Operations Management

Chapter 1 –
Operations and Productivity

PowerPoint presentation to accompany
Heizer and Render, Operations Management, 12th Ed.

Learning Objectives

When you complete this chapter you should be able to:

1. Define operations management
2. Explain the distinction between goods and services
3. Explain the difference between production and productivity
4. Compute single-factor productivity
5. Compute multifactor productivity
6. Identify the critical variables in enhancing productivity

What is Operations Management?

Production is as ‘a process by which goods and services are created.

Production is ‘the step-by-step conversion of one form of material into another form through chemical or mechanical process to create the utility of the product to the user.

In recent years the scope of the production function has broadened considerably .

What is Operations Management?

Production concepts and techniques are applied to wide range of activities outside manufacturing; that is in service such as:

healthcare	hotel management
food device	retail sales
recreation	education
hotel management	banking

What is Operations Management?

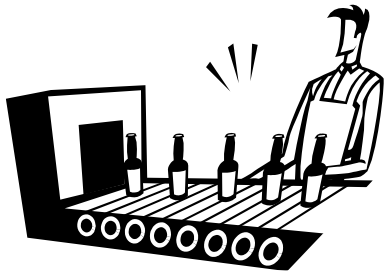
This broadening scope has given the field the name production/operations management or more simply operations management.

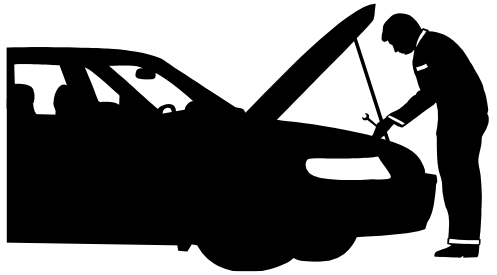
Regardless of whether the end product is a good or service, the production activities that go on in the organizations are referred to as operations or ***operations management***.

What is Operations Management?

We can define Operations Management as:

✓**1**. a transformation process





✓**2**. a basic function

What is Operations Management?

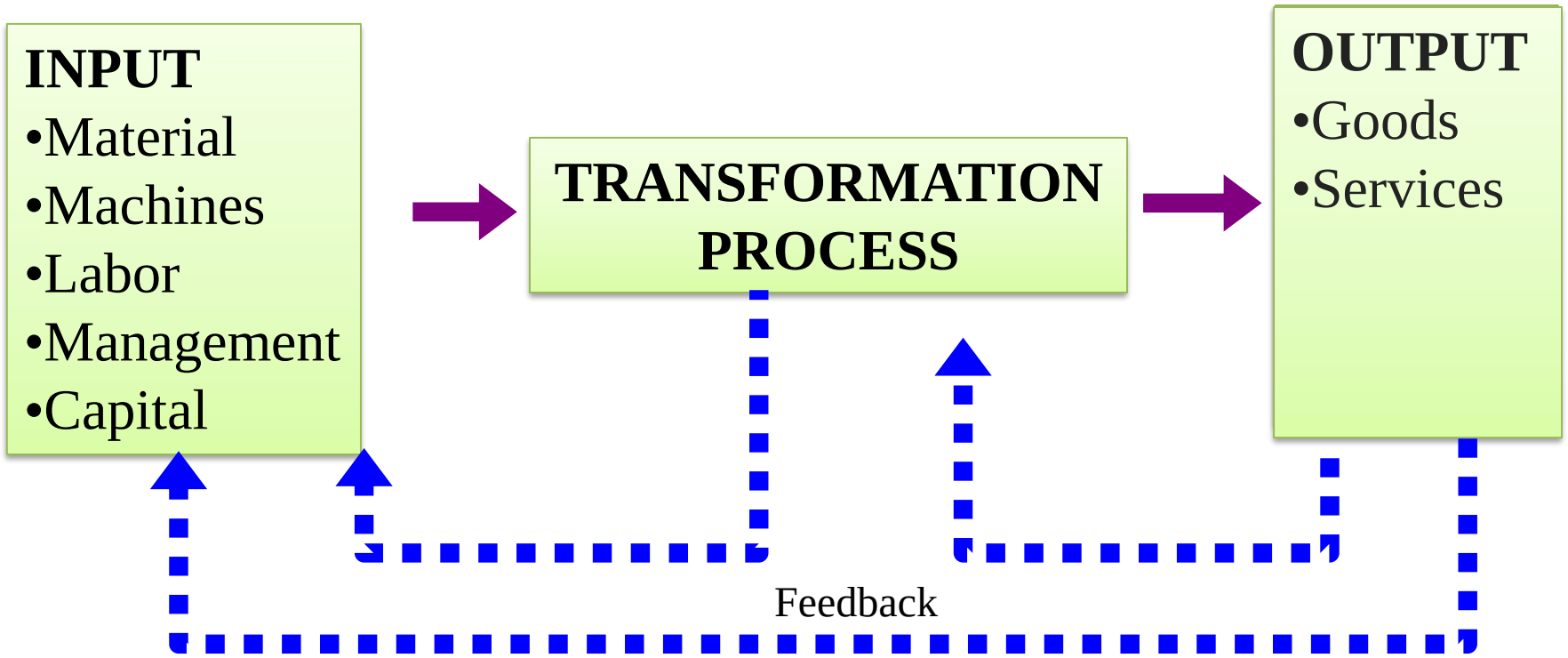
1- Operations as a transformation process

