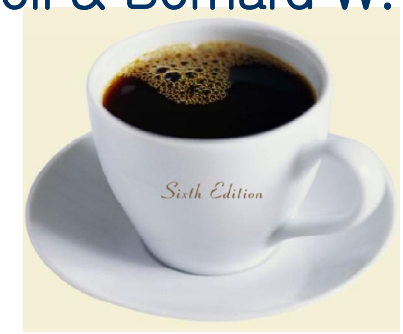
Chapter 1

Introduction to Operations and Supply Chain Management

Operations Management - 6th Edition

Roberta Russell & Bernard W. Taylor, III



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Lecture Outline

- What Operations and Supply Chain Managers Do
- Operations Function
- Evolution of Operations and Supply Chain Management
- Globalization and Competitiveness
- Operations
- Strategy and Organization of the Text
- Learning Objectives for This Course

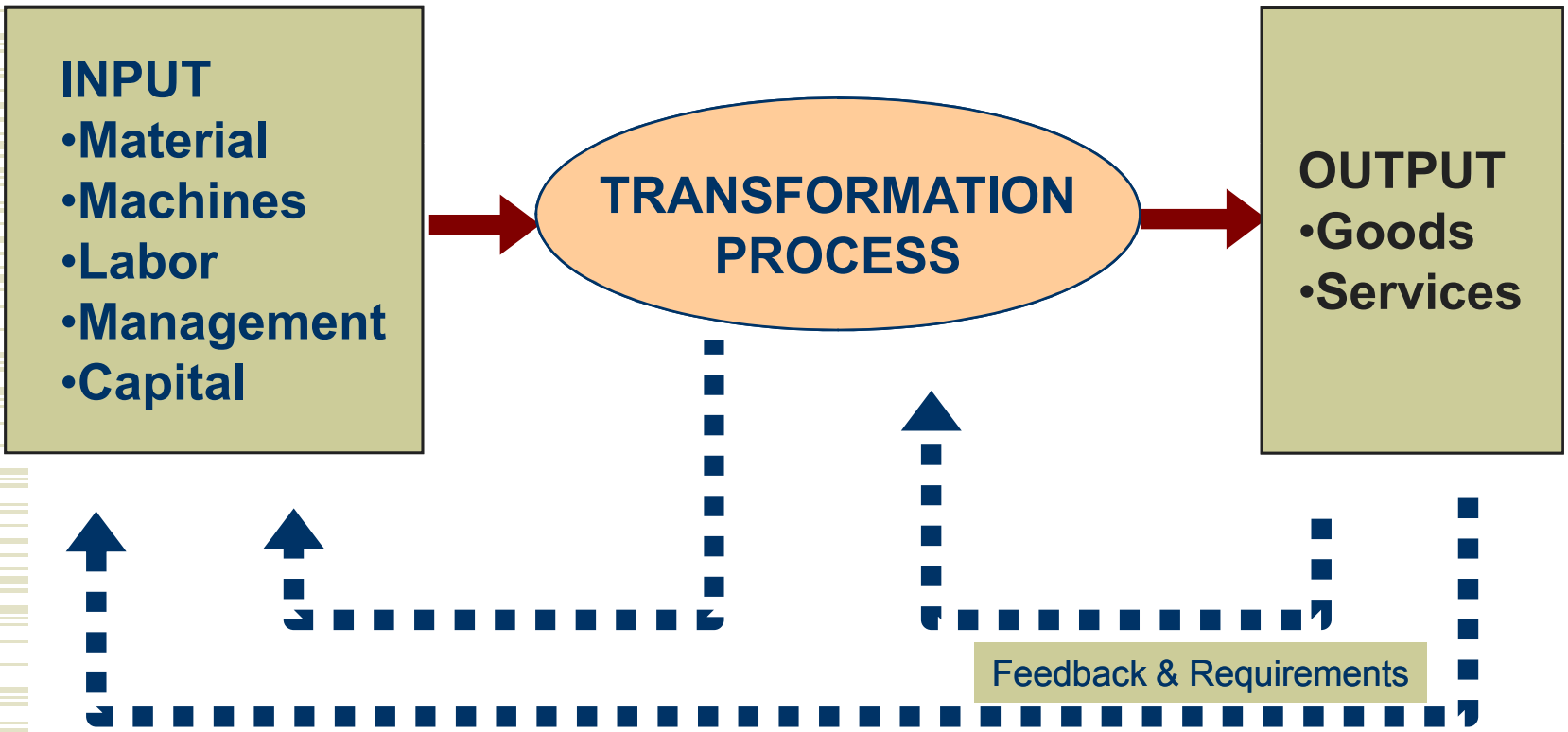
What Operations and Supply Chain Managers Do

- What is Operations Management?
  - design, operation, and improvement of productive systems
- What is Operations?
  - a function or system that transforms inputs into outputs of greater value
- What is a Transformation Process?
  - a series of activities along a *value chain* extending from supplier to customer
  - activities that do not add value are superfluous and should be eliminated

Transformation Process

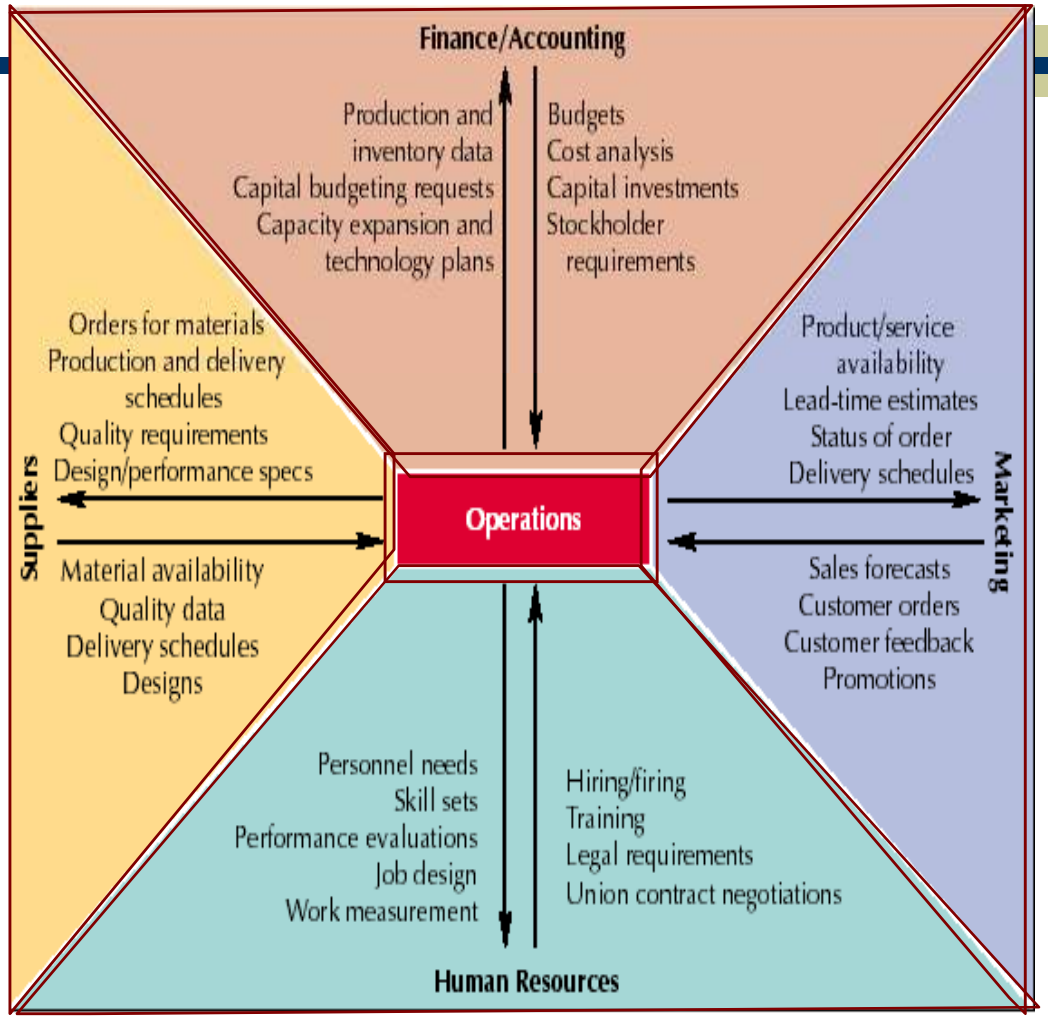
- *Physical:* as in manufacturing operations
- *Locational:* as in transportation or warehouse operations
- *Exchange:* as in retail operations
- *Physiological:* as in health care
- *Psychological:* as in entertainment
- *Informational:* as in communication

