Chapter 14: Production Planning and Management

Objectives

- Definition, background, and current issues in operations management
- Characteristics of the agricultural industry as they impact operations management and production planning
- Definition of quality and quality initiatives

Objectives

- Key elements in plant and facility location decisions
- Considerations in determining the capacity of a plant or facility
- Process, product, hybrid, and fixed-position facility layouts
- Key elements of job design

Operations Management

Planning processes used by firms to produce goods and services

- Production planning
- Logistics

Areas of Production Planning

- Devising a quality program
- Locating a plant
- Choosing the capacity level
- Designing the operation layout
- Deciding on process design
- Specifying job tasks and responsibilities

Areas of Logistics

- Aggregate production planning
- Production scheduling
- Purchasing materials for production
- Managing various types of inventories
- Distributing finished goods or services

Figure 14.1 Operations Management System

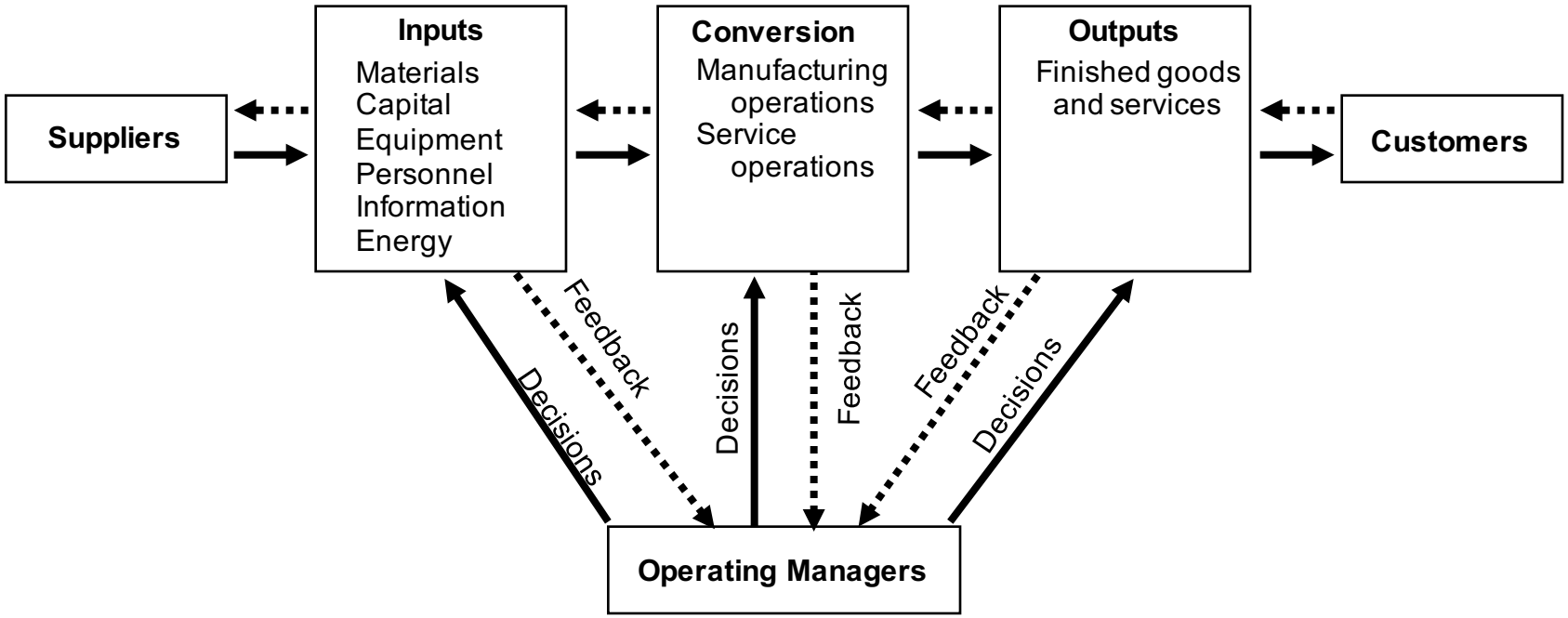


Table 14.1 Examples of Production Systems

Manager	Suppliers	Inputs	Conversion	Outputs	Customers
Restaurant manager	Distributors Meat suppliers Equipment mfrs	Meats Vegetables Food servers Utensils Equipment	Cooking Meal preparation Serving	Prepared foods Happy customers	Hungry diners
Farm producer	Equipment dealer Seed Firms Chemical mfrs Fertilizer mfrs	Land Labor Equipment Seed Chemicals	Plowing Planting Spraying Harvesting	Fruits Vegetables Grains	Food processors Consumers Exporters