Operations management (OM) is the set of activities that creates goods and services by transforming inputs into outputs.

Operations management (OM) is the set of activities and knowledge that help managers to find the most efficient and effective way of transforming inputs into outputs

What is Operations Management?

1- Operations as a transformation process



What is Operations Management?

1- Operations as a transformation process

Transformation Process of a canned food processor

Inputs	Transformation Process	Outputs
Metal sheets Raw vegetables Water Energy Labor Building Equipment	• Cleaning • Making cans • Cutting • Cooking • Packing • Labeling	Canned vegetables

What is Operations Management?

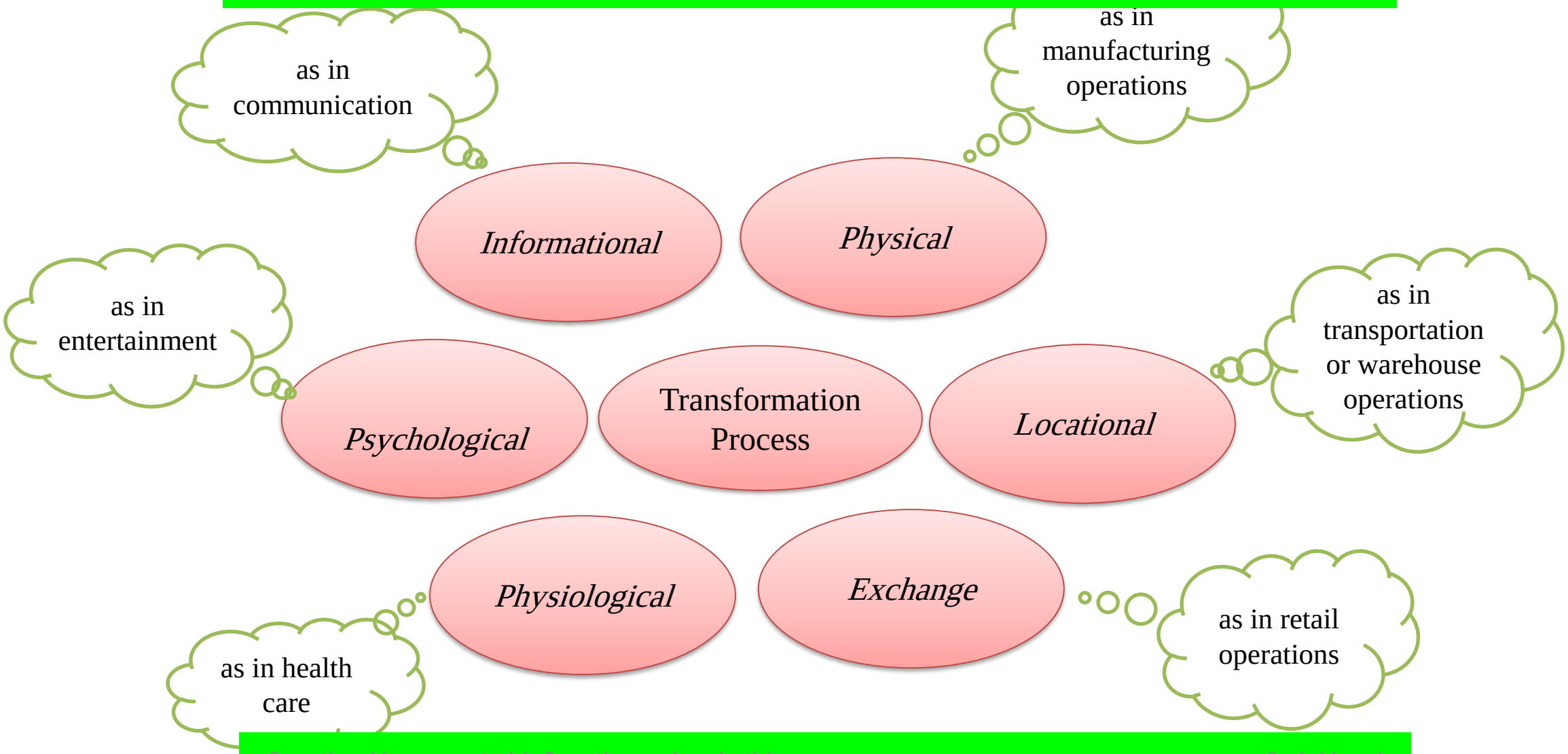
1- Operations as a transformation process

