Learning Objectives

1. Explain the nature of production.
2. Outline how the conversion process transforms raw materials, labor, and other resources into finished products or services.
3. Describe how research and development lead to new products and services.
4. Discuss the components involved in planning the production process.
Learning Objectives (cont’d)

5. Explain how purchasing, inventory control, scheduling, and quality control affect production.

6. Summarize how productivity and technology are related.

Chapter 8 Outline

– What Is Production?
  • Competition in the Global Marketplace
  • Careers in Operations Management

– The Conversion Process
  • Manufacturing Using a Conversion Process
  • The Increasing Importance of Services

– Where Do New Products and Services Come From?
  • Research and Development
  • Product Extension and Refinement
Chapter 8 Outline (cont.)

– Planning for Production
  • Design Planning
  • Facilities Planning and Site Selection
  • Operational Planning
– Operations Control
  • Purchasing
  • Inventory Control
  • Scheduling
  • Quality Control
– Management of Productivity and Technology
  • Productivity Trends
  • Improving Productivity Growth Rates
  • The Impact of Computers and Robotics in Production

What Is Production?

• Operations management

• Operations manager

• Planning

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Competition in the Global Marketplace

• The U.S. was the most productive country after World War II
• Competitors in European and Asian countries eventually recovered and began to compete with the U.S. firms
• U.S. firms have had to refocus on quality and customer needs
• The most successful U.S. firms have focused on:
  – Motivating employees to improve productivity
  – Reducing production costs by carefully selecting suppliers
  – Revamping their facilities with state-of-the-art equipment
  – Using computer-aided and flexible manufacturing systems
  – Improving control procedures to lower manufacturing costs
  – Building foreign manufacturing facilities where labor costs are lower

Careers in Operations Management

• Operations managers must appreciate the manufacturing process

• Successful operations managers must:
The Conversion Process

- The purpose of the resources conversion process is to provide utility to customers
  - Utility
  - Four types of utility:
    - Form utility:

The Nature of Conversion

- Focus

- Magnitude of change

- Number of production processes
The Increasing Importance of Services

• Service economy

  – An economy in which more effort is devoted to services than to the production of goods
  – The production of services varies from the production of goods
    1. Services are consumed immediately and cannot be stored
    2. Services are provided when and where the customer desires
    3. Services are usually labor intensive
    4. Services are intangible, making it difficult to evaluate customer satisfaction

Where Do New Products and Services Come From?

• Research and Development

  – Basic research
  – Applied research
  – Development and implementation
Where Do New Products and Services Come From? (cont’d)

• Product extension and refinement
  – Product life cycle
  – Product refinement
  – Product extension

Planning for Production

• Design planning
  – Product line
  – Product design
  – Capacity
  – Use of technology
• Labor-intensive technology:
• Capital-intensive technology:
Planning for Production (cont’d)

• Facilities planning and site selection

• Factors influencing the location decision for a production facility

• Human resources

• Plant layout

Operational Planning

• Four steps in operational planning
  – Step 1: Selecting a planning horizon
  – Step 2: Estimating market demand
  – Step 3: Comparing market demand with capacity
  – Step 4: Adjusting products or services to meet demand
Operations Control

• Purchasing

• Inventory control
  – Types of inventory
  – Costs of inventory

• Inventory control methods
  – Materials requirements planning (MRP)
  – Manufacturing resource planning (MRP II)
  – Enterprise resource planning (ERP)
  – Just-in-time inventory system

Operations Control (cont’d)

• Scheduling

• Quality control

  – Statistical process control (SPC)

  – Statistical quality control (SQC)

  – Inspection
Operations Control (cont’d)

• Quality control (cont’d)
  – Improving quality through employee participation
    • Total Quality Management (TQM)
    • Six Sigma
    • Quality circles

• World quality standards: International Organization for Standardization (ISO)
  – ISO 9000
  – ISO 14000

Management of Productivity and Technology

• Productivity

• Productivity trends

• Causes of U.S. productivity declines
Management of Productivity and Technology (cont’d)

• Improving productivity

The Impact of Computers and Robotics on Production

• Automation

• Robotics
The Impact of Computers and Robotics on Production (cont’d)

• Computer manufacturing systems
  – Computer-aided design (CAD)
  – Computer-aided manufacturing (CAM)
  – Computer-integrated manufacturing (CIM)

