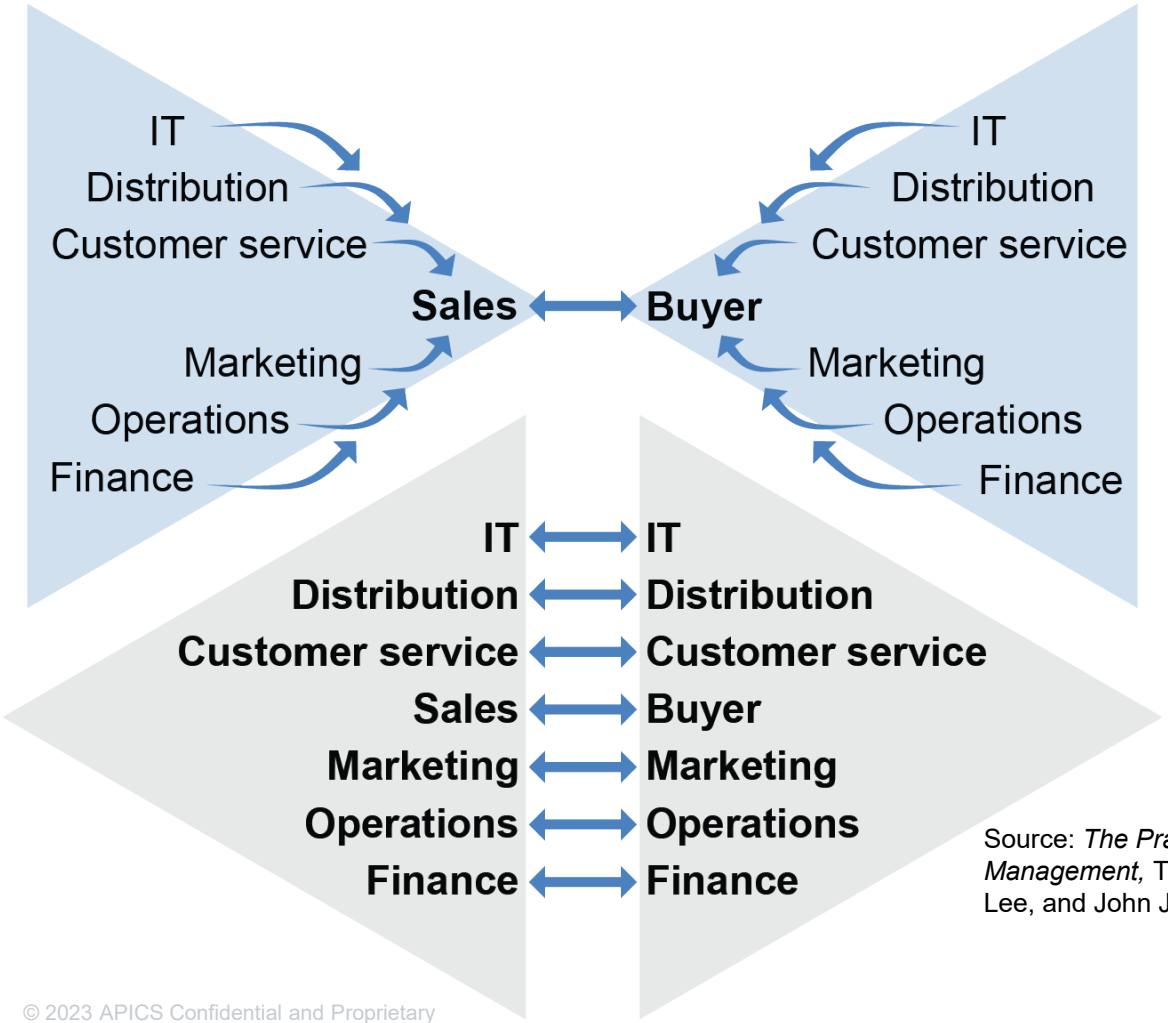
Logistics Organizational Structure

- Functional (hierarchical)
  - Silos with logistics split up or a logistics functional area.
  - If cross-functional logistics manager, authority level?
- Matrix
  - Logistics has planning and process authority.
- Network
  - Empowered, decentralized decision making.