Operations as a Transformation Process



Operations Function

- Operations
- Marketing
- Finance and Accounting
- Human Resources
- Outside Suppliers



How is Operations Relevant to my Major?

- Accounting
- Information Technology
- Management

- "As an auditor you must understand the fundamentals of operations management."
- "IT is a tool, and there's no better place to apply it than in operations."
- "We use so many things you learn in an operations class—scheduling, lean production, theory of constraints, and tons of quality tools."

How is Operations Relevant to my Major? (cont.)

- Economics
- Marketing
- Finance

- "It's all about processes. I live by flowcharts and Pareto analysis."
- "How can you do a good job marketing a product if you're unsure of its quality or delivery status?"
- "Most of our capital budgeting requests are from operations, and most of our cost savings, too."

Evolution of Operations and Supply Chain Management

- Craft production
  - process of handcrafting products or services for individual customers
- Division of labor
  - dividing a job into a series of small tasks each performed by a different worker
- Interchangeable parts
  - standardization of parts initially as replacement parts; enabled mass production

Evolution of Operations and Supply Chain Management (cont.)

- Scientific management
  - systematic analysis of work methods
- Mass production
  - high-volume production of a standardized product for a mass market
- Lean production
  - adaptation of mass production that prizes quality and flexibility

Historical Events in Operations Management

Era	Events/Concepts	Dates	Originator
Industrial Revolution	Steam engine	1769	James Watt
	Division of labor	1776	Adam Smith
	Interchangeable parts	1790	Eli Whitney
Scientific Management	Principles of scientific management	1911	Frederick W. Taylor
	Time and motion studies	1911	Frank and Lillian Gilbreth
	Activity scheduling chart	1912	Henry Gantt
	Moving assembly line	1913	Henry Ford

Historical Events in Operations Management (cont.)

Era	Events/Concepts	Dates	Originator
Human Relations	Hawthorne studies	1930	Elton Mayo
	Motivation theories	1940s	Abraham Maslow
		1950s	Frederick Herzberg
		1960s	Douglas McGregor
Operations Research	Linear programming	1947	George Dantzig
	Digital computer	1951	Remington Rand
	Simulation, waiting line theory, decision theory, PERT/CPM	1950s	Operations research groups
	MRP, EDI, EFT, CIM	1960s, 1970s	Joseph Orlicky, IBM and others

Historical Events in Operations Management (cont.)

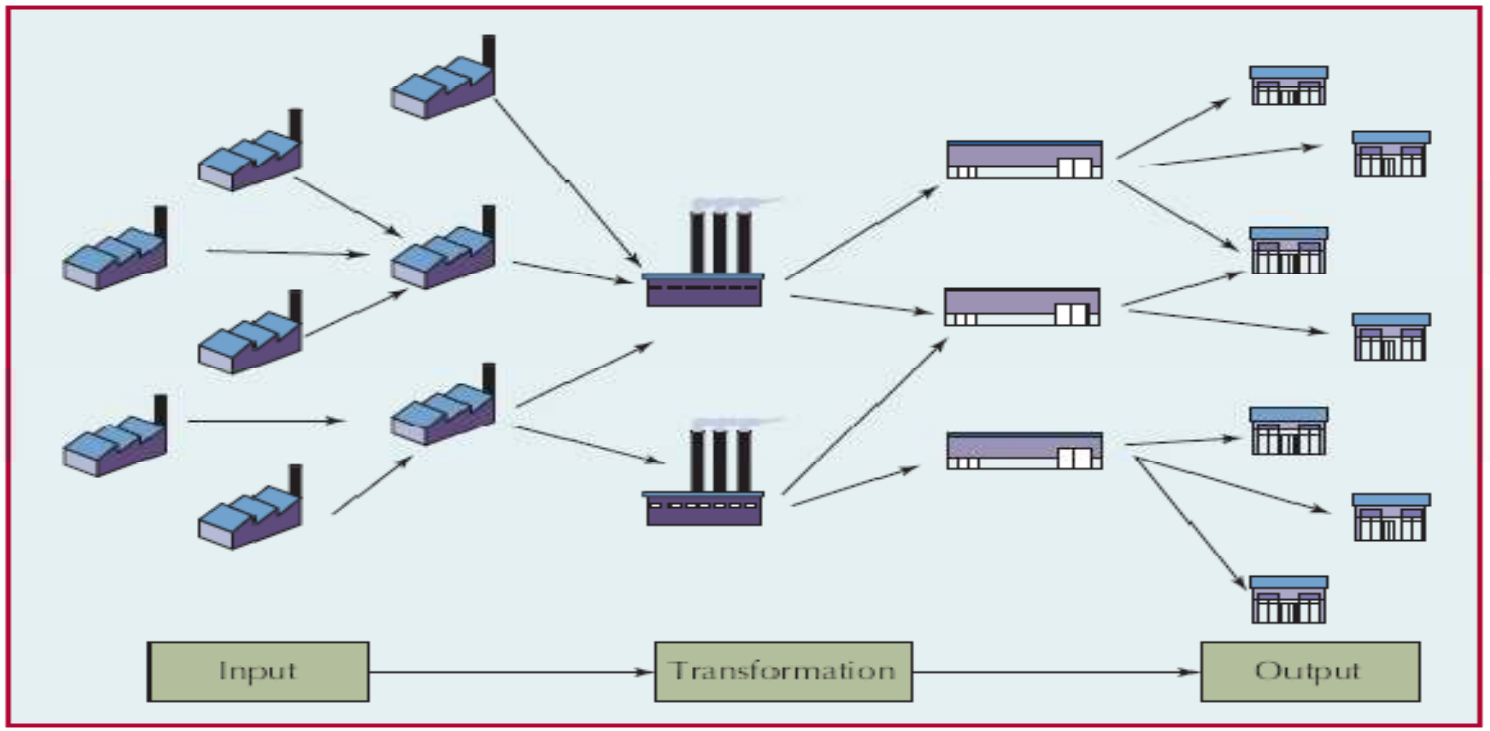
Era	Events/Concepts	Dates	Originator
Quality Revolution	JIT (just-in-time)	1970s	Taiichi Ohno (Toyota)
	TQM (total quality management)	1980s	W. Edwards Deming, Joseph Juran
	Strategy and operations	1980s	Wickham Skinner, Robert Hayes
	Business process reengineering	1990s	Michael Hammer, James Champy
	Six Sigma	1990s	GE, Motorola

Historical Events in Operations Management (cont.)