Transformation Process of a hospital

Inputs	Transformation Process	Outputs
Doctors, nurses	Examination	Healthy patients
Hospital	Surgery	
Medical Supplies	Monitoring	
Equipment	Medication	
Laboratories	Therapy	

What is Operations Management?

1- Operations as a transformation process



What is Operations Management?

2. Operations as a basic function

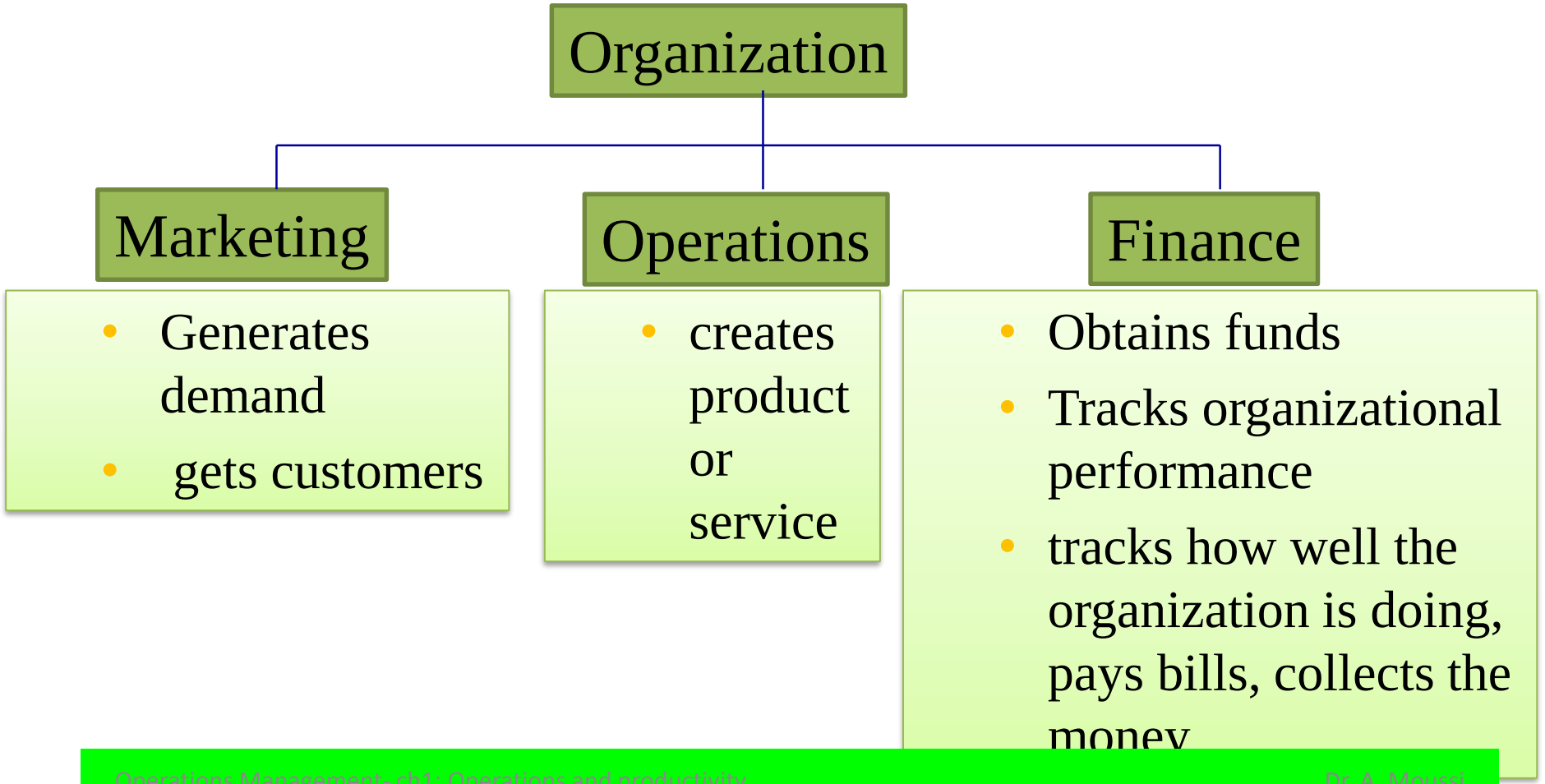
Operations management (OM) is the part of a business organization that is responsible for producing goods or services

The essential functions:

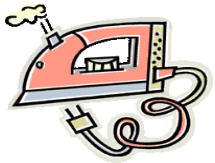
To create goods and services, all organization perform three functions. These functions are necessary ingredients not only for production but also for an organization survival. These functions are:

What is Operations Management?

2. Operations as a basic function



Goods Versus Services






Characteristics of Goods (Tangible Product)		Characteristics of Service (Intangible Product)
Can be resold	⟺	Reselling unusual
Can be inventoried	⟺	Difficult to inventory
Some aspects of quality measurable	⟺	Quality difficult to measure
Selling is distinct from production	⟺	Selling is part of service
Product is transportable	⟺	Provider, not product, is often transportable