Table 14.2 Goods Producers vs. Service Providers

More Like a Goods Producer	More Like a Service Provider
Physical, durable product	Intangible, perishable product
Output can be inventoried	Output cannot be inventoried
Low customer contact	High customer contact
Long response time	Short response time
Large facilities	Small facilities
Capital intensive	Labor intensive
Quality easily measured	Quality not easily measured

Source: Krajewski and Ritzman.

Unique Issues with Agricultural Products

- Seasonality
- Perishability
- Bulk
- Variability
  - Quality
  - Quantity
  - Value

Current Issues in Operations Management

1. A growing service sector
2. Time-based competition
3. Productivity
4. Global competition
5. Quality

Quality Management

Definitions of quality differ

- Customers
  - Fitness for use
  - Value for the money
- Companies
  - Meeting or exceeding customer expectations
  - Conformance to specifications

Table 14.3 Consumer Expectations of Quality

Products	Services
Performance	Time and timeliness
Features	Completeness
Reliability	Courtesy
Durability	Consistency
Serviceability	Accessibility and Convenience
Aesthetics	Accuracy
	Responsiveness

Source: Evan.

Production Costs Related to Quality

- Prevention costs
- Appraisal costs
- Internal failure costs
- External failure costs

Quality Management Systems

- Total Quality Management
- Deming
- Juran
- Crosby
- Taguchi
- ISO 9000, ISO 14000
- HACCP

Total Quality Management (TQM)

An integrated management concept focused on continuous quality improvement

- Quality is everyone's concern and responsibility
- Malcolm Baldridge National Quality Award

Principles of Total Quality Management (TQM)

- Business success only achieved if customer's needs are understood and satisfied
- Leadership in quality is the responsibility of top management
- Statistics and factual data are the basis

Principles of Total Quality Management (TQM)

- All levels of an organization must focus on continuous improvement
- Multifunction teams are key
- Continuous learning, training, and education are everyone's responsibility

Deming

Quality defined in terms of how well the product or service meets the consumer's needs

- W. Edwards Deming is considered the father of quality control in Japan
- See Table 14.4 for Deming's 14 Points for Quality Improvement

Juran

- Defines quality in terms of how well the product or service is fit for use
- Trilogy:
  - Quality planning
  - Quality control
  - Quality improvement

Crosby

Quality defined in terms of how well the product or service conforms to requirements

- Advocates a goal of zero defects
- Key to quality is a change in top management's thinking

Taguchi

Quality defined in terms of the absence of product variability and social cost

- Built on quality control techniques of Deming
- Engineering and statistics used to optimize product designs and processes

ISO 9000, ISO 14000

International Organization for Standardization

- A worldwide federation of national standards from more than 130 countries
- Mission: to promote the development of standardization to facilitate international exchange

ISO 9000

- Series of international standards and guidelines on quality management and quality assurance
- Standardized definition of quality refers to all features of a product or service required by the customer

ISO 14000

Worldwide standards of quality applied to the environment

- Provides the framework for managing legislative and regulatory orders for environmental compliance

Hazard Analysis and Critical Control Point (HACCP)

- Recognized food safety program for preventing food safety problems
  - Benefits include:
    - Reduced risk of manufacturing and selling unsafe products
    - Increased awareness of workplace hazards
    - Better product quality

Table 14.3
HACCP Seven Principles

1. Conduct a hazard analysis
2. Identify the Critical Control Points in the process
3. Establish Critical Limits for preventative measures
4. Establish Critical Control Point monitoring requirements
5. Establish corrective actions to be taken
6. Establish effective record-keeping procedures
7. Establish procedures for verification

Source: Mortimore and Wallace.