Era	Events/Concepts	Dates	Originator
Internet Revolution	Internet, WWW, ERP, supply chain management	1990s	ARPANET, Tim Berners-Lee SAP, i2 Technologies, ORACLE
	E-commerce	2000s	Amazon, Yahoo, eBay, Google, and others
Globalization	WTO, European Union, and other trade agreements, global supply chains, outsourcing, BPO, Services Science	1990s 2000s	Numerous countries and companies

Evolution of Operations and Supply Chain Management (cont.)

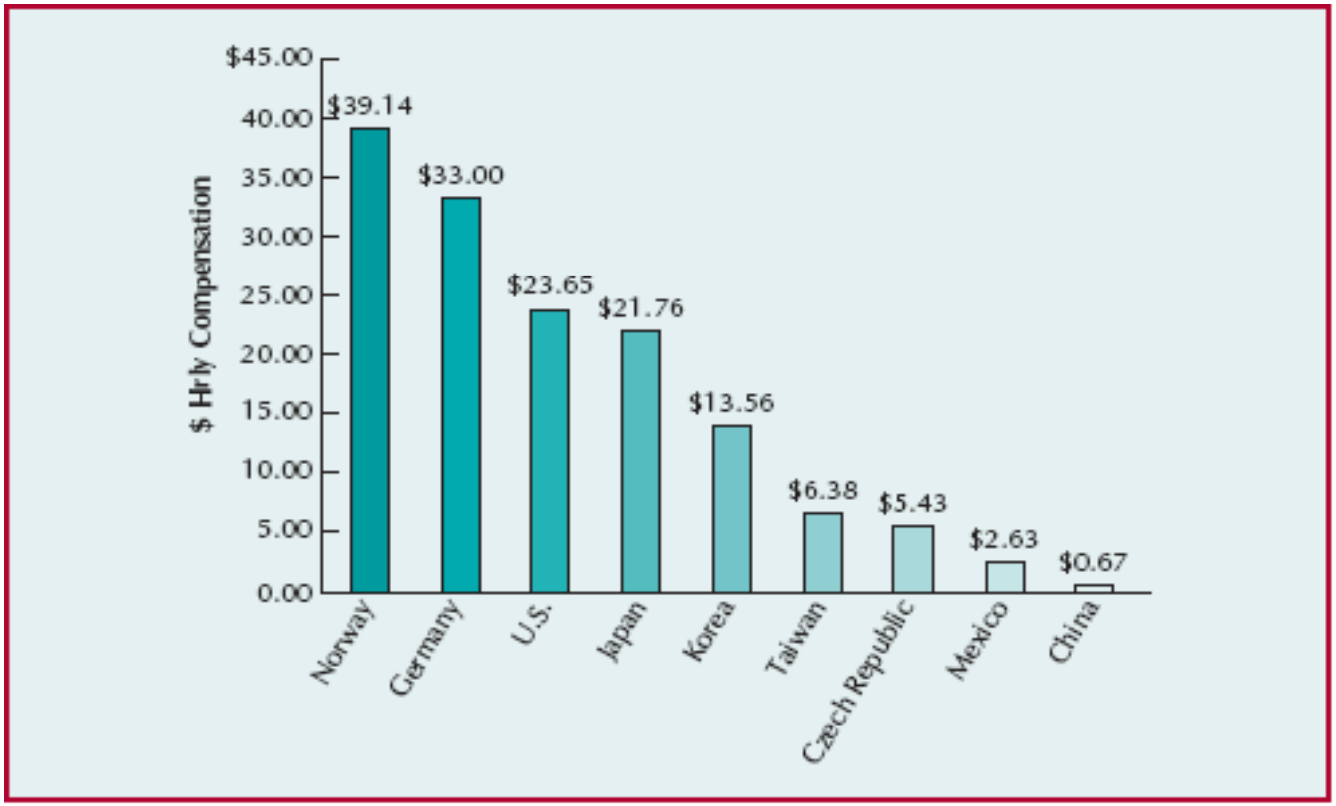
- **Supply chain management**
  - **management of the flow of information, products, and services across a network of customers, enterprises, and supply chain partners**



Globalization and Competitiveness

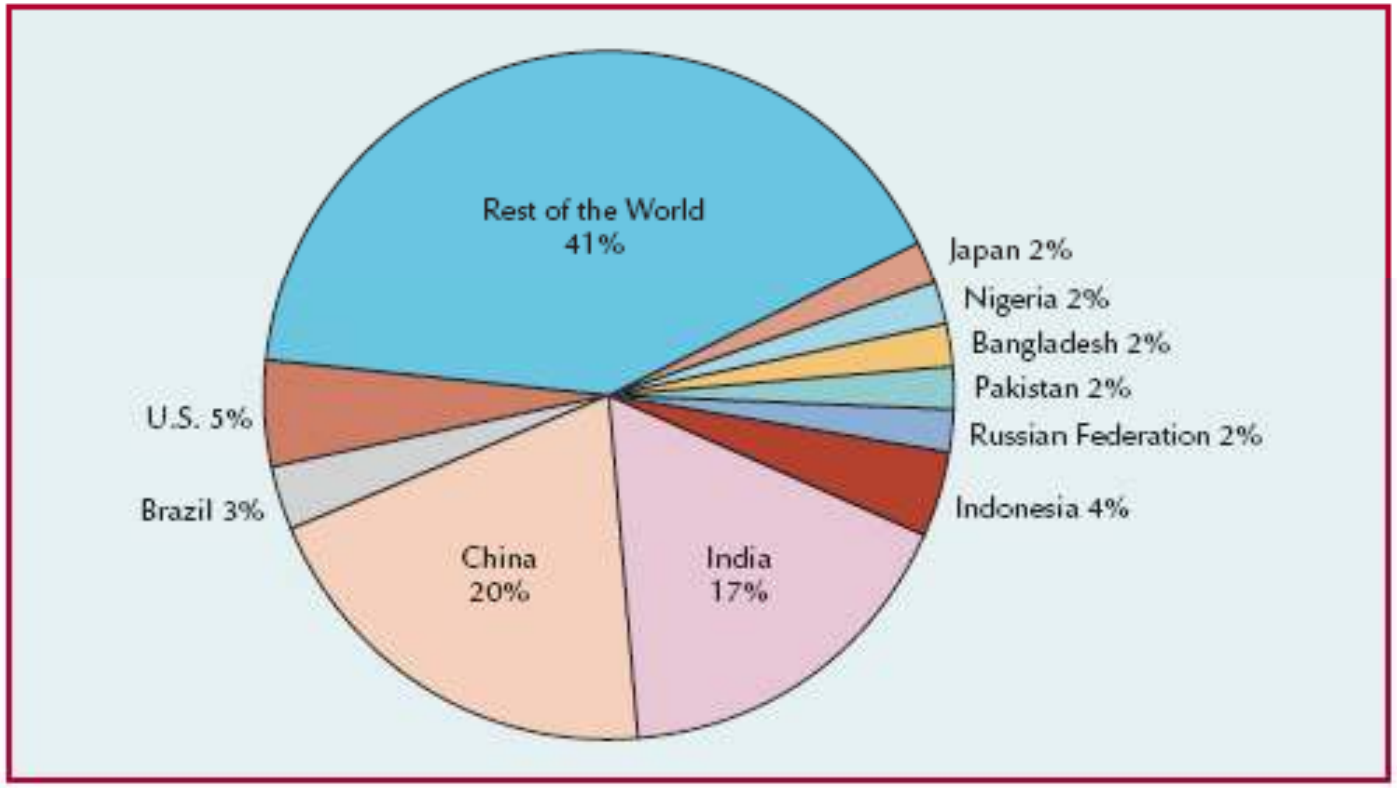
- Why “go global”?
  - favorable cost
  - access to international markets
  - response to changes in demand
  - reliable sources of supply
  - latest trends and technologies
- Increased globalization
  - results from the Internet and falling trade barriers