Matrix Structure with Logistics as Cross-Functional Area

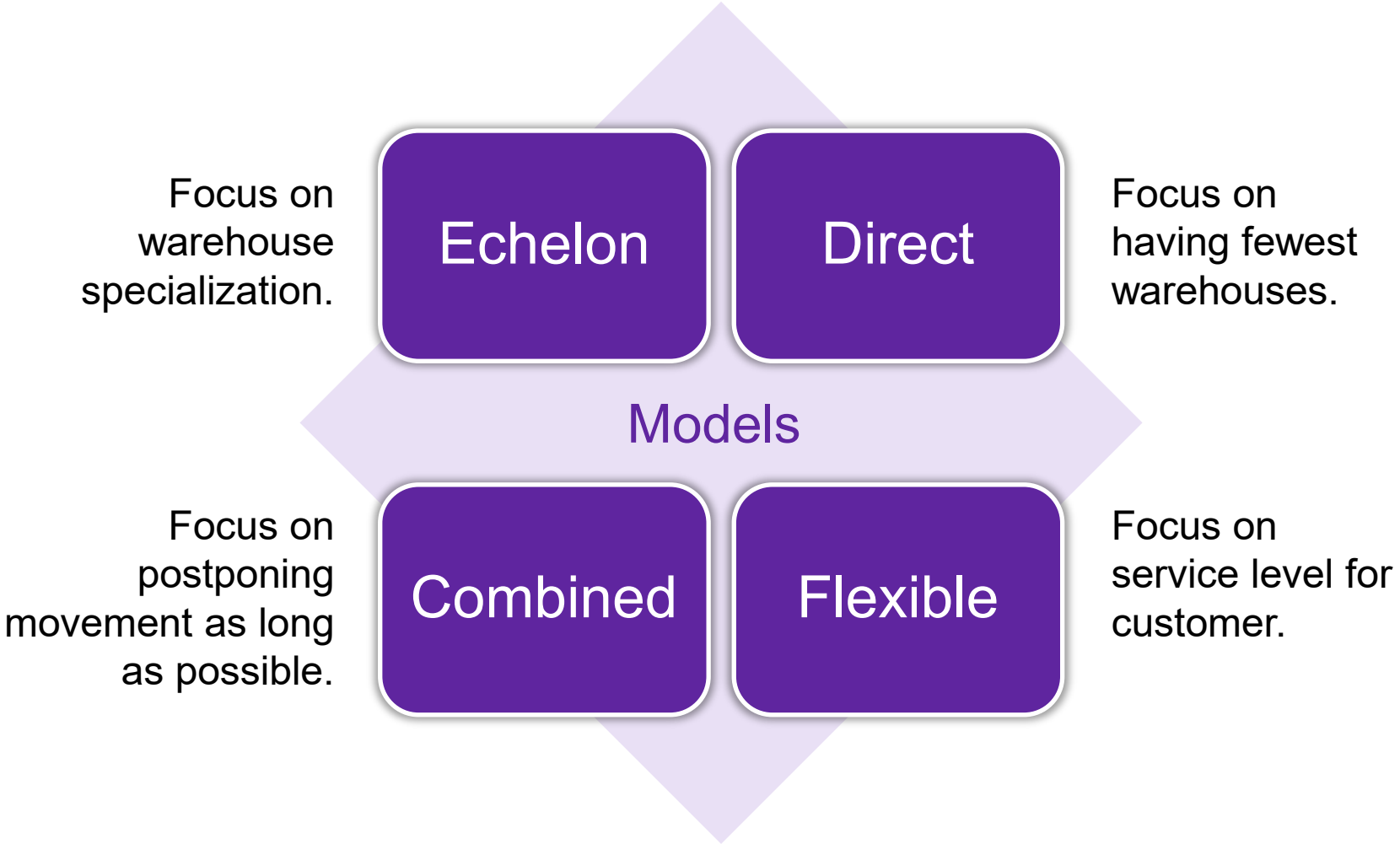


From Transactional to Linked Relationships

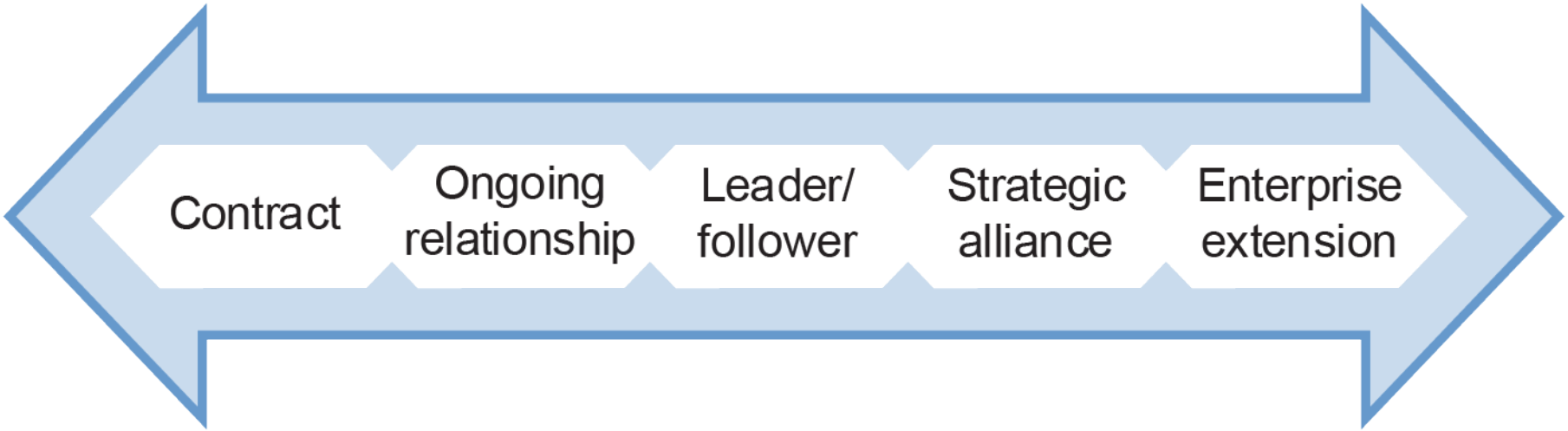


Source: *The Practice of Supply Chain Management,* Terry P. Harrision, Hau L. Lee, and John J. Neale, editors.

Operating Arrangements



Relationships Types Fall on a Spectrum



Developing Relationships

3PL perspective

- Value added: better efficiency and effectiveness
- Web-based integration
- Visibility
- Understand customer goals
- Customer sets strategy initially
- Strategy participation

Factors to address

- ✓ Trust
- ✓ Leadership
- ✓ Power
- ✓ Risk
- ✓ Information sharing and visibility

Initiating, Maintaining, and Terminating Relationships

- Invest time in analysis and project planning.
  - Reduces risk of failure
  - Increases benefits
- Develop exit plan.
- Reasons for termination:
  - Unprofitable cost pressure
  - Failure to remedy service issues
  - Difference of opinions
  - Competition

Types of Collaboration

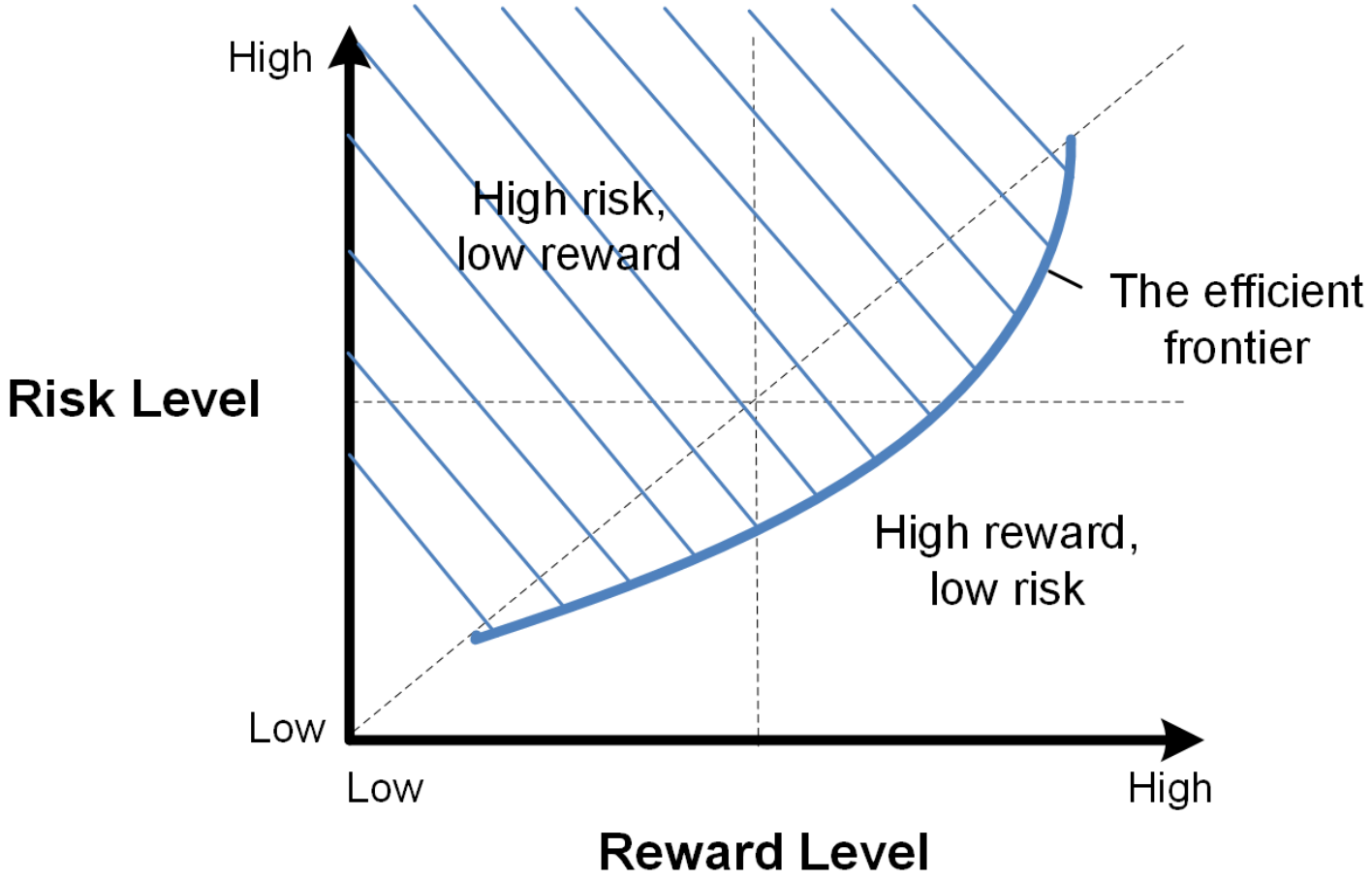
Horizontal collaboration

- Relationships between competitors or organizations doing parts of a process in parallel or sequence
- Shared logistics services through 3PLs

