KFU
جامعة الملك فيصل
كلية إدارة الأعمال
قسم الادارة

Course name: Operation Management

Chapter: 01

Management Department Team

KFU
جامعة الملك فيصل
كلية إدارة الأعمال
قسم الادارة

Operations and Productivity

Production is the creation of goods and services

Operations management (OM) is the set of activities that create value in the form of goods and services by transforming inputs into outputs

KFU
جامعة الملك فيصل
كلية إدارة الأعمال
قسم الادارة

Organizing to Produce Goods and Services

Essential functions:

-
1. Marketing – generates demand
2. Production/operations – creates the product
3. Finance/accounting – tracks how well the organization is doing, pays bills, collects the money

KFU
جامعة الملك فيصل
كلية إدارة الأعمال
قسم الادارة

Organizational Charts

Airline

Operations
- Ground support equipment
- Maintenance
- Ground Operations
- Facility maintenance Catering
- Flight Operations
- Crew scheduling Flying
- Communications Dispatching
- Management science

Finance/ accounting
- Accounting
- Payables Receivables
- Finance
- Cash control International exchange

Marketing
- Traffic administration
- Reservations Schedules
- Tariffs (pricing)
- Sales
- Advertising

Figure 1.1(B)

Organizational Charts

Manufacturing

Operations

Facilities
Construction; maintenance

Production and inventory control
Scheduling; materials control

Quality assurance and control

Supply-chain management

Manufacturing
Tooling; fabrication; assembly

Design
Product development and design
Detailed product specifications

Industrial engineering
Efficient use of machines, space, and personnel

Process analysis
Development and installation of production tools and equipment

Finance/ accounting

Receivables
Payables

Funds Management

Money market
International exchange

Capital requirements

Stock issue
Bond issue and recall

Marketing

Sales promotion

Advertising

Sales

Market research

Figure 1.1(C)

Why Study OM?

1. OM is one of three major functions of any organization, we want to study how people organize themselves for productive enterprise

2. **We want (*and need*) to know how goods and services are produced**

3. **We want to understand what operations managers do**

4. **OM is such a costly part of an organization**

Options for Increasing Contribution

	OM Option	Finance/ Accounting Option	Marketing Option		
	Reduce Production Costs 20%	Reduce Finance Costs 50%	Increase Sales Revenue 50%	Current	
	$100,000	$150,000	$100,000		Sales
			$100,000		
–	– 80,000	– 120,000	– 80,000		Cost of Goods
					64,000
	20,000	30,000	20,000		Gross Margin
			36,000		
–	– 3,000	– 6,000	– 6,000		Finance Costs
					6,000
	17,000	24,000	14,000		Subtotal
			30,000		

Table 1.1

What Operations Managers Do

Basic Management Functions

- Planning
- Organizing
- Staffing
- Leading
- Controlling

Ten Critical Decisions

	Ten Decision Areas	Chapter(s)
.1	Design of goods and services	5
.2	Managing quality	6, Supplement 6
.3	Process and capacity design	7, Supplement 7
.4	Location strategy	8
.5	Layout strategy	9
.6	Human resources and job design	10
.7	Supply-chain management	11, Supplement 11
.8	Inventory, MRP, JIT	12, 14, 16
.9	Scheduling	13, 15
.10	Maintenance	17

Table 1.2

The Critical Decisions

Design of goods and services .1

- What good or service should we offer?
- How should we design these products and services?

Managing quality .2

- How do we define quality?
- Who is responsible for quality?

Table 1.2 (cont.)

The Critical Decisions

Process and capacity design .3

- What process and what capacity will these products require?
- What equipment and technology is necessary for these processes?

Location strategy .4

- Where should we put the facility?
- On what criteria should we base the location decision?

Table 1.2 (cont.)