Globalization and Competitiveness (cont.)



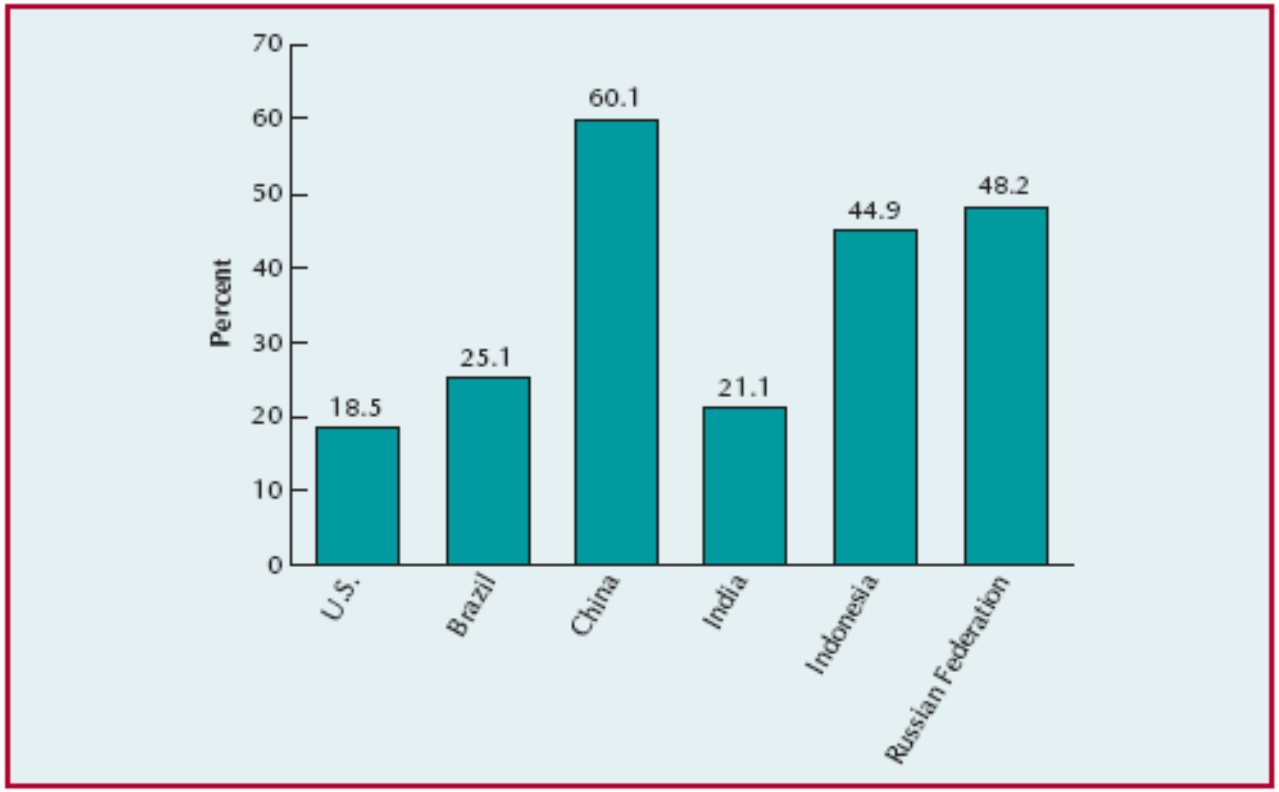
Hourly Compensation Costs for Production Workers
Source: U.S. Bureau of Labor Statistics, 2005.

Globalization and Competitiveness (cont.)



World Population Distribution
Source: U.S. Census Bureau, 2006.

Globalization and Competitiveness (cont.)



Trade in Goods as % of GDP

(sum of merchandise exports and imports divided by GDP, valued in U.S. dollars)

Productivity and Competitiveness

- **Competitiveness**
  - degree to which a nation can produce goods and services that meet the test of international markets
- **Productivity**
  - ratio of output to input
- **Output**
  - sales made, products produced, customers served, meals delivered, or calls answered
- **Input**
  - labor hours, investment in equipment, material usage, or square footage

Productivity and Competitiveness (cont.)

Single Factor-Productivity

$$\frac{\text{Output}}{\text{Labor}} \qquad \frac{\text{Output}}{\text{Materials}} \qquad \frac{\text{Output}}{\text{Capital}}$$