Site of facility important for cost	⟺	Site of facility important for customer contact
Often easy to automate	⟺	Often difficult to automate





Importance of OM
(Why study OM?)

- OM is one of three major functions (marketing, finance, and operations) of any organization

- We want (and need) to know how goods and services are produced

- We want to understand what operations managers do

- OM is such a costly part of an organization

Importance of OM
(Why study OM?)

- Offers a major opportunity for an organization to improve its productivity and profitability

OM affects

- 1) the companies' ability to compete and
- 2) the nation's ability to compete internationally

Options for Increasing Contribution

	CURRENT
Sales	$100,000
Cost of goods	–80,000
Gross margin	20,000
Finance costs	–6,000
Subtotal	14,000
Taxes at 25%	–3,500
Contribution	$ 10,500

MARKETING OPTION

INCREASE SALES REVENUE 50%

FINANCE /ACCOUNTING OPTION

REDUCE FINANCE COSTS 50%

OM OPTION

REDUCE PRODUCTION COSTS 20%

Options for Increasing Contribution

		MARKETING OPTION
	CURRENT	INCREASE SALES REVENUE 50%
Sales	$100,000	$150,000
Cost of goods	–80,000	–120,000
Gross margin	20,000	30,000
Finance costs	–6,000	–6,000
Subtotal	14,000	24,000
Taxes at 25%	–3,500	–6,000
Contribution	$ 10,500	$ 18,000