The Critical Decisions

Layout strategy .5

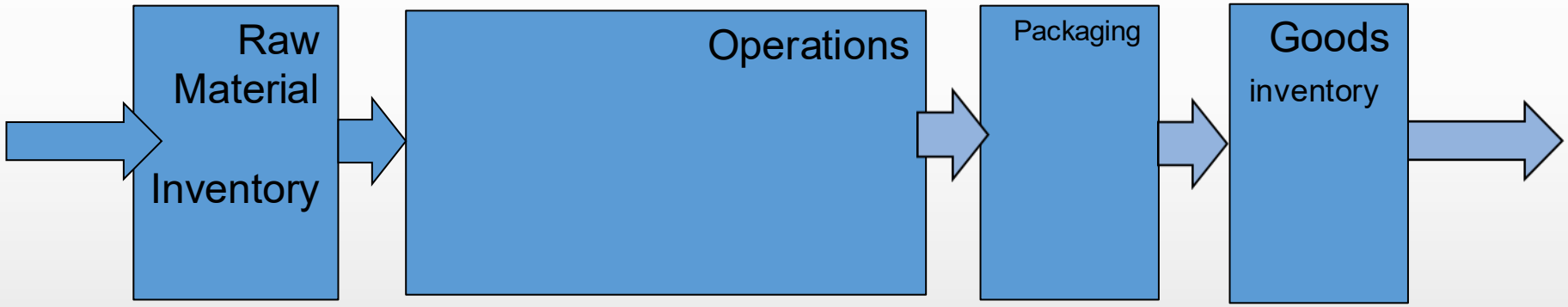
- How should we arrange the facility?
- How large must the facility be to meet our plan?

Human resources and job design .6

- How do we provide a reasonable work environment?
- How much can we expect our employees to produce?

Table 1.2 (cont.)

Ex: Manufacturer Layout



The Critical Decisions

Supply-chain management .7

- Should we make or buy this component?
- Who should be our suppliers and how can we integrate them into our strategy?

Inventory, material requirements planning, and JIT .8

- How much inventory of each item should we have?
- When do we re-order?

Table 1.2 (cont.)

The Critical Decisions

9. Intermediate and short–term scheduling
   - Are we better off keeping people on the payroll during slowdowns?
   - Which jobs do we perform next?
10. Maintenance
   - How do we build reliability into our processes?
   - Who is responsible for maintenance?

Table 1.2 (cont.)

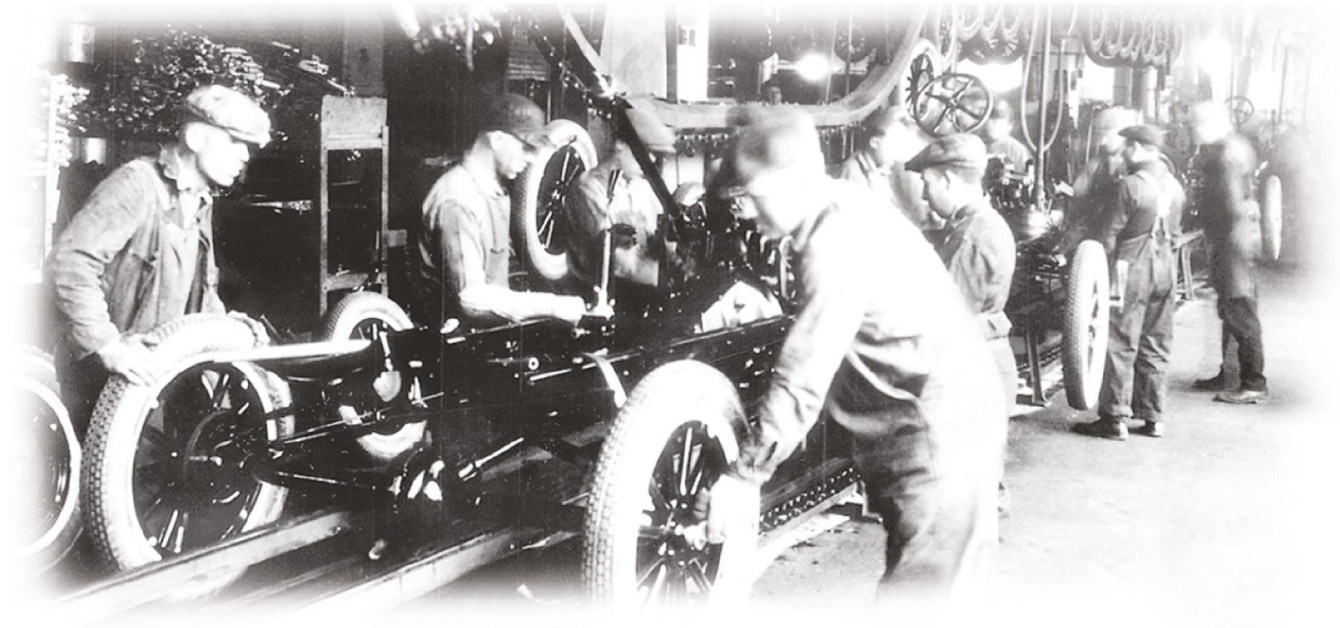
Where are the OM Jobs?

