

Jaipur Engineering College, Kukas

Mechanical Branch

- Vth SEM

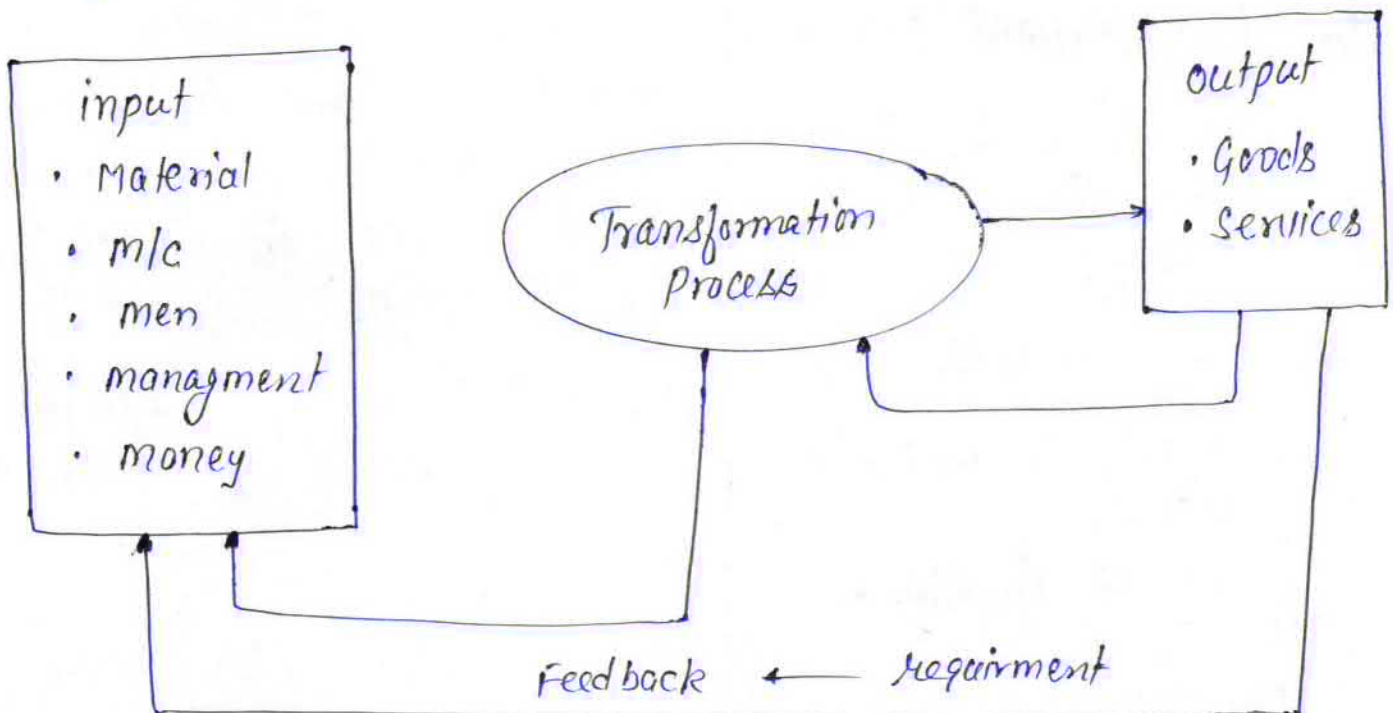
- Ist Mid term (Solution)

Sub. -- OM

Operation management (OM) is the business function that plans, organizes, co-ordinates & controls the resources needed to produce a company's good & services.

OM is a management function which involves managing people, equipment, technology, information & many other resources.

The role of OM is to transform a company's inputs into finished good or services. Input include human resources, facilities & processes as well as material, technology & informations.



Scope of OM:-

1) Historical Events in O.M.:-

The industrial revolution had a significant impact on the way goods are produced today. The industrial revolution changed all that on m/c power instead of human power.
Ex. Steam engine.

2) Scientific management:- Scientific management that productivity of workers & organizational opp is increased. Worker have no ip into this process. they are permitted only to work.

3) The human relations movement:-

The influence of this new philosophy can be seen in the implementation of a number of concept that motivat workers by making their job more interesting & meaning-ful.