Multifactor Productivity

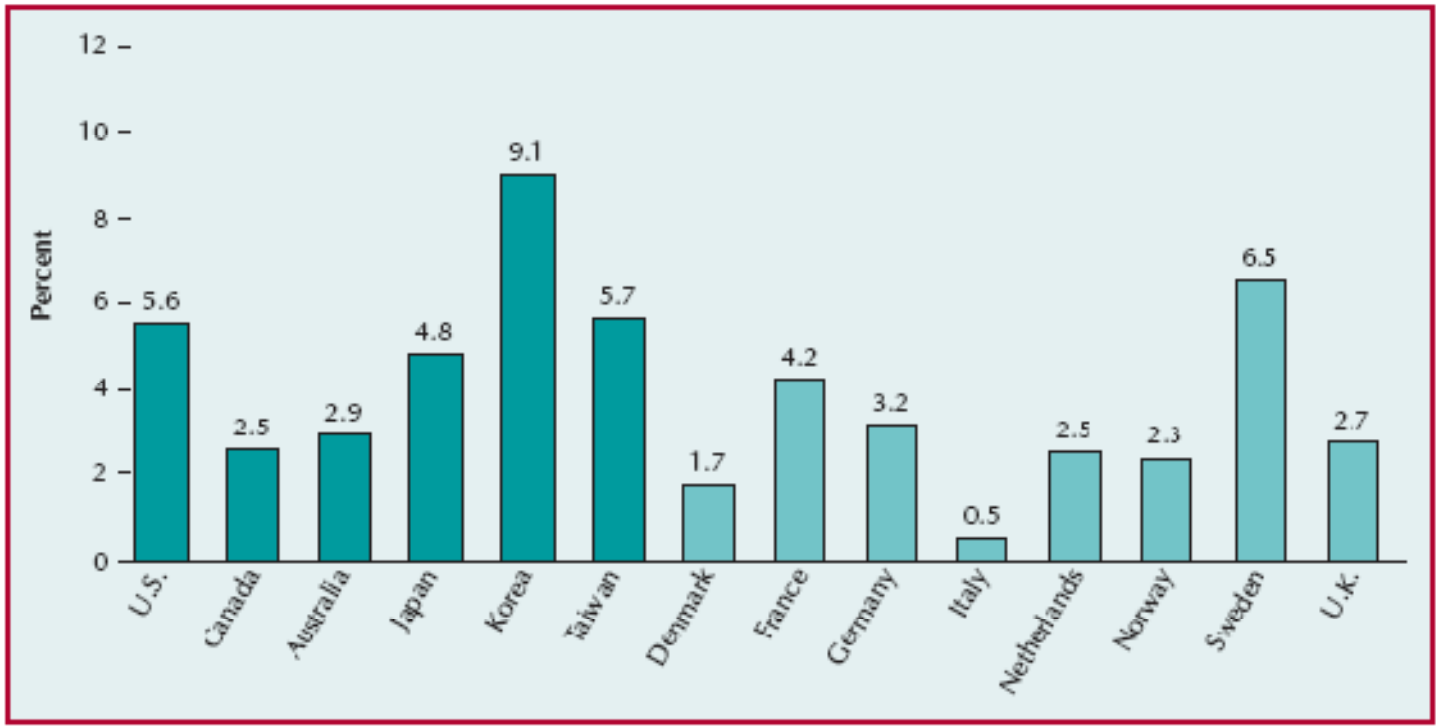
$$\frac{\text{Output}}{\text{Labor + Materials + Overhead}} \qquad \frac{\text{Output}}{\text{Labor + Energy + Capital}}$$

Total Factor Productivity

$$\frac{\text{Goods and services produced}}{\text{All inputs used to produce them}}$$

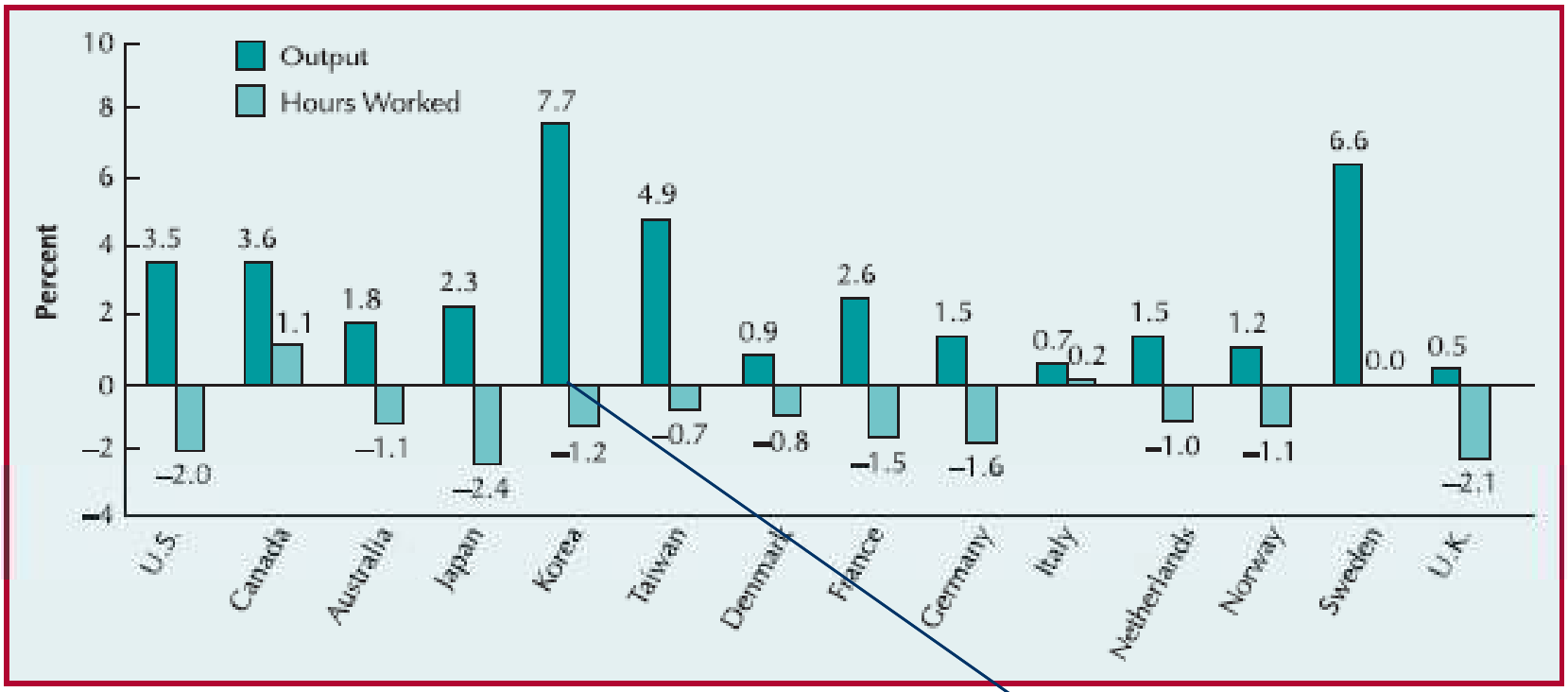
Measures of Productivity

Productivity and Competitiveness (cont.)



Average Annual Growth Rates in Productivity, 1995-2005.
Source: Bureau of Labor Statistics. A Chartbook of International Labor Comparisons. January 2007, p. 28.

Productivity and Competitiveness (cont.)



Average Annual Growth Rates in Output and Input, 1995-2005

Source: Bureau of Labor Statistics. A Chartbook of International Labor Comparisons, January 2007, p. 26.

