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American University Of The Middle East

Operations Management MGT 320

CHAPTER 5

Strategic Capacity Planning for Products and Services (Sections 5.1 to 5.7)





Capacity Planning (Ref. pg-189)

- **Capacity**

- The upper limit or ceiling on the load that an operating unit can handle
- Capacity needs include
 - Equipment
 - Space
 - Employee skills



Strategic Capacity Planning (Ref. pg-189)

- **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
 - Under-capacity → strained resources and possible loss of customers



Capacity Planning Questions (Ref. pg-190)

- **Key Questions:**

- **What kind** of capacity is needed?
- **How much** is needed to match demand? (Forecasting is key input to answer this question)
- **When** is it needed?

Capacity Decisions Are Strategic (Ref. pg-191)

- **Why Capacity decision is critical??**
 1. impact the ability of the organization to meet future demands
 2. affect operating costs
 3. often involve long-term commitment of resources
 4. can affect competitiveness
 5. affect the ease of management
 6. have become more important and complex due to globalization



Defining and Measuring Capacity (Ref. pg-192)

- **Measure capacity in units that do not require updating**
 - Why is measuring capacity in dollars problematic?
 - Capacity is not easy to be measured... different approaches are needed
- **Two useful definitions of capacity**
 - **Design capacity**
 - **Effective capacity**

Defining and Measuring Capacity (Ref. pg-192)

Capacity refer to an upper limit on the rate of output

Design capacity

- Maximum output rate or service capacity an operation, process, or facility is designed for

Effective capacity

- Design capacity minus allowances such as personal time, maintenance, and scrap

Actual output

- Rate of output actually achieved—
- cannot exceed effective capacity.

Measuring System Effectiveness (Ref. pg-193)

- **Actual output**
 - The rate of output actually achieved
 - It cannot exceed effective capacity

- **Efficiency**

$$\text{Efficiency} = \frac{\text{actual output}}{\text{effective capacity}}$$

- **Utilization**

$$\text{Utilization } n = \frac{\text{actual output}}{\text{design capacity}}$$

Measured as percentages

Example– Efficiency and Utilization (Ref. pg-193)

- **Design Capacity = 50 trucks per day**
- **Effective Capacity = 40 trucks per day**
- **Actual Output = 36 trucks per day**

$$\text{Efficiency} = \frac{\text{actual output}}{\text{effective capacity}} = \frac{36}{40} = 90\%$$

$$\text{Utilization} = \frac{\text{actual output}}{\text{design capacity}} = \frac{36}{50} = 72\%$$

Determinants of Effective Capacity (Ref. pg-193-195)

Factors that impact capacity decision:

- Facilities – Location, Layout, and Design
- Product and service factors – Design
- Process factors – Quantity and Quality
- Human factors – Training, and Motivation
- Operational factors – Scheduling, Material Management, Maintenance, Quality Assurance
- Supply chain factors – Warehouse, Suppliers, Transportation
- External factors



Capacity Strategy Formulation (Ref. pg-195)

- **Three primary strategies for capacity:**
 - **Leading:** Build capacity in anticipation of future demand increases
 - **Following :** Build capacity when demand exceeds current capacity
 - **Tracking :** is similar to following strategy, but it adds capacity in relatively small increments to keep pace with increasing demand.
- **Steps in capacity planning**



Capacity Cushion (Ref. pg-196)

- **Capacity Cushion**

- Extra capacity used to offset demand uncertainty
- Capacity cushion = Capacity – Expected Demand
- Capacity cushion strategy
 - Organizations that have greater demand uncertainty typically have greater capacity cushion
 - Organizations that have standard products and services generally have smaller capacity cushion.



Forecasting Capacity Requirements (Ref. pg-196)

- Involves both long-term & short term considerations:
 - **Long-term considerations**
 - Relates to long term trends & cycles in demand
 - **Short-term considerations**
 - Relates to seasonal & random variations
- **Patterns of demand**
- **Importance of link between marketing & operations**
- **Calculating processing requirements**



Service Capacity Planning (Ref. pg-198)

- Service capacity planning can present a number of challenges related to:
 - **The need to be near customers**
 - Convenience
 - **The inability to store services**
 - Cannot store services for consumption later
 - **The degree of demand volatility**
 - Volume and timing of demand
 - Time required to service individual customers