4) Management science:-

management science is mathematically oriented field that provides operations management with tools that can be used to assist in decision making. Ex. linear programming.

5) The Computer age:-

Computer inventory requirement & developed schedules for the production of thousands of items.

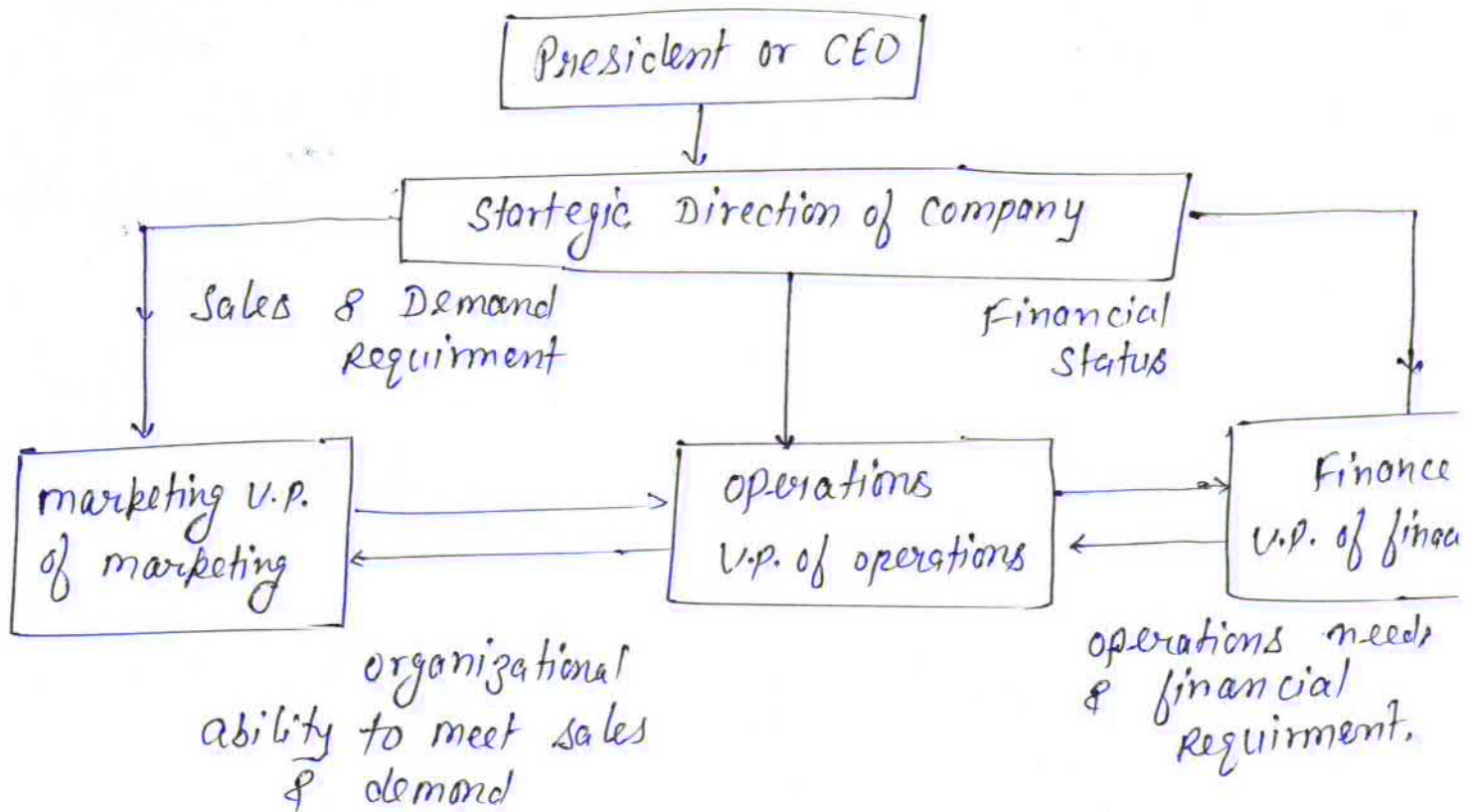
6) Just in time:-

It is to achieve high volume production using minimum amount of inventory. This is achieved through Co-ordination of flow of material.