Dramatic Increase in Output w/ Decrease in Labor Hours

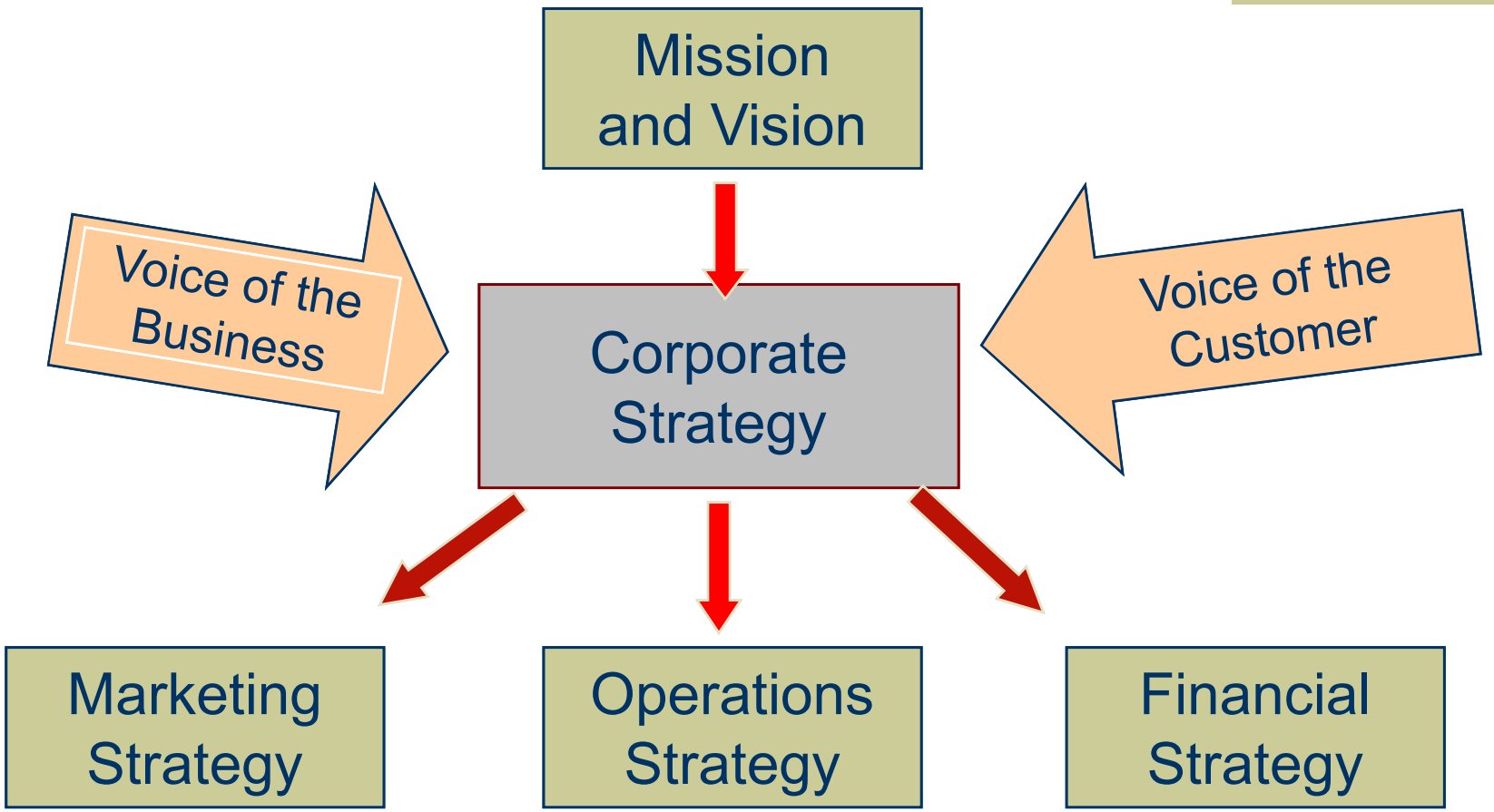
Productivity and Competitiveness (cont.)

- Retrenching
  - productivity is increasing, but both output and input decrease with input decreasing at a faster rate
- Assumption that more input would cause output to increase at the same rate
  - certain limits to the amount of output may not be considered
  - *output produced* is emphasized, not *output sold*; increased inventories

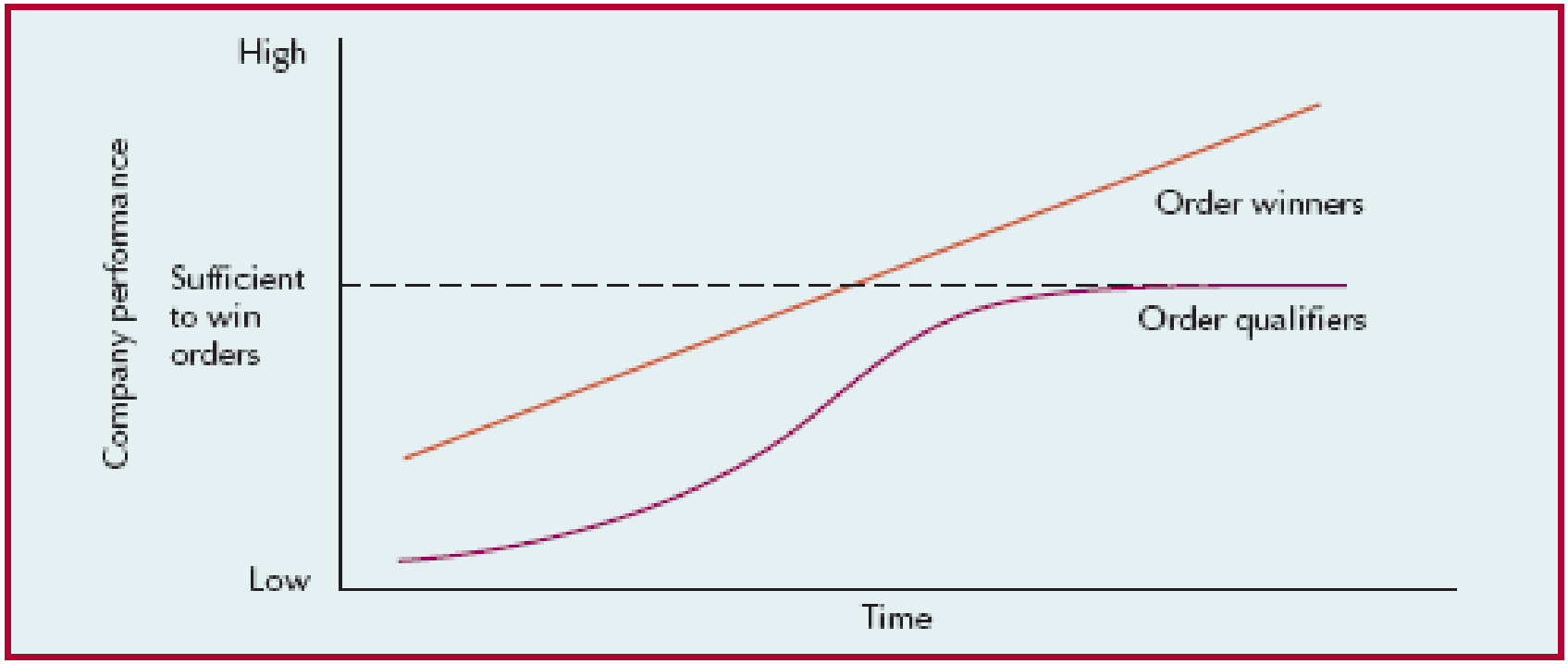
Strategy and Operations

- Strategy
  - Provides direction for achieving a mission
- Five Steps for Strategy Formulation
  - Defining a primary task
    - What is the firm in the business of doing?
  - Assessing core competencies
    - What does the firm do better than anyone else?
  - Determining order winners and order qualifiers
    - What qualifies an item to be considered for purchase?
    - What wins the order?
  - Positioning the firm
    - How will the firm compete?
  - Deploying the strategy

Strategic Planning



Order Winners and Order Qualifiers



Source: Adapted from Nigel Slack, Stuart Chambers, Robert Johnston, and Alan Betts, *Operations and Process Management*, Prentice Hall, 2006, p. 47

Positioning the Firm

- Cost
- Speed
- Quality
- Flexibility

Positioning the Firm: Cost

- Waste elimination
  - relentlessly pursuing the removal of all waste
- Examination of cost structure
  - looking at the entire cost structure for reduction potential
- Lean production
  - providing low costs through disciplined operations

