

**UNIT-II- OPERATIONS AND THE VALUE CHAIN**

Capacity Planning – Long range, Types, Developing capacity alternatives, tools for capacity planning. Facility Location – Theories, Steps in Selection, Location Models. Sourcing and procurement - Strategic sourcing, make or buy decision, procurement process, managing vendors

What is Capacity Planning?

Capacity planning refers to determining what kind of labour and equipment capacities are required and when they are required. Capacity is usually planned on the basis of labour or machine hours available within the plant. Thus, capacity planning is planning for quantity or scale of output.

There are four major considerations in capacity planning:

Level of demand, Cost of production, Availability of funds, Management policy.

Production has no meaning unless its products can be sold at a remunerative price. Generally, the capacity of plant is limited by the level of current demand. Stable demand makes the task of capacity planning simple while fluctuations in demand create problems concerning the acquisition of resources and matching them up with demand levels. Estimation of demand is, therefore, the first step in capacity planning. Size of the market depends upon the sales potential rather than on the geographical areas.

Capacity planning is an integral part of the overall production planning for an enterprise. Capacity planning and control is the process of establishing, measuring, monitoring and adjusting the levels of capacity in order to execute all manufacturing plans and schedules in the best possible manner.

Capacity planning involves the following questions.

- What type of capacity is required?
- How much capacity is required?
- When the capacity is required?

The type of capacity required depends upon the products and services which the enterprise intends to produce or provide. The quantity and timing of capacity is related to the quantity and timing of demand for the product or service. The nature of demand (stable or fluctuating) is another important consideration.

Capacity planning is an important element of production management. Decision concerning capacity are one of the most basic decisions of production. Location, layout, and production technology can be determined only after the capacity is decided. For example, Western

## BA4204- OPERATIONS MANAGEMENT

Electronics Ltd., can decide the number and type of machines, workers, materials and other inputs only after deciding the number of TV sets to be manufactured by it.

### IMPORTANCE OF CAPACITY PLANNING

Capacity planning is important due to the following reasons:

1. Capacity limits the rate of output. Therefore, capacity planning determines the ability of an enterprise to meet future demand for its products and services.
2. Capacity influences the operating costs. Capacity is determined on the basis of estimated demand. Actual demand is often different from estimated demand. As a result, there arises excess capacity or under capacity. Excess or idle capacity increases the cost per unit of output. Whereas under capacity results in the loss of sales.
3. Capacity decisions leave a direct impact on the amount of fixed investment made initially.
4. Capacity decisions result in long-term commitment of funds. Such long-term decisions cannot be reversed except at major costs.

The following concepts of capacity are involved in capacity planning:

- a. Design Capacity: It refers to the maximum output that can possibly be produced in a given period of time. It is the ideal situation.
- b. Effective Capacity: Refers to the maximum possible output, given the changes in product mix, machine maintenance, scheduling and operating problems, labour problems, etc. It is usually less than the design capacity.
- c. Actual Output: It is the rate of output actually achieved. It cannot exceed effective capacity due to machine breakdowns, labour absenteeism, irregular supply of raw materials, unusual delay in supply of equipment, power breakdown, etc.

The effectiveness of a production system (system effectiveness) can be measured in two ways:

1. Efficiency which is the rate of actual output to effective output, and
2. Utilization which implies the rate of actual output to the design capacity.

Symbolically:

$$\text{Efficiency} = \text{Actual Output} / \text{Effective Capacity}$$

$$\text{Utilization} = \text{Actual Output} / \text{Design Capacity}$$

Every operating manager should try to increase capacity utilization by increasing effective capacity.

## **Procedure for Capacity Planning**

### **1. Assessment of Existing Capacity**

Capacity of a unit can be measured in terms of output or inputs. Output measure is appropriate in case of manufacturing concerns, e.g., automobile plant (number of cars), iron and steel plant (tons of steel), brewery (barrels of beer), cannery (tons of food), power company, (megawatts of electricity), etc. Service concerns like hospitals (number of beds), airlines (number of seats), theatres (number of seats), restaurants (number of tables), university (number of students), warehouse (cubic feet of space), etc., can measure capacity in terms of inputs.