Vertical collaboration

- Quick response (QR)
- Efficient consumer response (ECR)
- Collaborative planning, forecasting, and replenishment (CPFR)
- Vendor-managed inventory (VMI)

Strategic Risk versus Reward



Types of Risk

- Demand
- Supply
- Process
- Financial
- Environmental

Tradeoffs Involve Risk

Strategy	Opportunities	Risks
Lean	Less waste and less buffer for better turnover.	No buffers increases risk of stockouts or line stoppage after disruption.
Fewer suppliers	Lean works with long-term suppliers to gain economies of scale.	Fewer suppliers increases supply risk due to disaster or financial failure.
Low-cost country sourcing	Low-labor-cost sourcing creates cost advantage.	Longer lead times and risk of intellectual property theft or government appropriation.
Contracting	Opportunity to focus on core competencies and cut costs.	Operations are less visible and harder to coordinate.

Additional Areas of Risk

Supply chain security

- Be proactive
- Safer modes
- Insurance
- Pilferage
- Safety policies
- Damage prevention

Compliance

- Customs
- Prohibited goods
- Country of origin
- All modes
- Safety
- Anti-terrorism

Social mandates

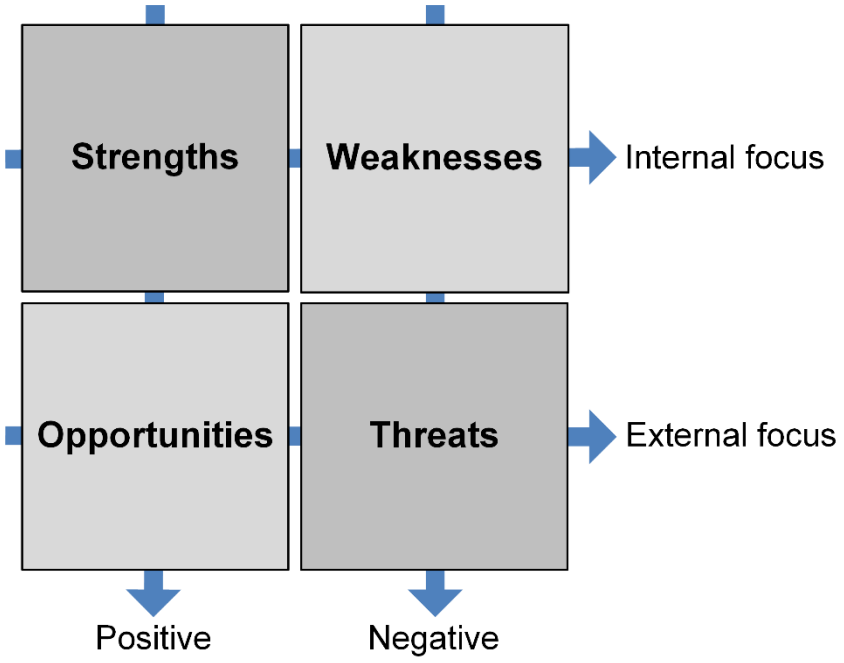
- Voluntary initiatives
- Consumer pressure

Strategic Risk Tools

Exceptions

- Detecting gaps in strategy
- Anonymous surveys
- Ways strategy might fail
- Common-sense exceptions
- Reduce complexity and variety

SWOT analysis



LTD Continuity Plan: Quick, Effective Action

Standards and policies

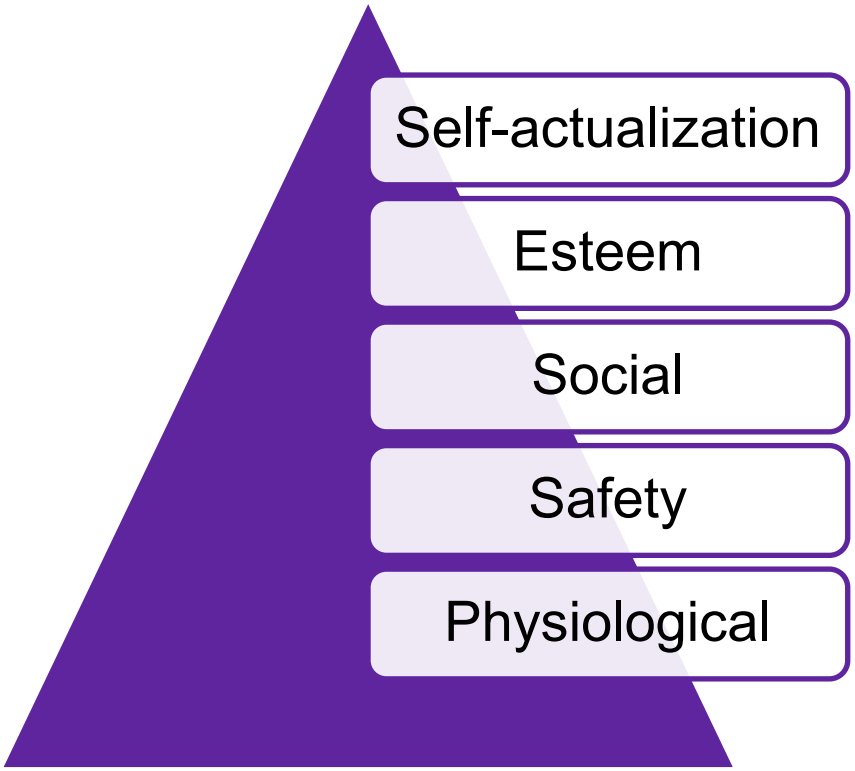
- Planning and control methodologies
- IT and tools
- Administer and audit
- Insured vs. not insured

Plan governance

- Historical use and effectiveness
- Gap analysis
- Up to date
- Appropriately sized based on likelihood and impact

Talent Retention: Understand Wants/Needs

Maslow's hierarchy



Common survey priorities

- Competitive salary
- Challenging work
- Work-life balance
- Talented team
- Appreciation for your work
- Training/career path
- Admired leaders/company

Key:
- Baby boomers:
- Millennials:

Talent Requirements and Recruitment

Talent requirements

- Talent capacity constraint
- Digitization of logistics
- Degree earners lacking
- Line-haul drivers lacking
  - High turnover, costs
  - "Arms race" among carriers

Recruitment

- Raise awareness of logistics as career path.
- Clearly lay out promotions, career path.
- Drivers:
  - Redesign networks for work-life balance.
  - Regional operations.