7) Total quality management:-

TQM is the area of O.M. that no competitive company has been able to ignore. It is a philosophy, promulgated by quality improved.

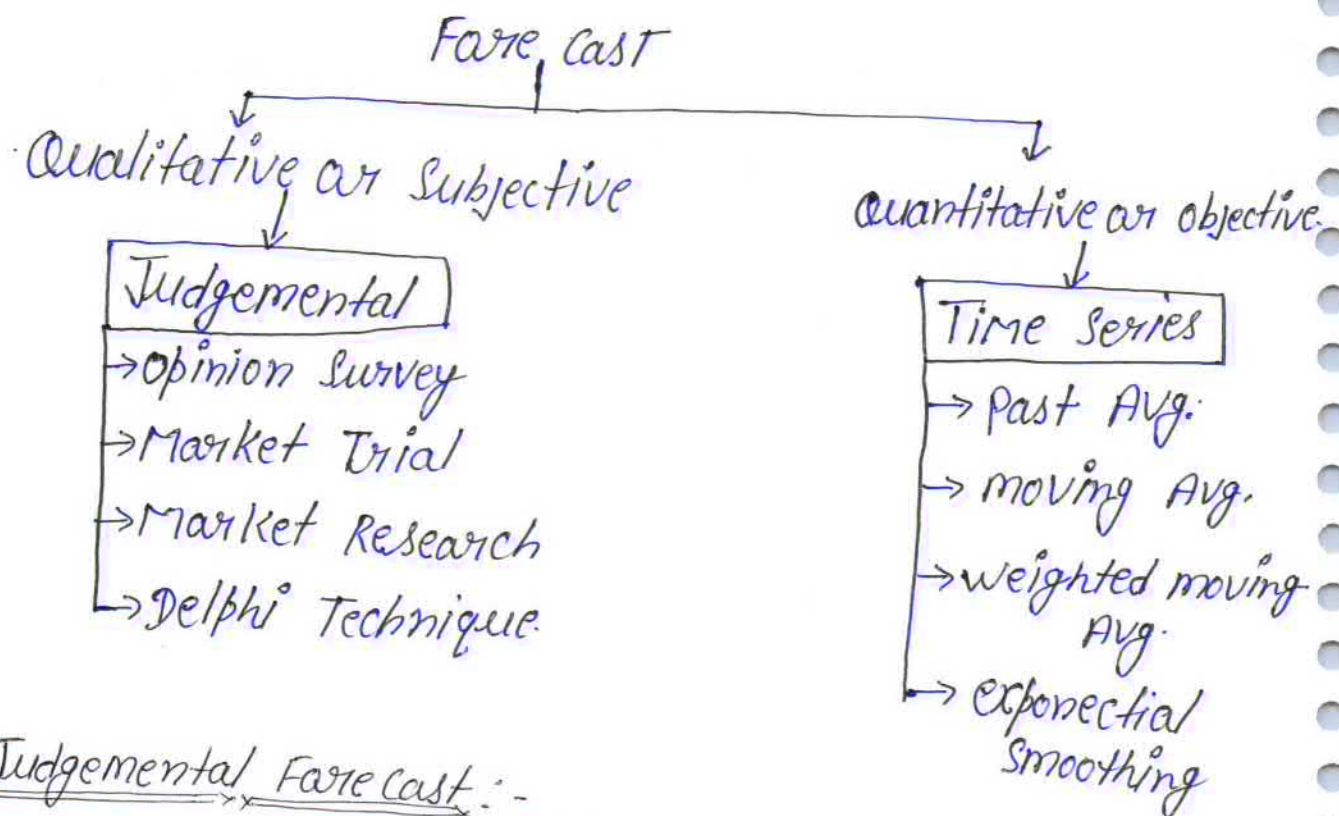
The management process:-



Ques. What is demand forecasting and classify the forecasting methods?

Ans: Demand forecasting:- Demand forecasting is a field of predictive analytics, which tries to understand and predict ~~can~~ customer demand to optimize supply decision by corporate supply chain and business management. Demand forecasting involves quantitative methods such as the use of data and especially historical sales data as well as statistical techniques from test market.