Factors Affecting Location Decisions

1. Proximity to raw materials and suppliers
2. Location of markets
3. Labor climate
4. Agglomeration
5. Taxes and incentives
6. Proximity to other company facilities

Additional Factors Affecting Location for Service Businesses

1. Area employment
2. Retail activity
3. Proximity to successful competitors
4. Traffic flow
5. Residential density
6. Accessibility and visibility

Capacity Planning

Determine the appropriate size of the plant or service location

- Cost of excess capacity weighed against the potential loss of sales due to too little capacity

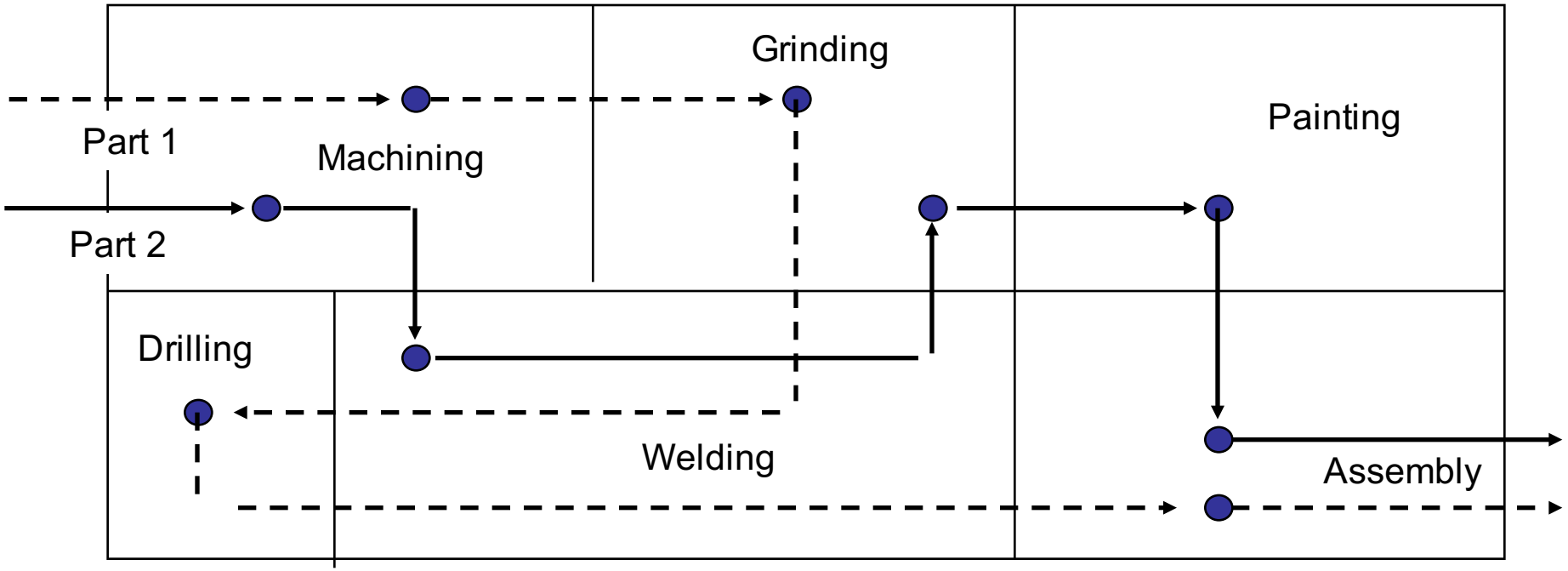
Factors Affecting Capacity Planning

1. Economies of scale
2. Flexibility
3. Seasonality and other patterns of production
4. Fluctuating demand
5. Multiple versus single shifts

Categories of Layout Planning

1. Process layout
   - Activities by function
   - Used when different goods or services are produced intermittently
   - Disadvantages:
     - Slower overall processing rates, higher levels of inventory, increased time lags, higher costs for material handling