Development, Retention, and Management

Development and retention

- Invest in training and development
- Certifications
- Career path
- Management quality
  - Care about work/worker
  - Know what jobs entail

Personnel management

- ERP tracks pay and capability
- Just enough supervisors
- Drug and alcohol testing

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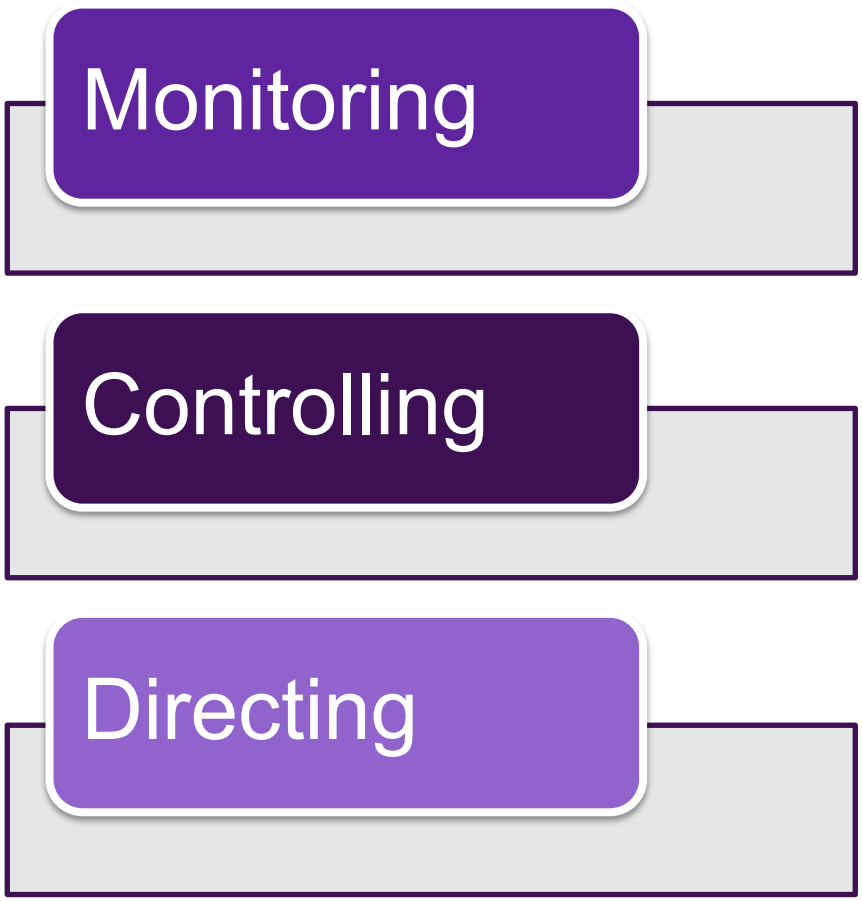
CERTIFIED IN LOGISTICS,
TRANSPORTATION AND DISTRIBUTION

MODULE 1, SECTION E:
STRATEGIC PERFORMANCE MANAGEMENT

APICS

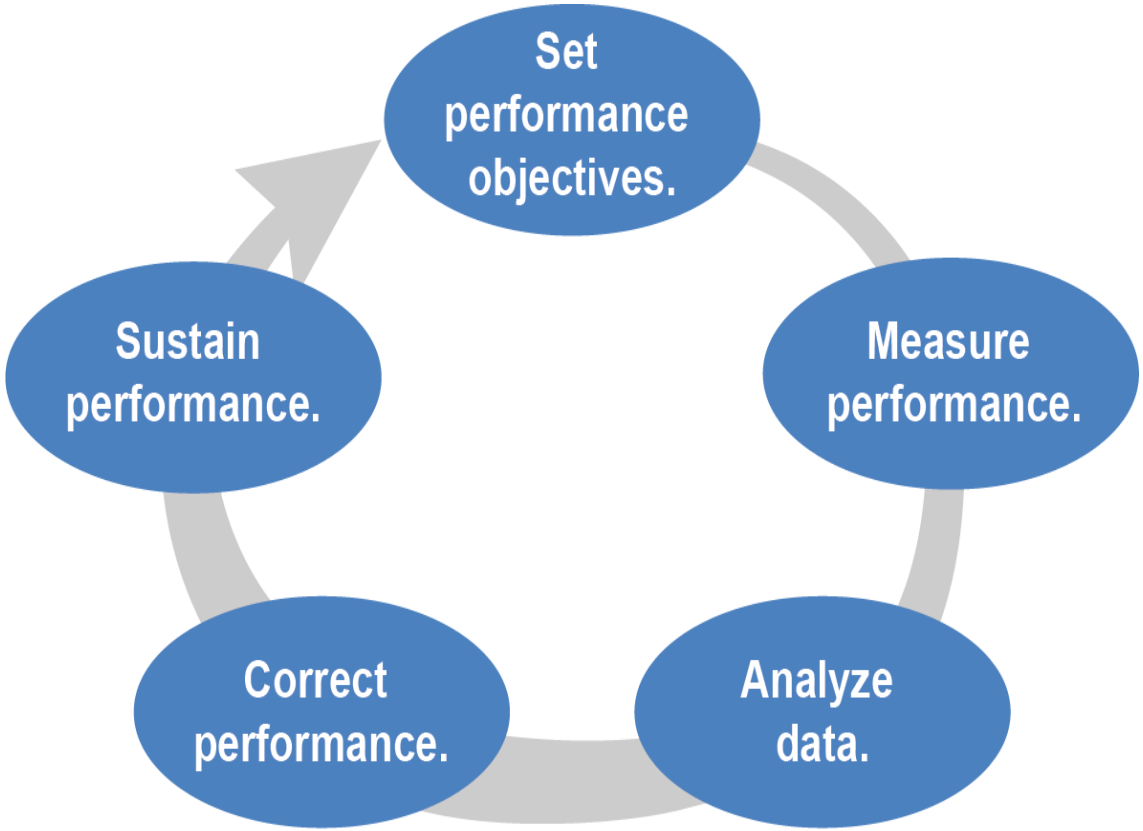
ASCM

Uses of Performance Management



- Track efficiency and effectiveness
- Efficiency and utilization of investments
- Predict performance
- Early correction
- Identify blockages
- Assign more accurate costs

Performance Management Process



Other Ways to View Performance Objectives

Critical success factors

- Results, actions, and processes that drive perceived value
- Focus is on customer

Value drivers

- Few key metrics
- Link to organizational strategy
- Functional areas jointly determine

KPIs measure attainment.

Effective Metrics

- Unintended consequences.
- Minimization versus inclusivity:
  - Utilization
  - Productivity
  - Performance results
- Majority quantitative to avoid bias.
- Self-explanatory is best.
- Clearly relate inputs to outputs.
- Encourage participation to gain buy-in.

Setting Performance Targets

Sources for standards:

- Historical standards
- Predetermined or public standards
- Work sampling
- Regression analysis

Performance targets are set to equal or exceed a standard or a benchmark.

Measuring and Analyzing Performance

Validity and value of data are improved by standardization measures.

- Measure at same time points.
- Measure under similar conditions.
- Use tools for collection consistency.

Performance Tools

Audit checklists

Balanced scorecards

Dashboards

Key Performance Indicators (KPIs)

- Measure only what is important.
- Avoid contradictory KPIs.
- Leading/lagging indicators, diagnostic metrics.
- KPIs supporting financial measures should be reported in real time.