Positioning the Firm: Speed

- fast moves, fast adaptations, tight linkages
- Internet
  - conditioned customers to expect immediate responses
- Service organizations
  - always competed on speed (McDonald's, LensCrafters, and Federal Express)
- Manufacturers
  - time-based competition: build-to-order production and efficient supply chains
- Fashion industry
  - two-week design-to-rack lead time of Spanish retailer, Zara

Positioning the Firm: Quality

- Minimizing defect rates or conforming to design specifications; please the customer
- Ritz-Carlton - one customer at a time
  - Service system is designed to “move heaven and earth” to satisfy customer
  - Every employee is empowered to satisfy a guest’s wish
  - Teams at all levels set objectives and devise quality action plans
  - Each hotel has a quality leader

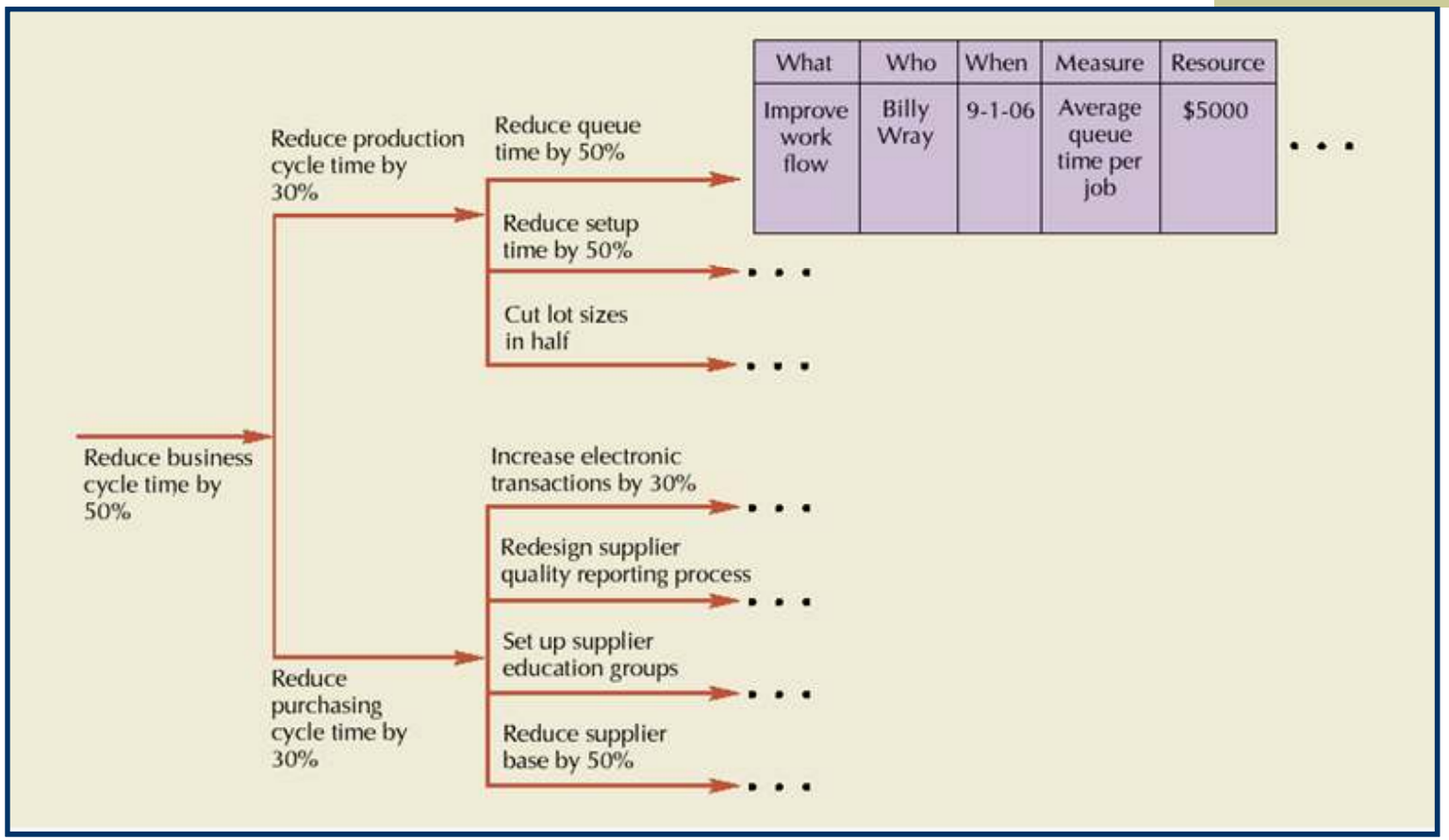
Positioning the Firm: Flexibility

- ability to adjust to changes in product mix, production volume, or design
- National Bicycle Industrial Company
  - offers 11,231,862 variations
  - delivers within two weeks at costs only 10% above standard models
  - *mass customization*: the mass production of customized parts

Policy Deployment

- Policy deployment
  - translates corporate strategy into measurable objectives
- Hoshins
  - action plans generated from the policy deployment process

Policy Deployment



Derivation of an Action Plan Using Policy Deployment

Balanced Scorecard

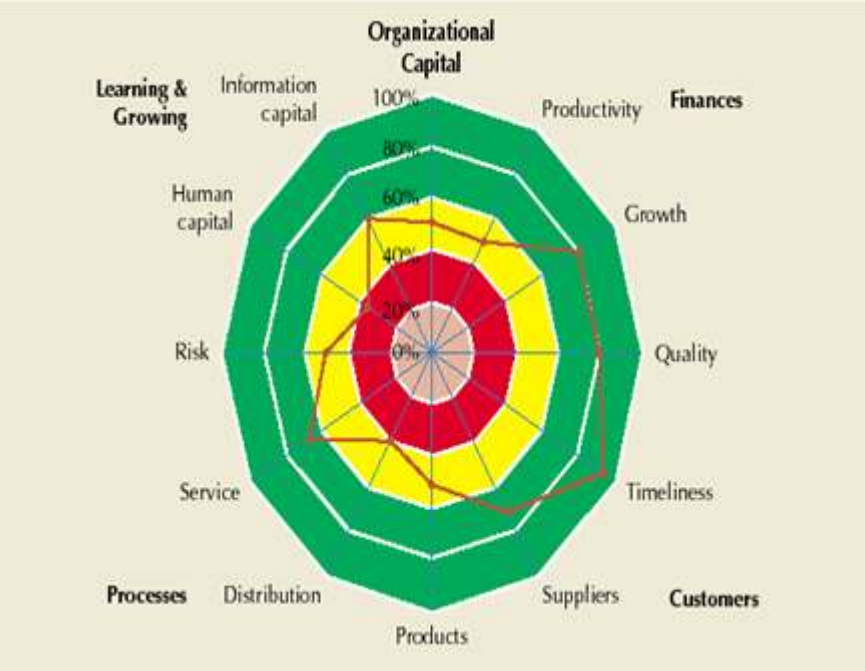
- Balanced scorecard
  - measuring more than financial performance
    - finances
    - customers
    - processes
    - learning and growing
- Key performance indicators
  - a set of measures that help managers evaluate performance in critical areas

