Capacity Planning

- What is Capacity Planning in Operations Management?
- Capacity planning in operations management is the process of balancing demand for a good or service with the ability of a manufacturer or organization to produce enough to meet demand.

Capacity planning

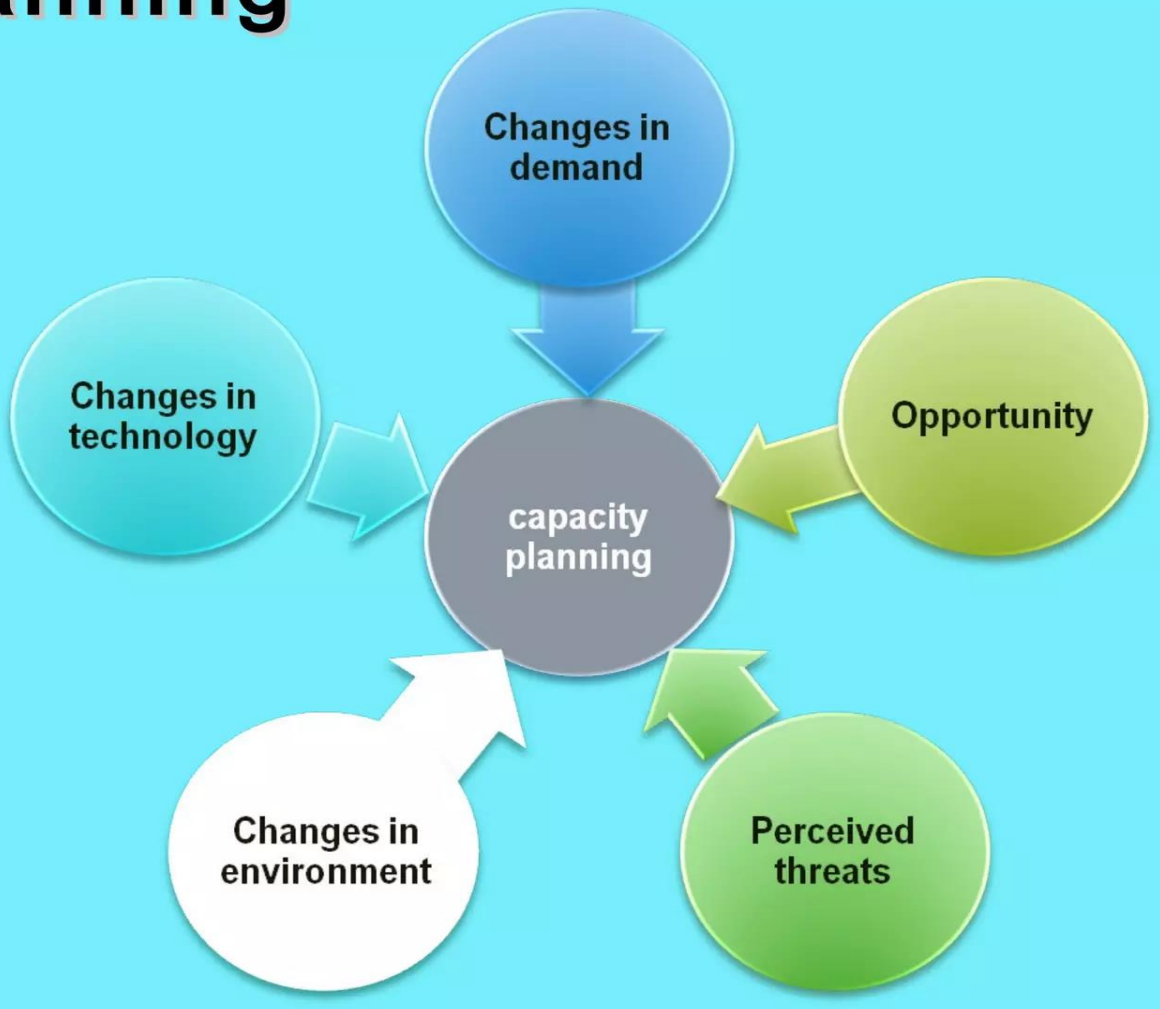
- Capacity is the maximum output rate of a production or service facility.

- Capacity also includes
  - Equipment
  - Space
  - Employee skills

The basic questions in capacity planning

Capacity planning is the process of establishing the output rate that may be needed at a facility.

Reasons of capacity planning



Importance of Capacity Decisions

- Impacts ability to meet future demands
- Affects operating costs
- Major determinant of initial costs
- Involves long-term commitment
- Affects competitiveness
- Affects ease of management

Measuring Capacity Examples

Type of Business	Input Measures of Capacity	Output Measures of Capacity
Car manufacturer	Labor hours	Cars per shift
Hospital	Available beds	Patients per month
Pizza parlor	Labor hours	Pizzas per day
Retail store	Floor space in square feet	Revenue per foot

Capacity terminology

- **Design capacity (Max. Capacity)** is the maximum theoretical output of a system
  - Normally expressed as a rate
  - Under ideal conditions
- **Effective capacity (Best Operating Level)** is the capacity a firm expects to achieve given current operating constraints
  - Often lower than design capacity
  - Under ideal conditions
  - **Actual output (Capacity Used)** is rate of output actually achieved
- Cannot exceed effective capacity.

Utilization and Efficiency

Utilization is the percent of design capacity achieved

Utilization = Actual Output/Design Capacity

Efficiency is the percent of effective capacity achieved

Efficiency = Actual Output/Effective Capacity

Both measures expressed as percentages

Calculating Capacity Utilization

- Measures how much of the available capacity is actually being used:

$$\text{Utilization} = \frac{\text{actual output rate}}{\text{capacity}}(100\%)$$

Measures effectiveness

- Use either effective or design capacity in denominator

Efficiency/Utilization

Ex.

Design capacity = 50 trucks/day

Effective capacity = 40 trucks/day

Actual output = 36 units/day

$$\text{Efficiency} = \frac{\text{Actual output}}{\text{Effective capacity}} = \frac{36 \text{ units/day}}{40 \text{ units/ day}} = 90\%$$

$$\text{Utilization} = \frac{\text{Actual output}}{\text{Design capacity}} = \frac{36 \text{ units/day}}{50 \text{ units/day}} = 72\%$$

Determinants of Effective Capacity

- **Facilities** (size, location, layout, heating, lighting, ventilations)
- **Product and service factors** (similarity of products)
- **Process factors** (productivity, quality)
- **Human factors** (training, skills, experience, motivations, absentation, turnover)
- **Policy factors** (overtime system, no. of shifts)
- **Operational factors** (scheduling problems, purchasing requirements, inventory shortages)
- **Supply chain factors** (warehousing, transportation, distribution)
- **External factors** (product standards, government agencies, pollution standard)

Capacity Planning Process