Chapter 4

Strategic Capacity Planning for Products and Services
Strategic Capacity Planning

- Goal
  - To achieve a match between the long-term supply capabilities of an organization and the predicted level of long-term demand
    - Overcapacity → operating costs that are too high
    - Undercapacity → strained resources and possible loss of customers
Capacity Decisions Are Strategic

- Capacity decisions
  1. impact the ability of the organization to meet future demands
  2. affect operating costs
  3. are a major determinant of initial cost
  4. often involve long-term commitment of resources
  5. can affect competitiveness
  6. affect the ease of management
  7. have become more important and complex due to globalization
  8. need to be planned for in advance due to their consumption of financial and other resources
Defining and Measuring Capacity

• Measure capacity in units that do not require updating
  • Why is measuring capacity in dollars problematic?

• Two useful definitions of capacity
  • Design capacity
    • The maximum output rate or service capacity an operation, process, or facility is designed for
  • Effective capacity
    • Design capacity minus allowances such as personal time and maintenance
Steps in Capacity Planning

1. Estimate future capacity requirements
2. Evaluate existing capacity and facilities; identify gaps
3. Identify alternatives for meeting requirements
4. Conduct financial analyses
5. Assess key qualitative issues
6. Select the best alternative for the long term
7. Implement alternative chosen
8. Monitor results
Capacity Strategies

- **Leading**
  - Build capacity in anticipation of future demand increases

- **Following**
  - Build capacity when demand exceeds current capacity

- **Tracking**
  - Similar to the following strategy, but adds capacity in relatively small increments to keep pace with increasing demand
Bottleneck Operation

- An operation in a sequence of operations whose capacity is lower than that of the other operations
Optimal Operating Level

- Optimal Output Rate
- Minimum cost
- Average cost per unit
- Rate of output

[Graph showing the relationship between Optimal Output Rate and Average cost per unit, with a minimum cost point indicated.]
Facility Size and Optimal Operating Level

Minimum cost & optimal operating rate are functions of size of production unit.
Break-Even Point (BEP)

- **BEP**
  - The volume of output at which total cost and total revenue are equal
  - Profit \( P = TR – TC = R \times Q – (FC + v \times Q) \)
    \[ = Q(R – v) – FC \]

\[ Q_{BEP} = \frac{FC}{R – v} \]
Capacity alternatives may involve step costs, which are costs that increase stepwise as potential volume increases.

- The implication of such a situation is the possible occurrence of multiple break-even quantities.
Operations Strategy

- **Capacity planning impacts all areas of the organization**
  - It determines the conditions under which operations will have to function
  - Flexibility allows an organization to be agile
    - It reduces the organization’s dependence on forecast accuracy and reliability
    - Many organizations utilize capacity cushions to achieve flexibility
  - Bottleneck management is one way by which organizations can enhance their effective capacities
  - Capacity expansion strategies are important organizational considerations
    - Expand-early strategy
    - Wait-and-see strategy
  - Capacity contraction is sometimes necessary
    - Capacity disposal strategies become important under these conditions