Balanced Scorecard

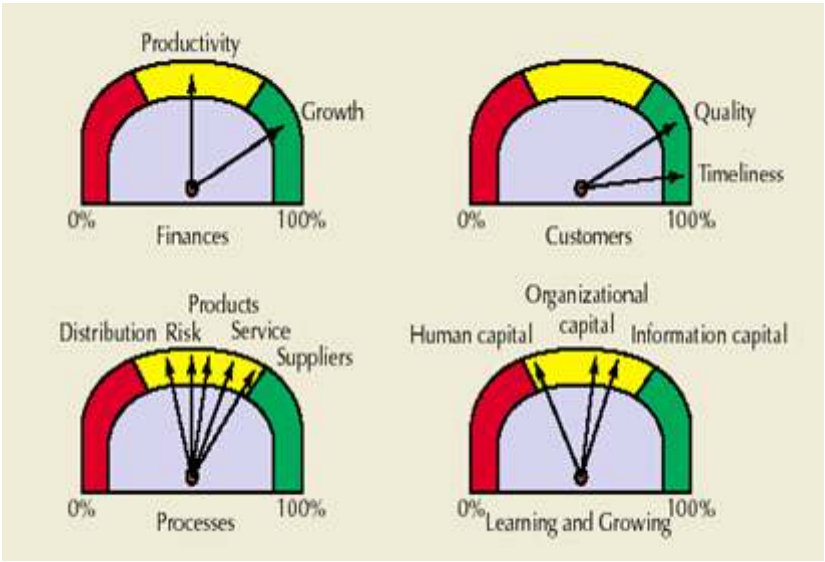
Balanced Scorecard Worksheet

Dimension		Objectives	Key Performance Indicator	Goal for 2008	KPI Results to Date	Score	Mean Performance
Finances	Productivity	Become industry cost leader	% reduction in cost per unit	20%	10%	50%	65%
	Growth	Increase market share	Market share	50%	40%	80%	
Customers	Quality	Zero defects	% good quality first pass	100%	80%	80%	87%
	Timeliness	On-time delivery	% of on-time deliveries	95%	90%	95%	
Processes	Suppliers	Integrate into production	% orders delivered to assembly	50%	40%	80%	73%
		Reduce inspections	% suppliers ISO 9000 certified	90%	60%	67%	
	Products	Reduce time to produce	Cycle time	10 mins.	12 mins.	83%	52%
		Improve quality	# warranty claims	200	1000	20%	
	Distribution	Reduce transportation costs	% FTL shipments	75%	30%	40%	40%
	Post-sales Service	Improve response to customer inquiries	% queries satisfied on first pass	90%	60%	67%	67%
	Risk	Reduce inventory obsolescence	Inventory turnover	12	6	50%	50%
		Reduce customer backlog	% order backlogged	10%	20%	50%	
Learning & Growing	Human capital	Develop quality improvement skills	# of six sigma Black Belts	25	2	8%	35%
			% trained in SPC	80%	50%	63%	
	Information capital	Provide technology to improve processes	% customers who can track orders	100%	60%	60%	61%
			% suppliers who use EDI	80%	50%	63%	
	Organizational capital	Create innovative culture	# of employee suggestions	100	60	60%	55%
			% of products new this year	20%	10%	50%	

Balanced Scorecard

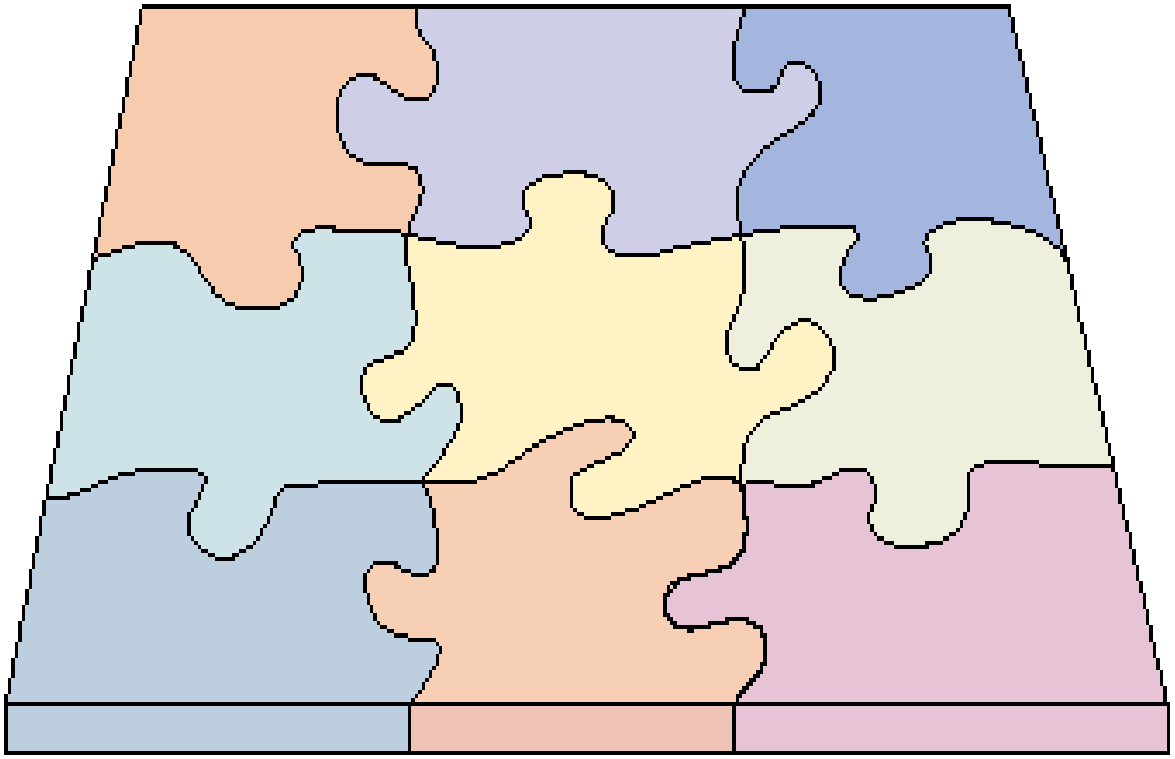


Radar Chart



Dashboard

Operations Strategy



Organization of This Text: Part I – Operations Management

- Intro. to Operations and Supply Chain Management: Chapter 1
- Quality Management: Chapter 2
- Statistical Quality Control: Chapter 3
- Product Design: Chapter 4
- Service Design: Chapter 5
- Processes and Technology: Chapter 6
- Facilities: Chapter 7
- Human Resources: Chapter 8
- Project Management: Chapter 9

Organization of This Text: Part II – Supply Chain Management

- Supply Chain Strategy and Design: Chapter 10
- Global Supply Chain Procurement and Distribution: Chapter 11
- Forecasting: Chapter 12
- Inventory Management: Chapter 13
- Sales and Operations Planning: Chapter 14
- Resource Planning: Chapter 15
- Lean Systems: Chapter 16
- Scheduling: Chapter 17

Learning Objectives of this Course

- Gain an appreciation of strategic importance of operations and supply chain management in a global business environment
- Understand how operations relates to other business functions
- Develop a working knowledge of concepts and methods related to designing and managing operations and supply chains
- Develop a skill set for quality and process improvement