The Impact of Computers and Robotics on Production (cont’d)

• Continuous process

• Flexible manufacturing systems (FMS)

• Intermittent process

• Technological displacement
Figure 8.1  The Conversion Process

The Conversion Process

INPUTS
• Concept for a new good or service
• Financial, material, human, and information resources

CONVERSION
• Develop specifications to convert an idea to a good or service
  • Planning for production
  • Actual production

OUTPUTS
• Completed good or service
Service Industries

Percent of American workers employed by service industries

- 1975: 72%
- 1985: 76%
- 1995: 80%
- 2005: 83%
- 2008: 84%

Facilities Planning

**PROCESS LAYOUT**
- Car in need of repairs
- Wheel alignment
- Body work
- Safety inspection
- Engine repair
- Repaired car

**PRODUCT LAYOUT**
- Maxim Integrated Products assembly line
  - Electronic components
  - Workstation
  - Finished circuit boards

**FIXED-POSITION LAYOUT**
- Boeing assembly site for a 787 Dreamliner jet aircraft
  - Resources and components
  - Workstation
  - Finished plane
Figure 8.5 Four Aspects of Operations Control

- Purchasing
- Inventory control
- Scheduling
- Quality control
Figure 8.6  A Gantt Chart


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Figure 8.7  Simplified PERT Diagram for Producing This Book
Chapter 8 Outline

Producing Quality Goods and Services

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Assume you are in charge of product development for a small manufacturing firm that produces three different sizes of paper clips.

1. What types of purchasing decisions would you need to make in order to manufacture these products?

2. How would you balance the problems of excessive holding costs and potential stock-out costs?

3. What specific steps would be used to manufacture a paper clip?

4. Should you be concerned with quality control for inexpensive products like paper clips?
Debate Issue

Should the just-in-time inventory system be used to reduce inventory costs?

**YES**

- Just-in-time ensures that materials or supplies arrive at a facility when they are needed.
- Just-in-time reduces a firm’s inventory storage costs because suppliers must deliver goods when they are needed.
- Storage space that was used for inventory can be diverted to other more productive activities, like manufacturing.

**NO**

- A firm using just-in-time can encounter stock-out costs if a supplier doesn’t deliver.
- If the supplier stores the goods the supplier just passes on the cost of storage in the form of higher prices.
- If suppliers don’t deliver goods on time, the manufacturer may have to shut down the assembly line.
Chapter Quiz

1. A(n) _________ process breaks raw materials into different component parts.
   a. mechanical
   b. analytic
   c. synthetic
   d. technological
   e. productive

2. In the manufacturing process, the resource or resources that comprise the major or most important input is referred to as the
   a. number of technologies.
   b. magnitude of change.
   c. focus of the conversion process.
   d. resource utilization process.
   e. resource manufacturing process.

3. Today, approximately _________ percent of American workers are employed by service industries.
   a. 92
   b. 83
   c. 76
   d. 40
   e. 28

4. A _________ layout is used when different operations are required for creating small batches of different products or working on different parts of a product.
   a. labor intensive
   b. capital intensive
   c. process
   d. product
   e. fixed

5. The average level of output per worker per hour
   a. is the definition for productivity.
   b. is the focus of the production process.
   c. only applies to a synthetic manufacturing process.
   d. only applies to an analytic manufacturing process.
   e. can be improved if the magnitude of the change is eliminated.
Design planning is the development of a plan for converting a product idea into an actual product.

Major decisions involved in design planning include:

- Product Line
- Required Production Capacity
- Use of Technology
Terms Associated with Product Quality

QUALITY CONTROL
The process of ensuring that goods and services are produced in accordance with design specifications

STATISTICAL PROCESS CONTROL
A system that uses sampling to obtain data that are plotted on control charts and graphs to identify and pinpoint problem areas

STATISTICAL QUALITY CONTROL
A set of statistical techniques used to monitor both work in progress and finished goods

QUALITY CIRCLES
Groups of employees who meet on company time to solve problems of product quality
PRODUCTIVITY

A measure of the average level of output per worker per hour

The following can be used to improve productivity:

• Elimination of government policies that reduce productivity
• Increased cooperation between labor and management
• Increased employee motivation and participation
• Reward systems based on what the employee contributes
• Increased investment in facilities, equipment, and employee training