

STRATEGIC CAPACITY MANAGEMENT

Chapter Five

Economies of Scale Made of Steel

- The Economics of Very Big Ships
- Economy of Container Ships
 - ▣ Allows a T-shirt made in China to be sent to the Netherlands for just 2.5 cents.
 - ▣ The Eleonora Maersk and the other seven ships in her class are among the largest ever built:
 - ▣ Almost 400 m long, or the length of four soccer fields, and another half-field across.
 - ▣ The ships can carry 7,500 or so 40-foot containers, each of which can hold 70,000 T-shirts.
- On this voyage, the Eleonora was carrying supplies for Europe's New Year celebrations: 1,850 tons of fireworks, including 30 tons of gunpowder.

Capacity Management in Operations

- **Capacity** – the ability to hold, receive, store, or accommodate
- In business, viewed as the amount of output that a system is capable of achieving over a specific period of time
- Capacity management needs to consider both inputs and outputs

Capacity Planning Time Durations

Long range

- Greater than one year

Intermediate range

- Monthly or quarterly plans covering the next 6 to 18 months

Short range

- Less than one month

Strategic Capacity Planning

- Determining the overall level of capacity-intensive resources that best supports the company's long-range competitive strategy
 - Facilities
 - Equipment
 - Labor force size

Capacity Planning Concepts

- **Capacity utilization rate** – a measure of how close the firm is to its best possible operating level

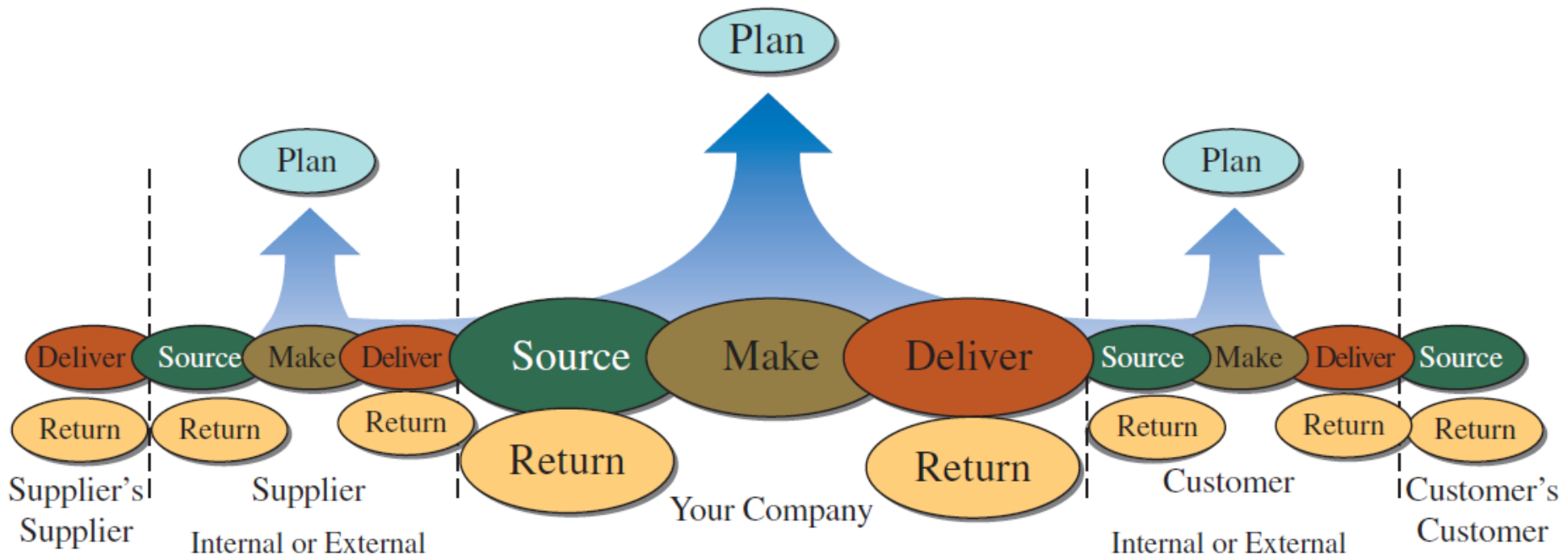
$$\text{Capacity utilization rate} = \frac{\text{Capacity used}}{\text{Best operating level}}$$

- **Economies of scale** – the idea that as a plant gets larger and volume increases, the average cost per unit tends to drop
- **Diseconomies of scale** – at some point, the plant becomes too large and average cost per unit begins to increase

Operations and Supply Chain Processes

Supply Chain Processes

exhibit 1.3



Source: Supply-Chain Council (www.supply-chain.org).

