KEY IDEAS

1. **Definition of Capacity.** Capacity is the upper limit or ceiling on the load that an operating system can handle. Essentially, it is the upper limit on output. Strategically, capacity and financial decisions are made first, followed by decisions on location of the facility, design of the product, layout and work systems.

2. **Expressing Capacity.** If products are similar enough, capacity is measured in common units or rates of output; when products are dissimilar, capacity is often expressed in units of resources used: machine time, labor hours, etc. Capacity is not measured in dollar units, because there can be substantial changes in prices over the life cycle of the product.

3. **Capacity Decisions.** The capacity decision involves the type of equipment or facilities to be employed in producing the product or service, how much capacity or equipment is needed, and when it is needed. These decisions are often costly and difficult to modify.

4. **Effective versus Decision Capacity.** Effective capacity is less than the design capacity, because the system may have alternative product-mix strategies, or issues such of changes in design of the product, job requirements or work rules. The specific reasons that the effective capacity is below the design capacity at a given facility are known as determinants of effective capacity. Actual output would usually be less than effective capacity, because of shortages, delays, or demand on the system.

5. **Capacity Measures.** Efficiency is the ratio of actual output to effective capacity. In contrast, utilization is the ratio of actual output to design capacity.

6. **Capacity Planning.** Planning considerations involve long term trends, seasonal shifts in demand, and joint and competing products and services. Irregular variations in demand can prove the most troublesome, as they cannot be estimated in advance. Because service systems cannot store their output in inventory for use during busy periods, capacity planning is even more critical and focus on demand management (in contrast to capacity management) is not uncommon.

7. **Cost-volume Analysis.** Cost-volume (breakeven) analysis, supplemented by marginal analysis on the optimum size of a plant, helps in determining the optimum design capacity, for a variety of output rates.

8. **Analytical Assumptions.** The linear cost-volume (breakeven) model discussed in this chapter assumes that there is only one product, all production is sold, variable cost per unit of output is constant, and that there is no change in fixed costs or in per unit revenues, regardless of volume. If there are major deviations from these assumptions, a nonlinear model should be used instead of a linear one.