Forecasting Techniques:-



Judgemental Forecast:-

These techniques are used for long term forecasting of new product and these methods are based on the art of human judgement i.e. how well human being can predict the demand of product in future.

(i) OPINION SURVEY:- In this method opinions are collected from the customer retailer and distributors regarding the demand pattern of a product and these information are used to project the demand in future.

(ii) Market Trial:-

This method is generally applied to new product and in that case product is introduced b/w the limited population in the form of Free Sample.

(iii) Market Research:-

In this method the work of survey is assigned to external marketing agencies and the purpose of research is to collect information regarding the demand of product.

(iv) Delphi Technique:-

In this method a panel of experts are asked sequential question in which the response of one question is used to produce next question.

TIME SERIES FORECAST:-

In this method past data are arrange in chronological order as dependent variable and time as independent variable. Based upon these past data.

(i) Past Average:-

In this method the forecast is given by mean or average value of the actual demand.

(ii) Simple moving Average:-

This method use past data and calculate a rolling avg. For a constant period.

(iii) Weight moving Avg. Method:-

This method gives unequal weight to each of demand data in such a manner that summation of all weight always equal to 1.

1. Find the sum of 'n' natural number

$$\Sigma n = \frac{n(n+1)}{2}$$

(ii) Arrange them in descending order as.

$$\frac{n}{\Sigma n}, \frac{n-1}{\Sigma n}, \frac{n-2}{\Sigma n} \dots \frac{1}{\Sigma n}$$

(iv) EXPONENTIAL SMOOTHING METHOD:-

This method requires only the current actual demand and forecasted value for the current period to give next forecast. This method gives weight to all the previous periods and the weight assigned are in exponentially decreasing order. The most recent data is given the highest weight and the weight assigned to the older data decreases exponentially.

General Form:-

$$F_t = \alpha D_{t-1} + \alpha(1-\alpha)D_{t-2} + \alpha(1-\alpha)^2 D_{t-3} + \alpha(1-\alpha)^3 D_{t-4} + \dots \infty$$

$$F_t = \alpha D_{t-1} + (1-\alpha) \left[\alpha D_{t-2} + \alpha(1-\alpha)D_{t-3} + \alpha(1-\alpha)^2 D_{t-4} + \dots \infty \right]$$

$\underbrace{\hspace{15em}}_{F_{t-1}}$

$$F_t = \alpha D_{t-1} + (1-\alpha) F_{t-1}$$

Q.3 What is productivity and defines factors affecting productivity.

Ans. Productivity :- Ratio of output and input

$$\frac{\text{output}}{\text{Input}}$$

It is a quantitative Ratio b/w what we produce and what we use as Resource to produce them. Every organization always want to increase productivity by applying new techniques and Method.

→ Eight factors Affecting productivity :-

(i) Man Power :- "Selection" i.e. Selection of right man for a specific job Applying Well

known saying division of labour. "Training" i.e. Consideration of training requirements whether to be imported training in the plant itself or to be sent for training outside the unit to other plants within the country or abroad or training institutes.

(ii) Equipment and Machines :- The number of machine tools, their capacity and accessories required, replacement policy of the organization and maintenance Schedules. etc.

(iii) Input Materials:

- i) Appropriate quality of materials.
 - ii) Material requirement planning (M.R.P.)
 - iii) Substitute of materials being used.
 - iv) Inspection of input materials at various points.
- (iv) v) cost of materials procurement and handing up to stores.

(iv) Time:

Time is significant of input materials

i.e.

- i) Inspection of input materials i.e. raw material and semi finished or finished items required for assembly.
- ii) Time for inspection of finished products
- iii) Production time (total time of manufacturing)
- iv) Time for repair and maintenance of machines and equipment.

(v) Floor Area or space:

- i) Total area covered by the administrative block, production shop and inspection & quality control departments etc.
- ii) Location of different departments and shop etc.
- iii) Other space covered by plant layout.