- Technology/methods
- Facilities/space utilization
- Strategic issues
- Response time
- People/team development
- Customer service
- Quality
- Cost reduction
- Inventory reduction
- Productivity improvement

Opportunities

Figure 1.2

Significant Events in OM



Cost Focus		Quality Focus	Customization Focus
Early Concepts 1776–1880	**Mass Production Era 1910–1980**	**Lean Production Era 1980–1995**	**Mass Customization Era 1995–2015**
Labor Specialization (Smith, Babbage)	Moving Assembly Line (Ford/Sorensen)	Just-in-Time (JIT)	Globalization
Standardized Parts (Whitney)	Statistical Sampling (Shewhart)	Computer-Aided Design (CAD)	Internet/E-Commerce
Scientific Management Era 1880–1910	Economic Order Quantity (Harris)	Electronic Data Interchange (EDI)	Enterprise Resource Planning
Gantt Charts (Gantt)	Linear Programming	Total Quality Management (TQM)	International Quality Standards (ISO)
Motion & Time Studies (Gilbreth)	PERT/CPM (DuPont)	Baldrige Award	Finite Scheduling
Process Analysis (Taylor)	Material Requirements Planning (MRP)	Empowerment	Supply-Chain Management
Queuing Theory (Erlang)		Kanbans	Mass Customization
			Build-to-Order
			Sustainability

Figure 1.3

The Heritage of OM

- Division of labor (Adam Smith 1776; Charles Babbage 1852)
- Standardized parts (Whitney 1800)
- Scientific Management (Taylor 1881)
- Coordinated assembly line (Ford/ Sorenson 1913)
- Gantt charts (Gantt 1916)
- Motion study (Frank and Lillian Gilbreth 1922)
- Quality control (Shewhart 1924; Deming 1950)

Frederick W. Taylor

- Born 1856; died 1915
- Known as ‘father of scientific management’
- In 1881, as chief engineer for Midvale Steel, studied how tasks were done
- Began first motion and time studies
- Created efficiency principles

Taylor's Principles

Management Should Take More Responsibility for:

- Matching employees to right job
- Providing the proper training
- Providing proper work methods and tools
- Establishing appropriate incentives for work to be accomplished

Frank & Lillian Gilbreth

- **Frank (1868-1924); Lillian (1878-1972)**
- **Husband-and-wife engineering team**
- **Further developed work measurement methods**
- **Applied efficiency methods to their home and 12 children!**

Henry Ford

- Born 1863; died 1947
- In 1903, created Ford Motor Company
- In 1913, first used moving assembly line
- Paid workers very well for ($5/day!)

W. Edwards Deming

- Born 1900; died 1993
- Engineer and physicist
- Credited with teaching Japan quality control methods
- Used statistics to analyze process
- His methods involve workers in decisions

Contributions From

- Human factors
- Industrial engineering
- Management science
- Biological science
- Physical sciences
- Information technology

New Challenges in OM

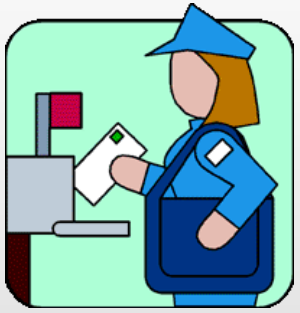
From	To
Local or national focus	Global focus
Batch shipments	Just-in-time
Low bid purchasing	Supply-chain partnering
Lengthy product development	Rapid product development, alliances
Standard products	Mass customization
Job specialization	Empowered employees, teams