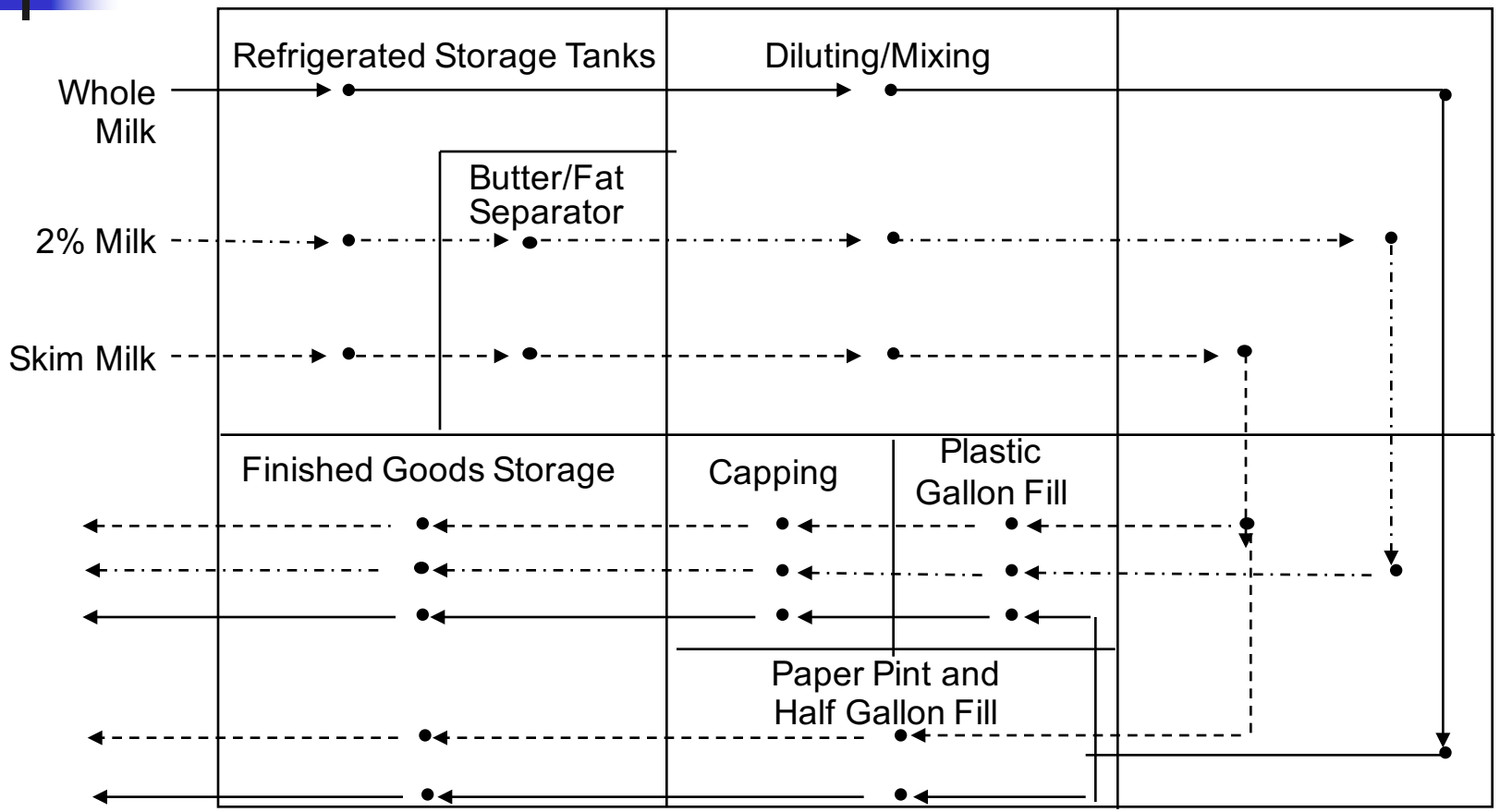
Figure 14.2 Process Layout for Farm Implement Manufacturing Facility



Categories of Layout Planning

2. Product layout
   - Continuous production process
   - Advantages:
     - Faster processing rates, lower inventories, less skilled labor required, less time lost, less materials handling
   - Disadvantages:
     - Less flexibility, expensive downtime