Increase in contribution 71%

Options for Increasing Contribution

		MARKETING OPTION	FINANCE /ACCOUNTING OPTION
	CURRENT	INCREASE SALES REVENUE 50%	REDUCE FINANCE COSTS 50%
Sales	$100,000	$150,000	$100,000
Cost of goods	–80,000	–120,000	–80,000
Gross margin	20,000	30,000	20,000
Finance costs	–6,000	–6,000	–3,000
Subtotal	14,000	24,000	17,000
Taxes at 25%	–3,500	–6,000	–4,200
Contribution	$ 10,500	$ 18,000	$ 12,750
Increase in contribution		*71%*	*21%*

Options for Increasing Contribution

		MARKETING OPTION	FINANCE /ACCOUNTING OPTION	OM OPTION
	CURRENT	INCREASE SALES REVENUE 50%	REDUCE FINANCE COSTS 50%	REDUCE PRODUCTION COSTS 20%
Sales	$100,000	$150,000	$100,000	$100,000
Cost of goods	–80,000	–120,000	–80,000	–64,000
Gross margin	20,000	30,000	20,000	36,000
Finance costs	–6,000	–6,000	–3,000	–6,000
Subtotal	14,000	24,000	17,000	30,000
Taxes at 25%	–3,500	–6,000	–4,200	–7,500
Contribution	$ 10,500	$ 18,000	$ 12,750	$ 22,500
Increase in contribution		*71%*	*21%*	*114%*