KFU
جامعة الملك فيصل
كلية إدارة الأعمال
قسم الادارة

Characteristics of Goods

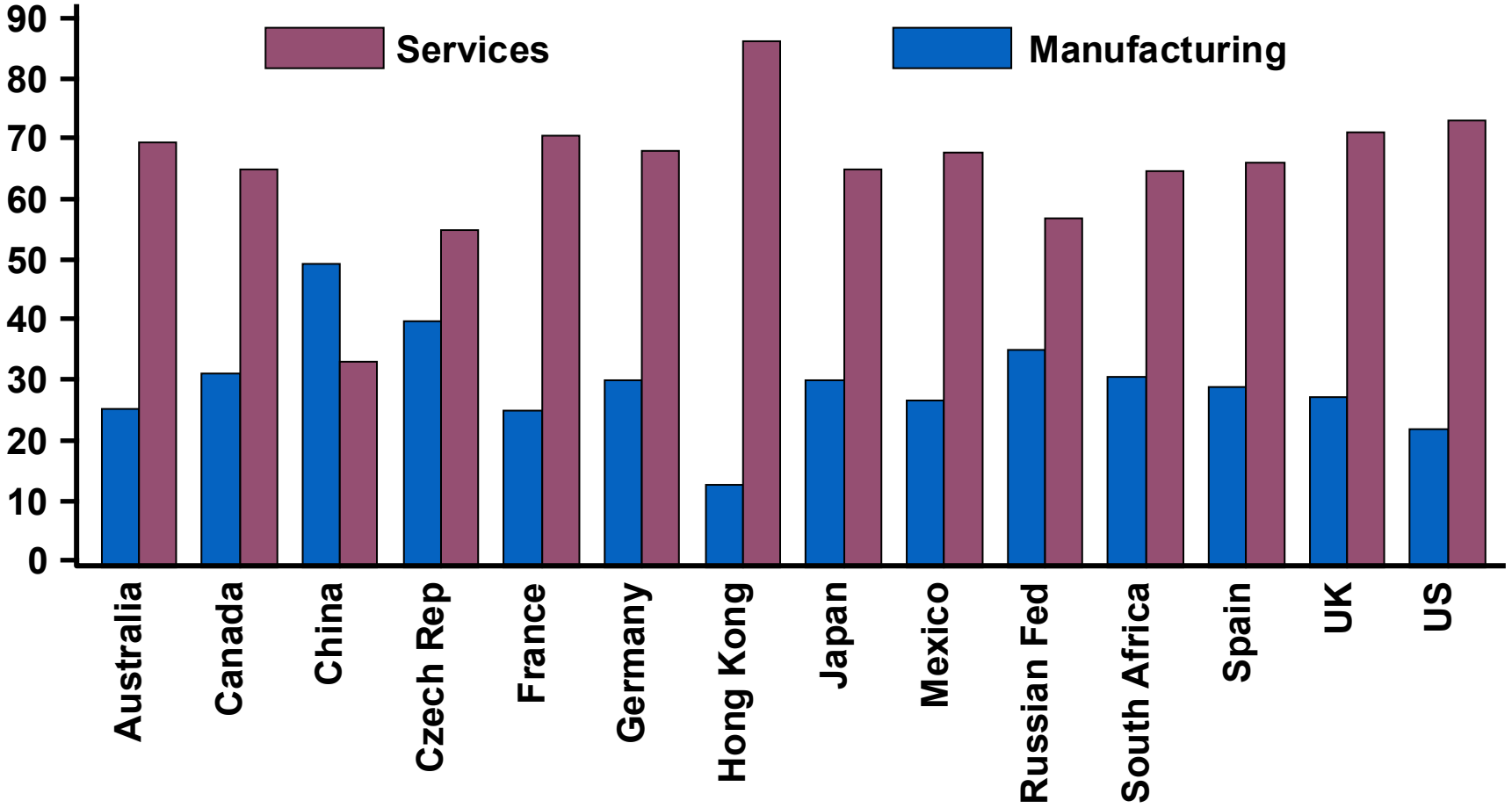
- Tangible product
- Production usually separate from consumption
- Can be inventoried
- Low customer interaction
- Can be re-sell

Characteristics of Service



- **Intangible product**
- **Produced and consumed at same time**
- **Often unique**
- **High customer interaction**
- **Often knowledge-based**
- **Can not re-sell**

Industry and Services as Percentage of GDP



Changing Challenges

Traditional Approach	Reasons for Change	Current Challenge
Ethics and regulations not at the forefront	Public concern over pollution, corruption, child labor, etc.	High ethical and social responsibility; increased legal and professional standards
Local or national focus	Growth of reliable, low cost communication and transportation	Global focus, international collaboration
Lengthy product development	Shorter life cycles; growth of global communication; CAD, Internet	Rapid product development; design collaboration