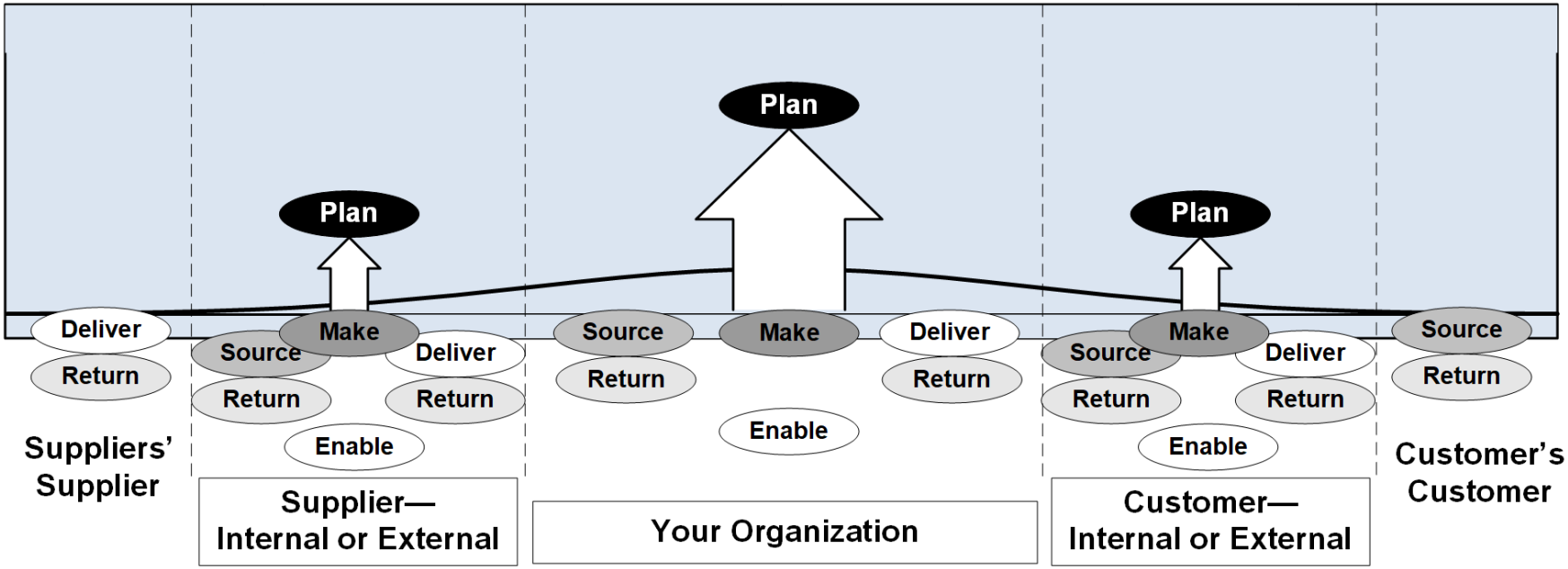
Retail Compliance KPIs

- ASNs correct/on time
- Retailer-specific labeling
- Label placement on box
- Packing slip format
- Bar code track and trace
- Pallet type
- Assortment per master carton
- EDI correct, complete,
- Whole order metrics
  - On-time in full (OTIF)
  - Must-arrive-by-date (MABD)
- Penalties for failure

SCOR Business Processes

Plan	Balancing aggregate demand and supply
Source	Procuring goods and services
Make	Transforming products into finished goods
Deliver	Providing finished goods/services
Return	Returning or receiving returned products for any reason
Enable	Managing relationships, performance, and information in the supply chain

SCOR Model



Source: Adapted from APICS Supply Chain Council.

SCOR Performance Attributes and Metrics

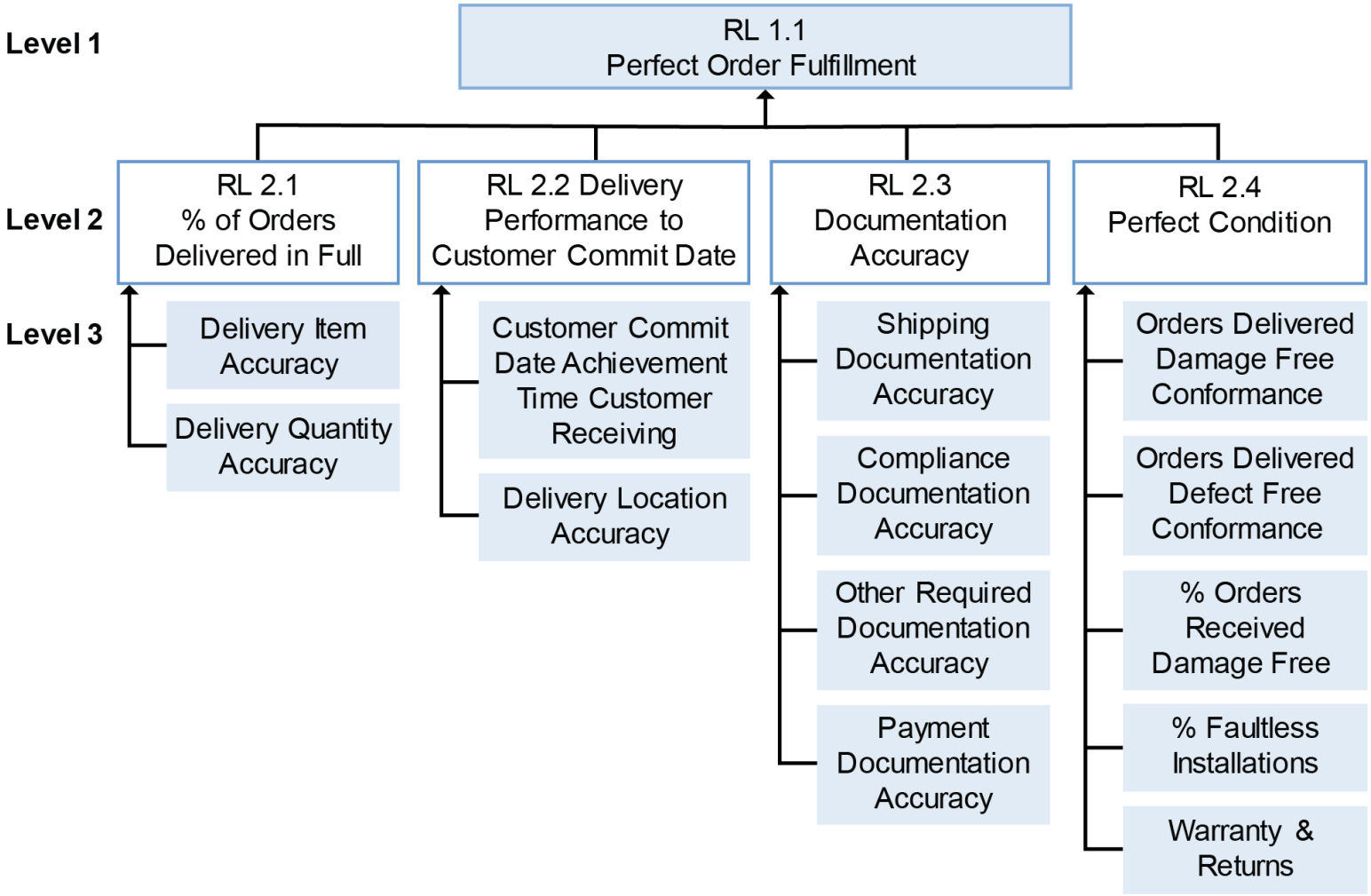
Performance Attribute	Level 1 Metric
Supply chain reliability	Perfect order fulfillment
Supply chain responsiveness	Order fulfillment cycle time
Supply chain agility	Upside supply chain adaptability Downside supply chain adaptability Overall value at risk
Supply chain costs	Total supply chain management cost Cost of goods sold (COGS)
Supply chain asset management	Cash-to-cash cycle time Return on supply chain fixed assets Return on working capital