Capacity Planning Concepts

- Capacity focus – the idea that a production facility works best when it is concentrated on a limited set of production objectives
 - ▣ Focused factory or plant within a plant (PWP) concept
- Capacity flexibility – the ability to rapidly increase or decrease product levels or the ability to shift rapidly from one product or service to another
 - ▣ Comes from the plant, processes, and workers or from strategies that use the capacity of other organizations

Capacity Flexibility

Flexible Plants

- Ability to quickly adapt to change
- Zero-changeover time

Flexible Processes

- Flexible manufacturing systems
- Simple, easily set up equipment

Flexible Workers

- Ability to switch from one kind of task to another quickly
- Multiple skills (cross training)

Considerations in Changing Capacity

Maintaining System Balance

- Similar capacities desired at each operation
- Manage bottleneck operations

Frequency of Capacity Additions

- Cost of upgrading too frequently
- Cost of upgrading too infrequently

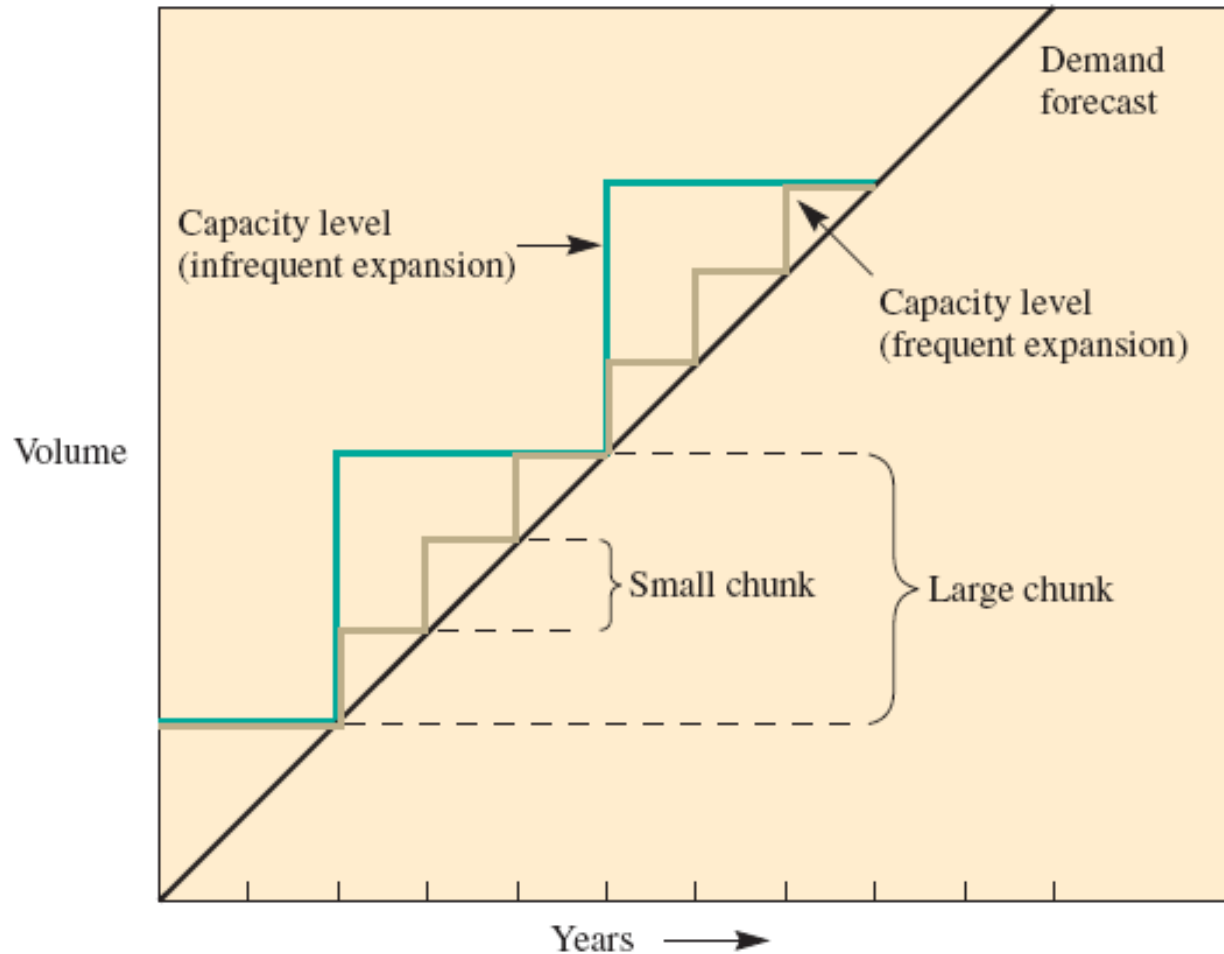
External Sources of Capacity

- Outsourcing
- Sharing capacity

Decreasing Capacity

- Temporary reductions
- Permanent reductions

Frequent versus Infrequent Capacity Expansions



Determining Capacity Requirements

Use forecasting to predict sales for individual products

Calculate labor and equipment requirements to meet forecasts

Project labor and equipment availability over the planning horizon

Planning Service Capacity

Manufacturing Capacity

Goods can be stored for later use.

Goods can be shipped to other locations.

Volatility of demand is relatively low.

Service Capacity

Capacity must be available when service is needed – cannot be stored.

Service must be available at customer demand point.

Much higher volatility is typical.

Capacity Utilization and Service Quality

- The relationship between service capacity utilization and service quality is critical.
 - ▣ Utilization is measured by the portion of time servers are busy.
- Optimal levels of utilization are context specific.
 - ▣ Low rates are appropriate when the degree of uncertainty (in demand) is high and/or the stakes are high (e.g., emergency rooms, fire departments).
 - ▣ Higher rates are possible for predictable services or those without extensive customer contact (e.g., commuter trains, postal sorting).

Service Quality

- Rate of service utilization and service quality are directly linked.