Figure 1.5

Changing Challenges

Traditional Approach	Reasons for Change	Current Challenge
Low cost production, with little concern for environment; free resources (air, water) ignored	Public sensitivity to environment; ISO 14000 standard; increasing disposal costs	Environmentally sensitive production; green manufacturing; sustainability
Low-cost standardized products	Rise of consumerism; increased wealth; individualism	Mass customization

Figure 1.5

Changing Challenges

Traditional Approach	Reasons for Change	Current Challenge
Emphasis on specialized, often manual tasks	Recognition of the employee's total contribution; knowledge society	Empowered employees; enriched jobs
"In-house" production; low-bid purchasing	Rapid technological change; increasing competitive forces	Supply-chain partnering; joint ventures, alliances
Large lot production	Shorter product life cycles; increasing need to reduce inventory	Just-In-Time performance;

Figure 1.5

New Trends in OM

- Ethics
- Global focus
- Environmentally sensitive production
- Rapid product development
- Environmentally sensitive production
- Mass customization
- Empowered employees
- Supply-chain partnering
- Just-in-time performance

Productivity Challenge

Productivity is the ratio of outputs (goods and services) divided by the inputs (resources such as labor and capital)

The objective is to improve productivity!

Important Note!
Production is a measure of output only and not a measure of efficiency