Perfect Order Fulfillment

Product	Quantity	Delivery
Customer order	Documentation	Product condition

$$\text{Perfect Order Fulfillment} = \frac{\text{Total Perfect Orders}}{\text{Total Number of Orders}}$$

Perfect Order Fulfillment Example



Responsiveness

Order Fulfillment Cycle Time =
Order Fulfillment Process Time + Order Fulfillment Dwell Time

$$\text{Average Actual Cycle Time} = \frac{\text{Sum of Actual Cycle Times for All Orders Delivered}}{\text{Total Number of Orders Delivered}}$$

Agility

- Upside/downside supply chain adaptability
  - Maintainable increase/decrease in production (30 days)
- Overall value at risk (VaR)
  - Number of times event was below target times the amount below the target
  - Probability × monetary impact

Costs

Total Supply Chain Management Cost = Sales – Profits – Cost to Serve*

*Cost to Serve: Can include marketing, selling, administration

Asset Management

Cash−to−Cash Cycle Time = Days Sales Outstanding + Inventory Days of Supply – Days Payables Outstanding

$$\text{Days Sales Outstanding} = \frac{\text{Receivables}}{\left(\frac{\text{Annualized Revenue}}{365}\right)}$$

$$\text{Inventory Days of Supply} = \frac{\text{Inventory}}{\left(\frac{\text{Annualized COGS}}{365}\right)}$$

$$\text{Days Payables Outstanding} = \frac{\text{Payables}}{\left(\frac{\text{COGS}}{365}\right)}$$

Asset Management

$$\text{Return on Supply Chain Fixed Assets} = \frac{(\text{Supply Chain Revenue} - \text{COGS} - \text{Supply Chain Management Cost})}{\text{Supply Chain Fixed Assets}}$$

$$\text{Return on Working Capital} = \frac{(\text{Supply Chain Revenue} - \text{COGS} - \text{Supply Chain Management Costs})}{(\text{Inventory} + \text{A/R} - \text{A/P})}$$

Financial Performance Metrics

Cost metrics

- TCO
- Total landed cost
- Cost per function, pallet, unit, etc.
- Cost as percentage of net sales
- Order processing cost
- Inventory carrying cost
- Trends and variances

Ratios

- Liquidity ratios
- Activity ratios
- Leverage ratios
- Profitability ratios

Strategic Profit Model

Net Profit Margin × Asset Turnover

$$\text{ROA} = \frac{\text{Net Profit}}{\text{Total Assets}} = \left(\frac{\text{Net Income}}{\text{Net Sales}} \times \frac{\text{Net Sales}}{\text{Total Assets}}\right)$$

$$\frac{\text{Net Income}}{\text{Net Sales}}$$

Gross Margin – Total Expenses

Net Sales – COGS

Variable Expenses + Fixed Expenses

$$\frac{\text{Net Income}}{\text{Net Sales}}$$

Variable Expenses + Fixed Expenses

Inventory + Accounts Receivable + Other Current Assets

Strategic Profit Model Example 1

	A	B	C	D	E	F	G	H	I	J
1									USD 1,000	Net Sales
2							USD 200	Gross Profit =	USD 800	- Cost of Goods Sold
3									USD 80	Variable Expenses
4					USD 60	Net Profit =	USD 140	- Total Expenses =	USD 60	+ Fixed Expenses
5			0.06	Net Profit Margin =	USD 1,000	Net Sales				
6	0.143	Return on Assets =							USD 180	Inventory
7			2.38	x Asset Turnover =	USD 1,000	Net Sales			USD 40	+ Accounts Receivable
8					USD 420	Total Assets =	USD 280	Current Assets =	USD 60	+ Other Current Assets
9							USD 140	+ Fixed Assets		
10										
11	0.143	Return on Assets =	USD 60	Net Profit						
12			USD 420	Total Assets						

Strategic Profit Model Example 2

Reduction in inventory, carrying cost, and net sales

	A	B	C	D	E	F	G	H	I	J
1									USD 990	Net Sales
2							USD 190	Gross Profit =	USD 800	- Cost of Goods Sold
3									USD 70	Variable Expenses
4					USD 60	Net Profit =	USD 130	- Total Expenses =	USD 60	+ Fixed Expenses
5			0.061	Net Profit Margin =	USD 990	Net Sales				
6	0.158	Return on Assets =							USD 140	Inventory
7			2.61	x Asset Turnover =	USD 990	Net Sales			USD 40	+ Accounts Receivable
8					USD 380	Total Assets =	USD 240	Current Assets =	USD 60	+ Other Current Assets
9							USD 140	+ Fixed Assets		

Benchmarking

- Competitive: Apples to apples
- Best-in-class: Inspire
- Process: Qualitative checklists
- Internal: Replicate local success

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CERTIFIED IN LOGISTICS,
TRANSPORTATION AND DISTRIBUTION

MODULE 1, SECTION F:
REENGINEERING AND CONTINUOUS IMPROVEMENT

APICS

ASCM

Lean Objectives

1. Make only products and services customers want.
2. Match production rate to demand rate.
3. Make with perfect quality.
4. Make with shortest possible lead times.
5. Include only features in demand, excluding the rest.
6. Keep labor, equipment, materials, and inventory in motion, with no waste or unnecessary movement.
7. Build learning and growth into each activity.

Eight Forms of Waste

Transportation	Excessive movement of people, things, information
Inventory	Storage of materials prior to demand signal
Motion	Unnecessary handling, walking, driving, bending, lifting, reaching, turning
Waiting	Idle time caused by lack of direction, instructions, information, parts, equipment
Overproduction	Make more than immediately required
Overprocessing	Higher-grade materials or tighter tolerances than required
Defects	Scrap, rework, erroneous documentation
Skills	Worker underutilization or empowerment beyond capabilities

Problem-Solving Approach to Waste

Look for waste in three major areas:

- Muda
  Activities that consume resources but create no customer value
- Mura
  Demand or activities that are inconsistent or uneven
- Muri
  Overburdening of workers or processes

Look for cause-and-effect relationship between these areas.