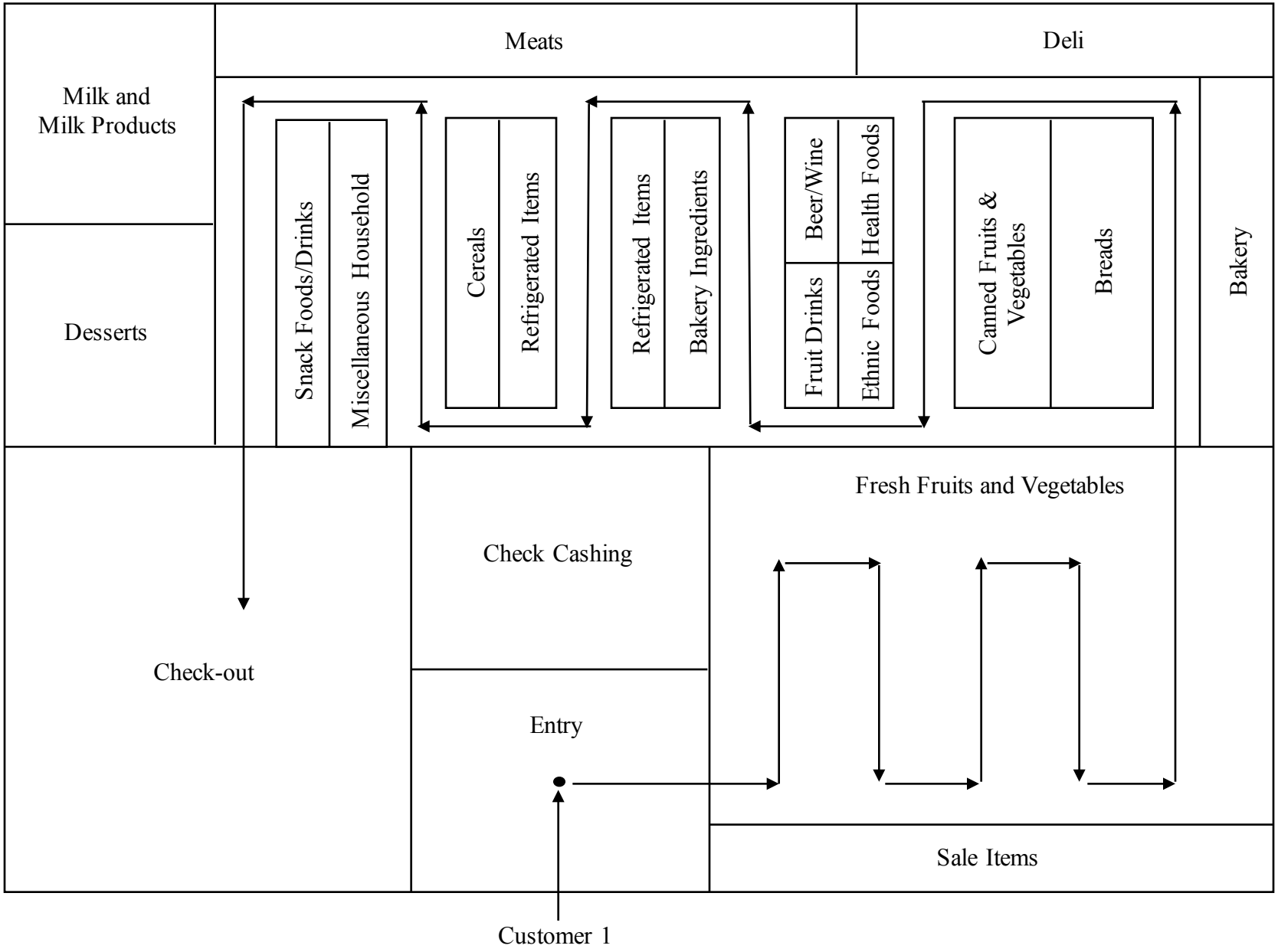
Figure 14.3 Product Layout for Fluid Milk Facility



Categories of Layout Planning

3. Hybrid layout
   - Combines process and product layouts
   - Different machines brought together to produce a group of similar parts