### **2. Forecasting Future Capacity Needs**

Short-term capacity requirements can be estimated by forecasting product demand at different stages of the product life cycle. It is more difficult to anticipate long-term capacity requirements due

to uncertainties of market and technology. Capacity forecast helps to determine the gap between the existing capacity and estimated capacity so that necessary adjustments may be made. For example, a company engaged in manufacturing two products may find that one product has a low demand in summer (e.g. coffee or tea) while another product has low demand in winter (e.g. cold drink).

### **3. Identifying Alternative ways of Modifying Capacity**

In case where the existing capacity is inadequate to meet the forecast demand capacity, the expansion is required to meet the shortage. Additional shifts may be employed to expand the capacity. Expansion will provide economies of scale and help in meeting the forecast demand. However, it involves additional investment and danger of fall in forecast demand in future.

When the existing capacity exceeds forecast capacity, there is a need for reduction of excess capacity. Developing new products, selling of existing facilities, layoff of workers or getting work from other firms are the methods of overcoming it.

### **4. Evaluation of Alternatives**

Various alternatives for capacity expansion or reduction are evaluated from economic, technical and other viewpoints. Reactions of employees and local community should also be considered. Cost Benefit analysis, Decision theory and Queuing theory are the main techniques of evaluating alternatives.

### **5. Choice of Suitable Course of Action**

After performing the cost-benefit analysis of various alternatives to expand or reduce the capacity, the most appropriate alternative is selected.

## **Types of Capacity Planning**

## BA4204- OPERATIONS MANAGEMENT

There are several types of capacity planning in operations management that can inform your overall strategies. Four capacity planning types include:

- **Resource capacity planning** is the lifeblood of a services firm's visibility into what work can be sold and delivered. Resource capacity at a high level is simply a calculation of number of employees multiplied by expected billable hours available in a given week. For most organizations, there has to be at least a few more considerations for optimal resource capacity planning, things like skill sets, utilization targets and work under management and in the sales pipeline create a complete understanding.
- **Project capacity planning**, by contrast, takes a view of a given project within an organization and the time and resources it needs. Project managers estimate the amount of time their assigned team can work in a given timeframe to balance workloads against project delivery milestones. Project capacity planning strategies need to be balanced with strong resource management, ensuring staff are not overworked (leading to burnout) or underworked (leading to lower profits).
- **Team capacity planning** is useful for groups that typically operate or work together. IT teams with specialized skills, for example, may perform work together on one or more projects. Project managers will use team capacity planning to understand how much work can be done from week to week and how those efforts will affect the project timeline.
- **HR capacity planning** is similar to resource planning but conducted by an HR group who may take into consideration other factors around professional development, ability to hire and onboard new staff and budget for new hires when determining capacity.

### DEVELOP CAPACITY ALTERNATIVES

Once a company has identified its capacity requirements for the future, the next step is to develop alternative ways to modify its capacity. One alternative is to do nothing and reevaluate the situation in the future. With this alternative, the company would not be able to meet any demands that exceed current capacity levels. Choosing this alternative and the time to reevaluate the company's needs is a strategic decision. The other alternatives require deciding whether to purchase one large facility now or add capacity incrementally, as discussed earlier in the chapter.

Capacity Alternatives: 1. Do nothing

2. Expand large now

3. Expand small now, with option to add later

### Evaluate Capacity Alternatives

There are a number of tools that we can use to evaluate our capacity alternatives. Recall that these tools are only decision-support aids. Ultimately, managers have to use many different

## **BA4204- OPERATIONS MANAGEMENT**

inputs, as well as their judgment, in making the final decision. One of the most popular of these tools is the decision tree.