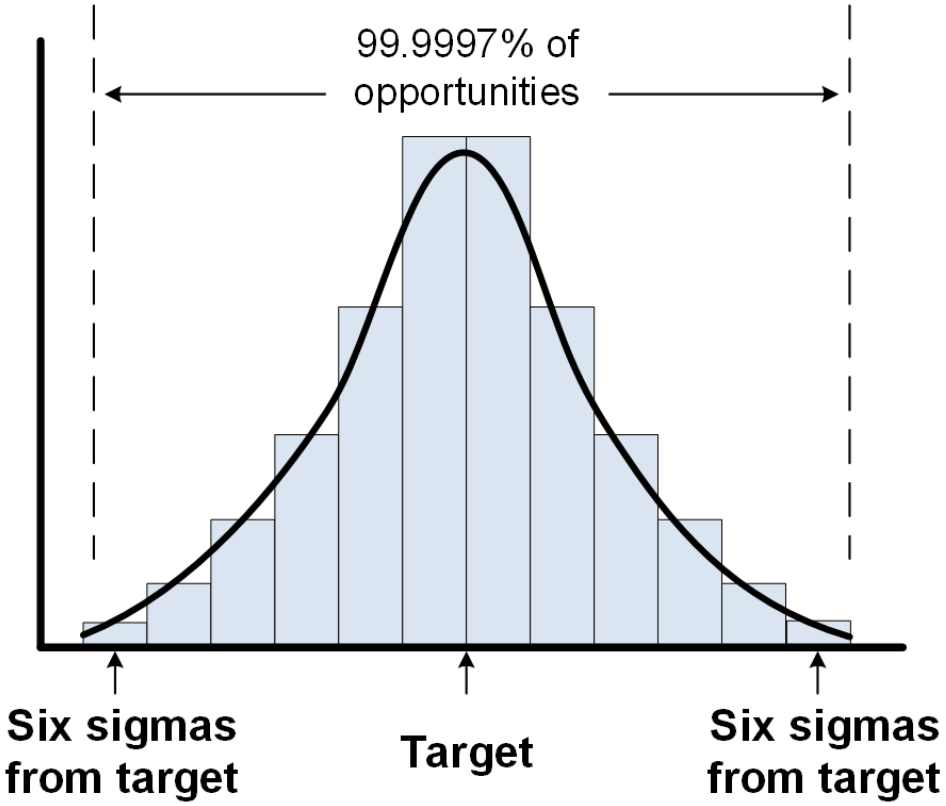
Agile Supply Chains

Agile characteristics

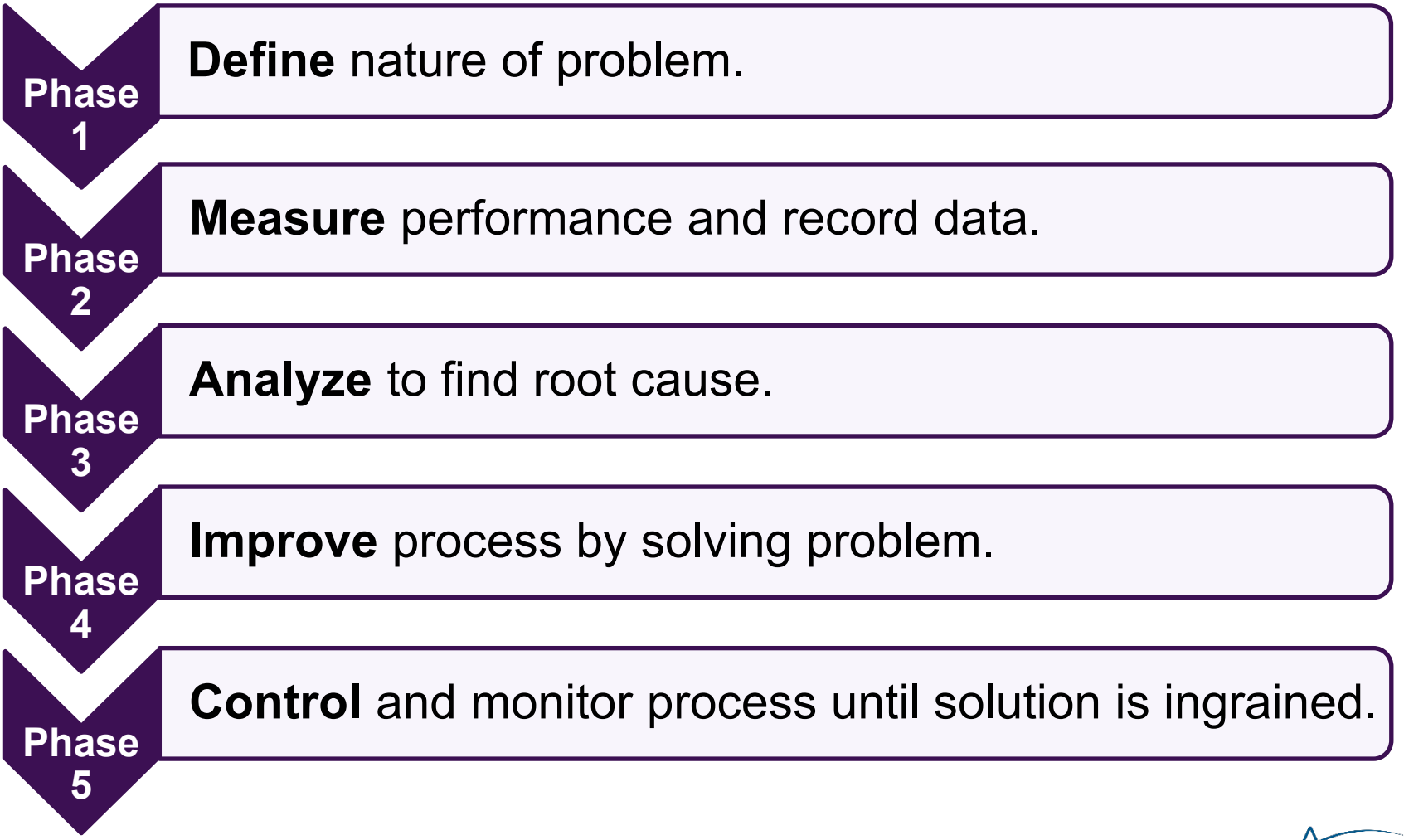
- Minimal finished goods inventory or lead times
- Direct factory delivery to customer
- Collaborative production planning across echelons
- Manufacturing postponement
- Geographic postponement

Six Sigma

Limit of 3.4 defects per million “opportunities”



DMAIC Process to Generate Lasting Results



Creating a Culture of Continuous Improvement

Continuous improvement/continuous process improvement

- Incremental, regular improvements
- Expose, eliminate root causes of problems
- Small-step improvement
- Results in a week or two
- Part of ongoing operations