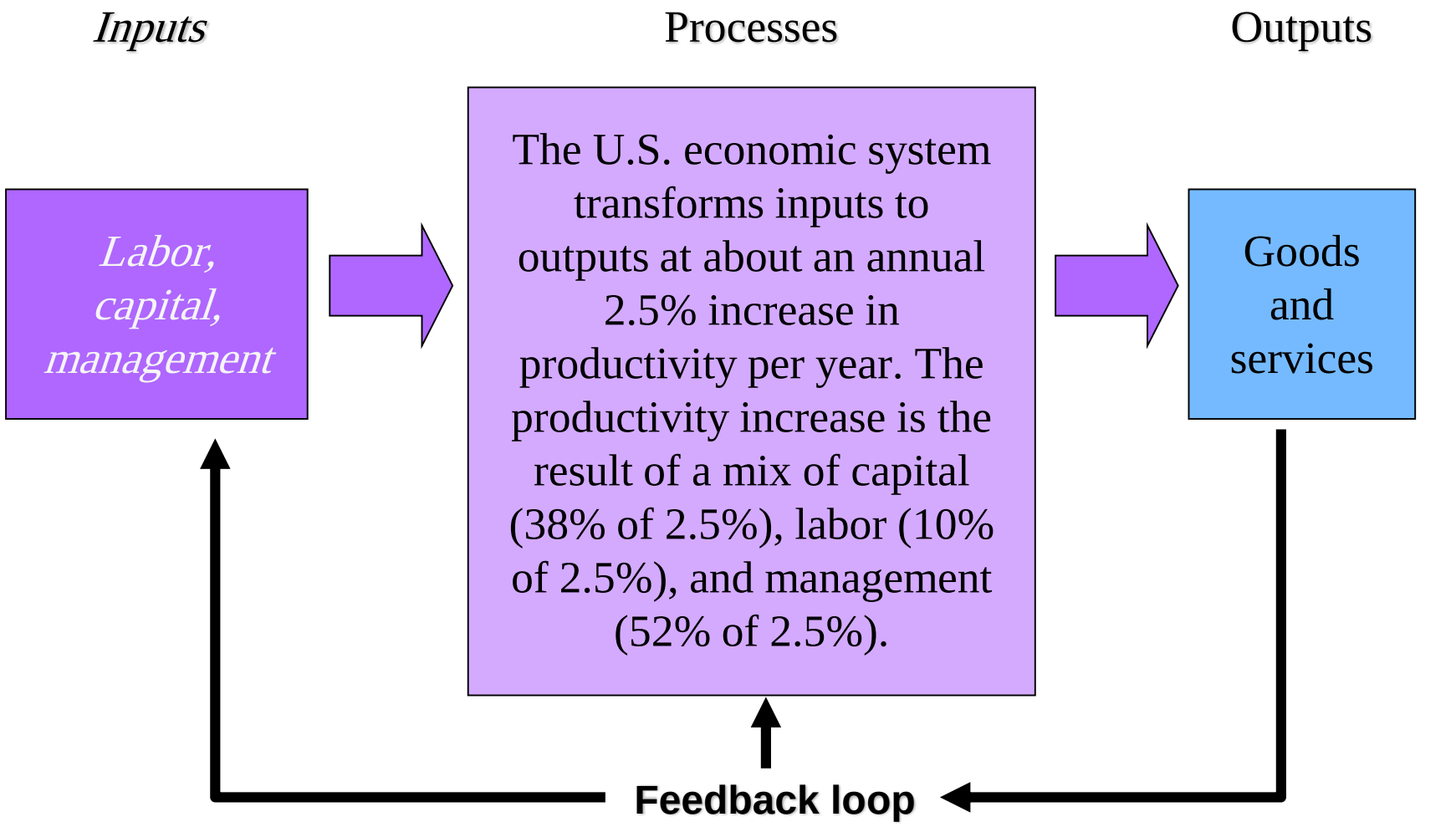
Productivity Challenge

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



Efficiency vs. effectiveness

- ✓ Efficiency – doing a job with a minimum of resources and waste i.e. doing the job well.
  - ✓ Efficiency= actual output/standard output
    (70pcs/hr) / (60 pcs/hr) = 1.17
- ✓ Effectiveness – achieving your stated goal or purpose i.e. doing the right job.

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

Factor Productivity Types

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

$$\text{Labor Productivity} = \frac{\text{Output}}{\text{Labor}}$$

$$\text{Material Productivity} = \frac{\text{Output}}{\text{Material}}$$

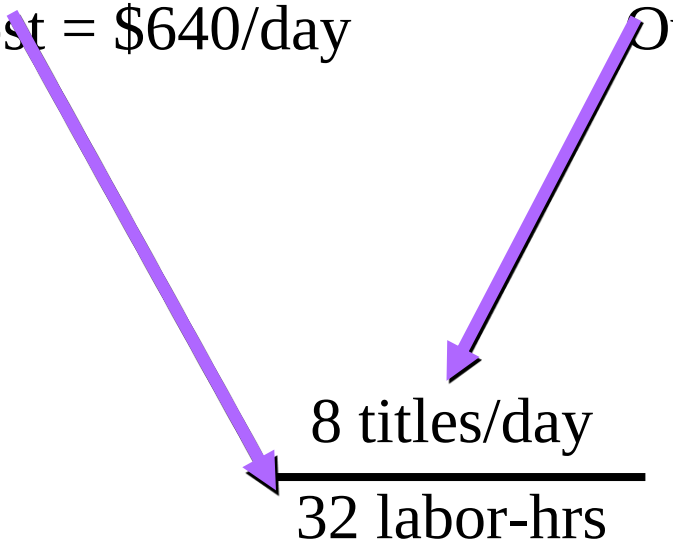
$$\text{Capital Productivity} = \frac{\text{Output}}{\text{Capital}}$$

Illustration-
Collins Title Productivity

Old System (Non-computerized):

Staff of 4 works 8 hrs/day
Payroll cost = $640/day

8 titles/day
Overhead = $400/day



$$\frac{\text{8 titles/day}}{\text{32 labor-hrs}}$$

Collins Title Productivity

Old System:

Staff of 4 works 8 hrs/day — 8 titles/day

Payroll cost = $640/day — Overhead = $400/day

$$\text{Old labor productivity} = \frac{8 \text{ titles/day}}{32 \text{ labor-hrs}} = .25 \text{ titles/labor-hr}$$