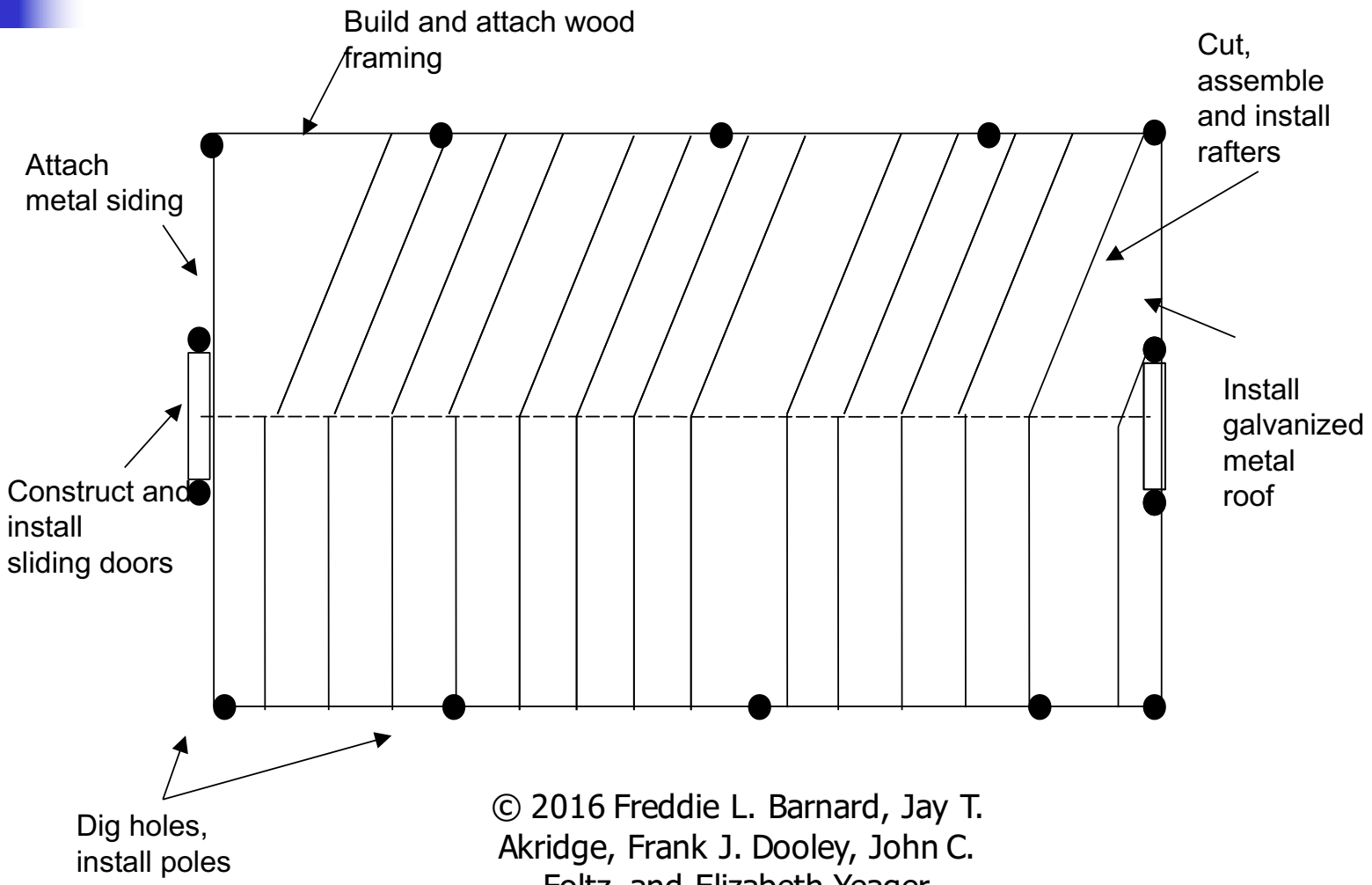
Figure 14.4 Hybrid Layout—Supermarket



Categories of Layout Planning

4. Fixed position layout
   - Used for construction of large items which are too large or bulky to move easily
     - Farm buildings, silos, stores
   - Minimizes number of times a product must be moved

Figure 14.5 Fixed Position Layout for Farm Building



Process Design

Selecting inputs, operations, and methods used to produce the good or service

- Aspects to consider
  - Capital intensity
  - Resource flexibility
  - Vertical integration
  - Customer involvement

Job Design

The set of activities determining:

- Tasks and responsibilities of each employee's job
- Surrounding work environment
- Detailed order of operations used to meet production requirements

Aspects of Job Design

- Social Environment
  - Training, supervision, job expectations and responsibilities, performance feedback
- Physical Environment
  - Safe working conditions, lighting, noise, temperature, and ergonomics