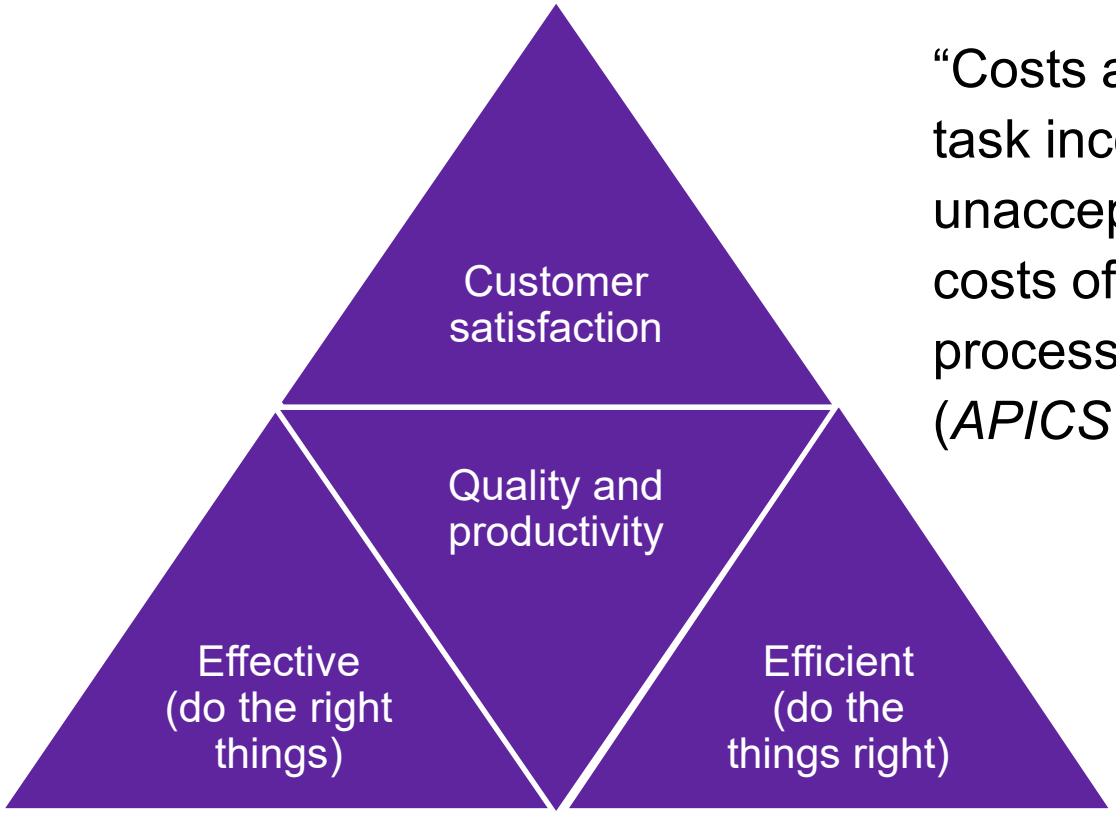
Continuous improvement culture

- Involves everyone
- Everyone empowered to eliminate waste
- Starts at top.
- Replace hierarchy with learning/experimentation

Continuous Improvement Objectives/Cost of Poor Quality

Objectives

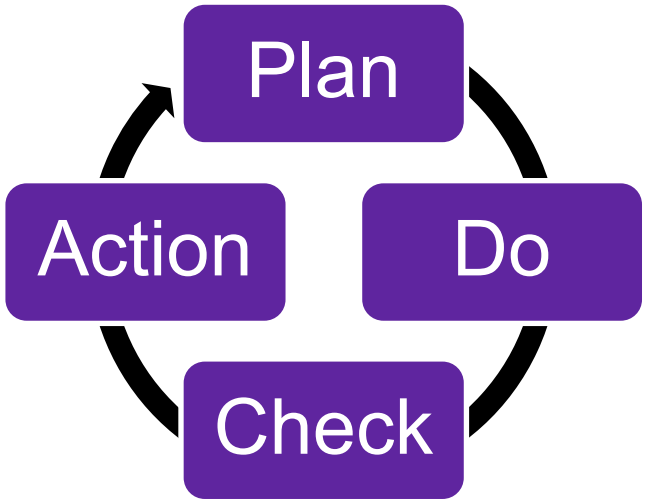
Cost of poor quality



"Costs associated with performing a task incorrectly and/or generating unacceptable output… include the costs of nonconformities, inefficient processes, and lost opportunities." (*APICS Dictionary,* 16th edition)

Continuous Process Improvement Steps

Plan-do-check-action (PDCA)



Continuous improvement cycle

1. Determine process to improve.
2. Gather “as-is” data.
3. Analyze and make “to be.”
4. Select best alternative.
5. Implement.
6. Sustain.

Commonalities Among Continuous Improvement Methods

Ensuring employee involvement and empowerment

- Keep teams small, effective.
- Decisions, improving task, part of job.
- From “Do this” to “What do you think?”

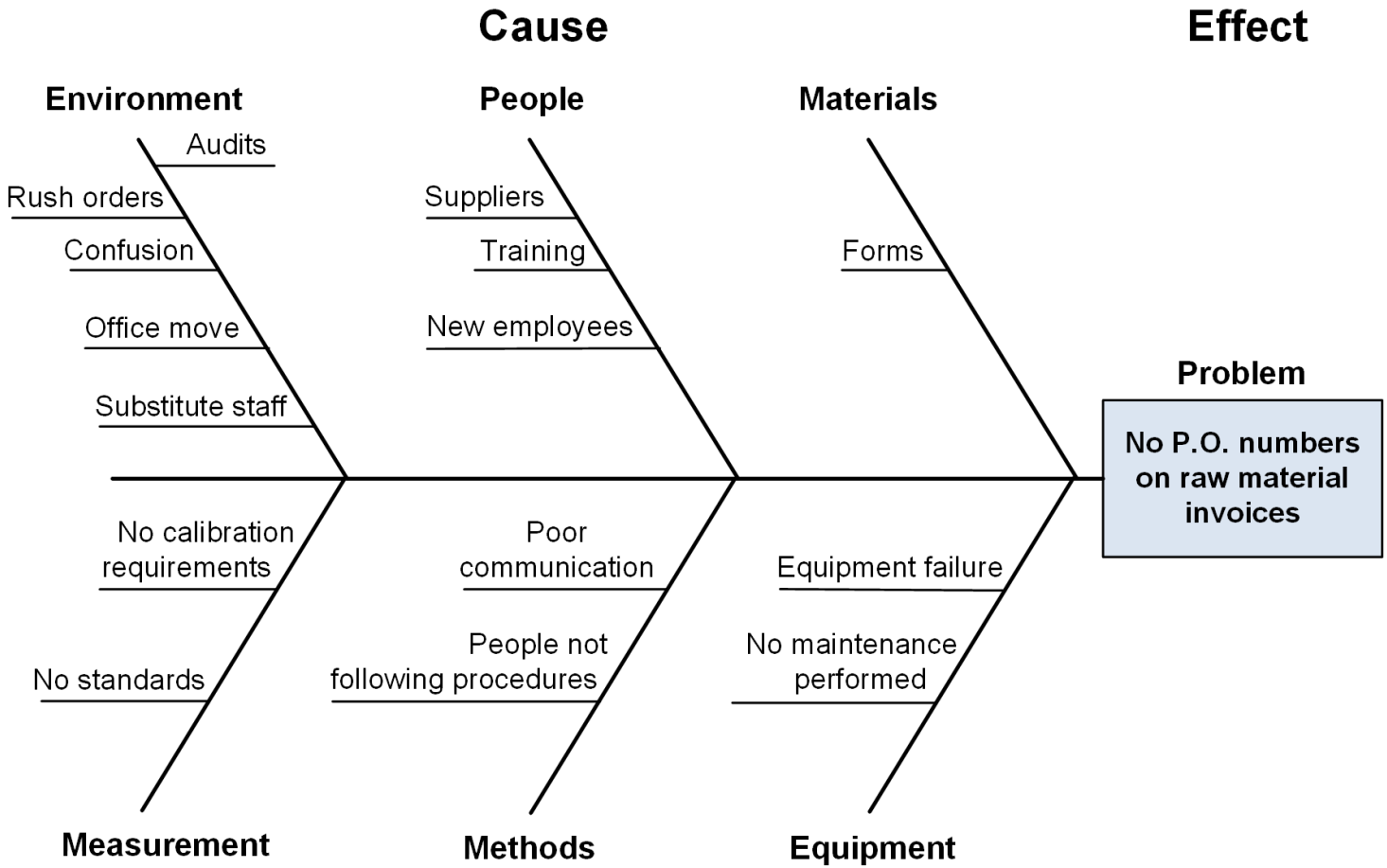
Focusing on customer

- Customer ultimate definer of quality.
- Perceptions, willing to pay for.
- Internal customers too.

Sustaining continuous improvement

- Small step is sustainable by design.
- Avoids being disruptive, exhausting.
- Always on to next problem.

Root Cause Analysis: Cause-and-Effect Diagram



Value Stream Mapping