The Economic System

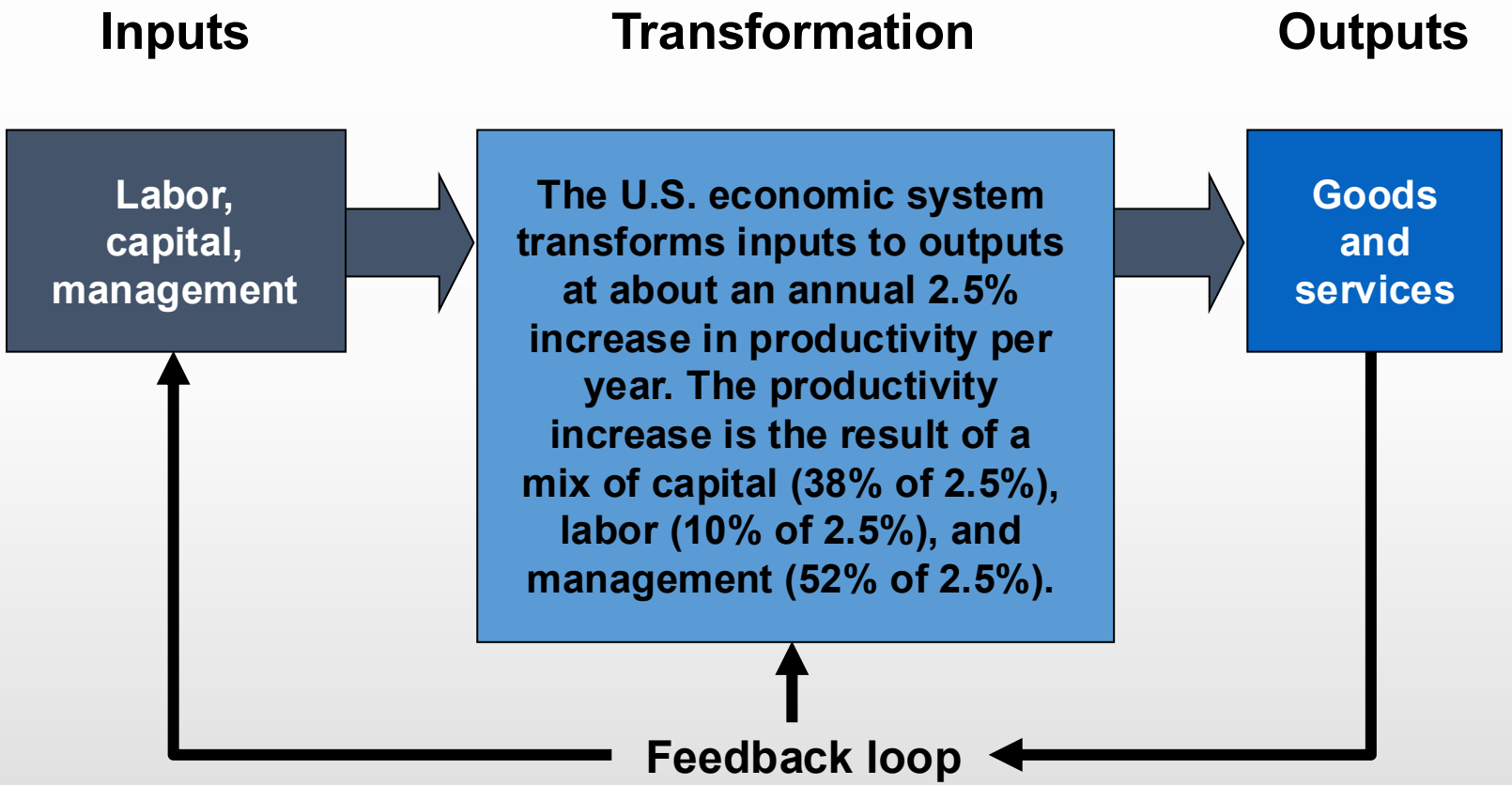


Figure 1.6

Improving Productivity at Starbucks

A team of 10 analysts continually look for ways to shave time. Some improvements:

Stop requiring signatures on credit card purchases under $25	**Saved 8 seconds per transaction**
Change the size of the ice scoop	**Saved 14 seconds per drink**
New espresso machines	**Saved 12 seconds per shot**

Improving Productivity at Starbucks

A team of 10 analysts continually look for ways to

Stop requiri
on credit ca
under $25

Change the
scoop

New espress

per shot

Operations improvements have helped Starbucks increase yearly revenue per outlet by $200,000 to $940,000 in six years.

Productivity has improved by 27%, or about 4.5% per year.

Productivity

$$\text{Productivity} = \frac{\text{Units produced}}{\text{Input used}}$$

- Measure of process improvement
- Represents output relative to input
- Only through productivity increases can our standard of living improve

Productivity Calculations

Labor Productivity

$$\text{Productivity} = \frac{\text{Units produced}}{\text{Labor-hours used}}$$

$$= \frac{1{,}000}{250} = 4 \text{ units/labor-hour}$$

One resource input ⇨ single-factor productivity

Multi-Factor Productivity

$$\text{Productivity} = \frac{\text{Output}}{\text{Labor} + \text{Material} + \text{Energy} + \text{Capital} + \text{Miscellaneous}}$$

- Also known as total factor productivity
- Output and inputs are often expressed in dollars

Multiple resource inputs ⇨ multi-factor productivity

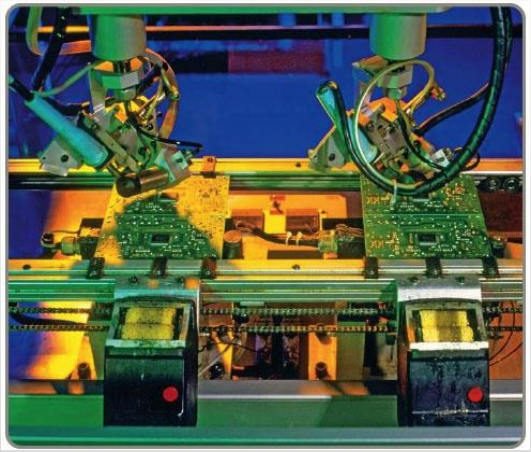
Measurement Problems

1. **Quality** may change while the quantity of inputs and outputs remains constant
2. **External elements** may cause an increase or decrease in productivity

