

# Capacity planning

# capacity

Capacity is the amount of goods that a firm is capable of producing over a specified period of time. Capacity can be defined as highest reasonable output rate which can be achieved with the current product specifications, product mix, work force, plant and equipment.

# Types of capacity

Maximum capacity/design capacity

Effective capacity

Demonstrated capacity/actual capacity

# Maximum capacity/design capacity

Maximum capacity or design capacity is the highest rate of output a process or activity can achieve. It specifies a theoretical upper limit above the usual rate of routine operations. The operation managers calculate the maximum capacity of a manufacturing process. It is based on the number and duration of available shifts, the number of available machines and employees per shift and the working days in a period of the calculation

# Effective capacity

- ▶ Effective capacity identifies the output rate that managers expect for a given activity or process. It is the actual capacity to reflect current conditions and that could be less than or more than design capacity. They base production plans and schedules on this measure of output

# Determinants of effective capacity

Facilities factors

Product/service  
factors

Process factors

Human factors

Operation  
factors

External factors

# Demonstrated capacity/actual capacity

Demonstrated or actual capacity deals with actual rather than planned production. It measures the actual level of output for a process or activity over a specified period of time.

Product mix

Operator  
skill and  
experience

Condition  
of  
equipment

Types of job

Inaccurate  
production  
standard

Quality of  
materials

# Measurement of capacity

Capacity can be expressed in one of the two ways

Output measures

Input measures

# Importance of capacity decisions

- ▶ Real impact on the ability of the organization to meet future demands
- ▶ Affect operating costs
- ▶ Capacity is usually a major determinant of initial cost
- ▶ Long term commitment of resources
- ▶ It can affect competitiveness
- ▶ Capacity affects the ease of management

# Capacity utilisation

- ▶ Capacity utilization is a measure of the extent to which the productive capacity of a business is being used
- ▶ The capacity utilization rate is useful to companies as it provides an insight into the value of production and the resources being utilized at any given time.
- ▶ It determines the company's ability to cope with a rise in the production of output without increasing costs

$$\text{Capacity Utilization} = \frac{\text{Actual Level of Output}}{\text{Maximum Level of Output}} \times 100$$

# Capacity planning

Capacity planning is the process of predicting and defining the long-term and the short-term capacity needs of an organisation and determining how those needs will be satisfied. Capacity planning decisions are taken based upon the consumer demand. Capacity planning also takes in to consideration the human, material and financial resources of the organisation. Capacity requirements can be evaluated from two perspectives—long-term capacity strategies and short-term capacity strategies

# Capacity strategy

## Long-term capacity strategies

It is difficult to predict the long term capacity requirements because the future demands are difficult to predict. Long-range capacity requirements are dependent on marketing plans, product development and life-cycle of the product. Long-term capacity planning is related with accommodating major changes that affect overall level of the output in long-term. Designing and implementing the long-term capacity plans are the major responsibilities of management.

## Short-term capacity strategies

Another task in capacity planning is to develop short term capacity strategies. Managers can predict the future demand for the product in the near future based on statistical tools. Managers then compare requirements with existing capacity and then take decisions as to when the capacity adjustments are needed.

# Process of capacity planning

## ▶ Demand forecasting

Capacity planning starts with the setting of up of a business plan which sets out the types of goods or services to be produced. The Manager has to take a long range forecast of demand in order to determine the resources needed to produce and offer specified goods and services. Market trend changes, competitor's role and technological changes have to be carefully examined.

## ▶ Capacity decisions

The demand forecasting of goods and services then must be translated in to a measure of capacity needed. On the basis of forecasting of demand for products, organisation will be able to determine the various resources needed for producing such goods.

# Process of capacity planning

## ▶ Facilities planning

Capacity decisions automatically lead to the setting up of necessary facilities in order to produce goods and services as determined the previous steps. Facility planning can be done either by the expansion or contraction of existing facilities or by setting up of additional new facilities

## ➤ Decisions and implementation

Finally, alternative resource requirements plan should be properly evaluated. The feasibility of plans along with its economic impact needs to be analysed.

# Capacity planning methods

Long term planning

Medium term planning

Short term day to day adjustments

# Capacity utilisation –service organizations and manufacturing firms

Transportation

Hotel industry

Theatres  
,cinemas,  
restaurants

Hospitals

Manufacturing  
firms

# Capacity and bottlenecks

- ▶ Bottleneck is defined as a resource which has a demand requirement greater than its capacity and which limits the output capacity of the complete system.
- ▶ Approach to address bottlenecks and system improvement is the **Theory of constraints** developed by **Eliyahu Goldratt** (1980)

The basics of this theory are:

- ▶ Identify system constraints
- ▶ Decide how to exploit the system constraint
- ▶ Subordinate everything else to that decision
- ▶ Elevate the system constraints
- ▶ If the constraints have been broken go back to step 1 and start over

# Methods to evaluate capacity

Break –Even analysis

Decision tree

Capital Budgeting

# Capacity Requirement Planning(CRP)

- ▶ Capacity requirements planning is the process through which a company—primarily in manufacturing—figures out how much product it needs to make, and determines if it has the ability to meet its production goals.

# Maintenance management-types

- ▶ Reliability centred maintenance

Reliability centred maintenance (RCM) is a corporate-level maintenance strategy that is implemented to optimize the maintenance program of a company or facility. The final result of an RCM program is the implementation of a specific maintenance strategy on each of the assets of the facility. The maintenance strategies are optimized so that the productivity of the plant is maintained using cost-effective maintenance techniques.

Successful implementation of RCM will lead to increase in cost effectiveness, reliability, machine uptime, and a greater understanding of the level of risk that the organization is managing.