Collins Title Productivity

Old System:

Staff of 4 works 8 hrs/day — 8 titles/day

Payroll cost = $640/day — Overhead = $400/day

New System:

14 titles/day — Overhead = $800/day

$$\text{Old labor productivity} = \frac{8 \text{ titles/day}}{32 \text{ labor-hrs}} = .25 \text{ titles/labor-hr}$$

$$\text{New labor productivity} = \frac{14 \text{ titles/day}}{32 \text{ labor-hrs}}$$

Collins Title Productivity

Old System:

Staff of 4 works 8 hrs/day — 8 titles/day

Payroll cost = $640/day — Overhead = $400/day

New System:

14 titles/day — Overhead = $800/day

$$\text{Old labor productivity} = \frac{8 \text{ titles/day}}{32 \text{ labor-hrs}} = .25 \text{ titles/labor-hr}$$

$$\text{New labor productivity} = \frac{14 \text{ titles/day}}{32 \text{ labor-hrs}} = .4375 \text{ titles/labor-hr}$$

75 % increase

Collins Title Productivity

Old System:

Staff of 4 works 8 hrs/day
Payroll cost = $640/day

8 titles/day
Overhead = $400/day

New System:

14 titles/day

Overhead = $800/day

$$\text{Old multifactor productivity} = \frac{8 \text{ titles/day}}{\$640 + 400}$$

Collins Title Productivity

Old System:

Staff of 4 works 8 hrs/day — 8 titles/day

Payroll cost = $640/day — Overhead = $400/day

New System:

14 titles/day — Overhead = $800/day

$$\text{Old multifactor productivity} = \frac{8 \text{ titles/day}}{\$640 + 400} = .0077 \text{ titles/dollar}$$

Collins Title Productivity

Old System:

Staff of 4 works 8 hrs/day — 8 titles/day

Payroll cost = $640/day — Overhead = $400/day

New System:

14 titles/day — Overhead = $800/day

$$\text{Old multifactor productivity} = \text{?}$$

$$\text{New multifactor productivity} = \frac{14 \text{ titles/day}}{\$640 + 800}$$

Collins Title Productivity

Old System:

Staff of 4 works 8 hrs/day — 8 titles/day

Payroll cost = $640/day — Overhead = $400/day

New System:

14 titles/day — Overhead = $800/day

$$\text{Old multifactor productivity} = \frac{8 \text{ titles/day}}{\$640 + 400} = .0077 \text{ titles/dollar}$$

$$\text{New multifactor productivity} = \frac{14 \text{ titles/day}}{\$640 + 800} = .0097 \text{ titles/dollar}$$

26 % increase

Measurement Problems

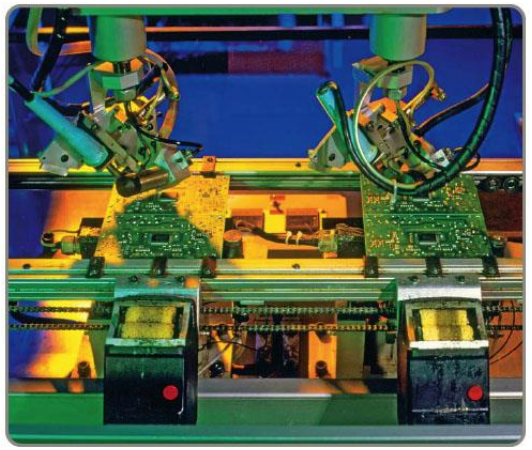
- Quality may change while the quantity of inputs and outputs remains constant
- External elements may cause an increase or decrease in productivity(power or gas shortages, strikes & lockouts, etc)
- Precise units of measure may be lacking (not all cars may require the same inputs– Opel Corsa vs. Porsche)

Productivity Variables

For the U.S. economy's 2.5 % annual increase

- Labor - contributes about 10% of the annual increase

- Capital - contributes about 38% of the annual increase



- Management - contributes about 52% of the annual increase