Productivity Variables

1. **Labor** - contributes about 10% of the annual increase

2. **Capital** - contributes about 38% of the annual increase



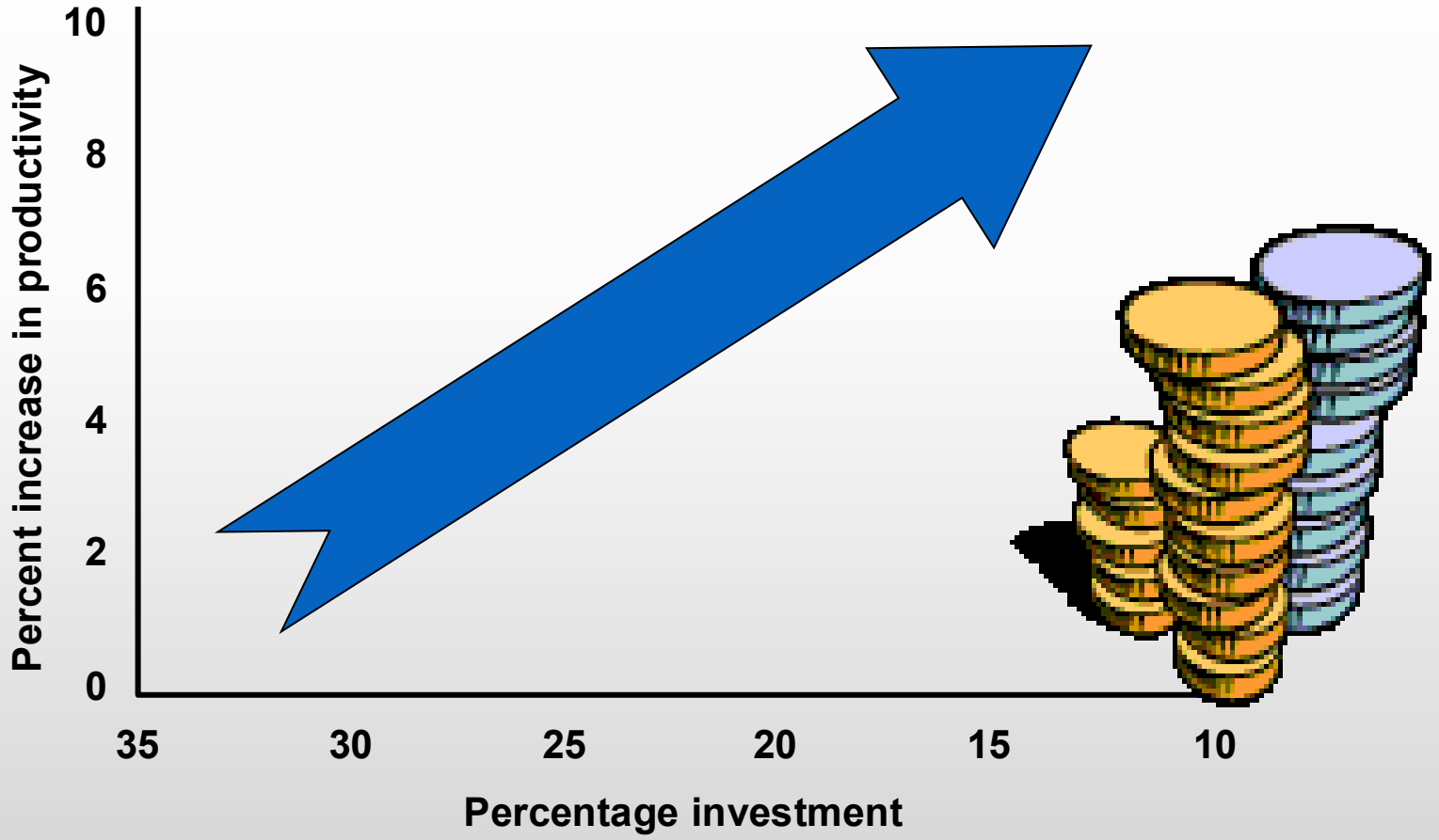
3. **Management** - contributes about 52% of the annual increase

Key Variables for Improved Labor Productivity

1. **Basic education appropriate for the labor force**
2. **Diet of the labor force**
3. **Social overhead that makes labor available**

- **Challenge is in maintaining and enhancing skills in the midst of rapidly changing technology and knowledge**

Investment and Productivity



Service Productivity

1. Typically labor intensive
2. Frequently focused on unique individual attributes or desires
3. Often an intellectual task performed by professionals
4. Often difficult to mechanize
5. Often difficult to evaluate for quality

Productivity at Taco Bell

Improvements:

- **Revised the menu**
- **Designed meals for easy preparation**
- **Shifted some preparation to suppliers**
- **Efficient layout and automation**
- **Training and employee empowerment**
- **New water and energy saving grills**

Productivity at Taco Bell

I

Results:

- Preparation time cut to 8 seconds
- Management span of control increased from 5 to 30
- In-store labor cut by 15 hours/day
- Stores handle twice the volume with half the labor
- Conserve 300 million gallons of water and 200 million KwH of electricity each year saving $17 million annually

Ethics and Social Responsibility

Challenges facing operations managers:

- Developing and producing safe, quality products
- Maintaining a clean environment
- Providing a safe workplace
- Honoring stakeholder commitments