(vi) Power or Energy:

- i) Maintenance of equipment for saving energy.
- ii) Use of renewable energy devices.
- iii) Use of biogas, photovoltaic cells, solar energy and other non-conventional techniques.

(vii) Finance:

Finance is required to maintain all the above requirements. The management should be for minimum rather optimum finance.

(iii) Movement of Man and Materials:

- i) The required motion of manpower within the plant.
- ii) The motion of raw material semi finished and finished products / items within the plant.

Q.4. What is production system and discuss the product life-cycle?

Ans:

Production system:

The production system can be classified into two major categories,

a) Product-focused systems - These are generally employed in mass production organization where there are groups of mks, tools and workers arranged accordingly to their respective tasks in order to put together a product.

ex - standardized products - cars, TVs, computers etc.

b) The process-focused systems - These are designed to support production department that perform a single task like painting or packing. These are highly flexible and can easily be modified to support other product designs. They are used in the production of customized products.

Product - life - cycle :

The life cycle of a product is associated with marketing and management decisions within business, and all products go through five primary stages ;. Each state has its costs, opportunities and risks and individual products differ in how long they remain at any of the life cycle stages.

(1) Development :

The product development stage is often referred to as "the valley of death." At this stage, costs are accumulating with no corresponding revenue. Some products require years and large capital investment to develop and then test their effectiveness. Since risk is high, outside funding sources are admitted.

(2) Introduction :

This stage is about developing a market for the product and building product awareness. Marketing costs are high at this stage, as it is necessary to reach out to potential customers. This is also the stage where intellectual property rights protection is obtained.

(3) Growth :

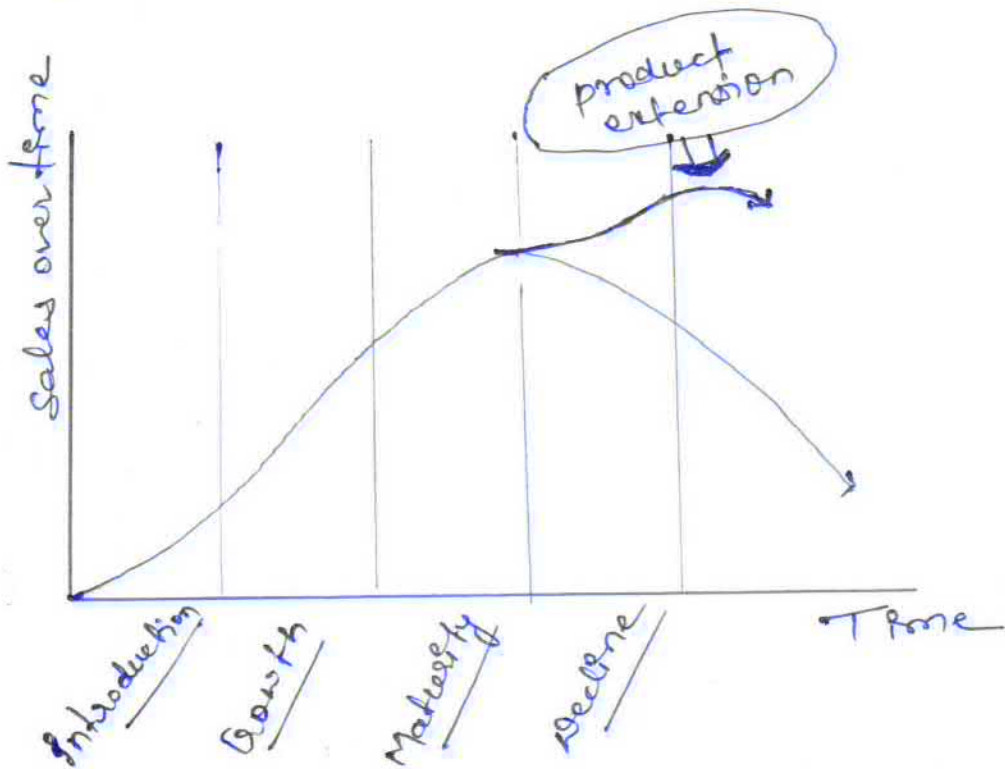
In this stage, the product has been accepted by customers, and companies are striving to increase market share. For innovative products there is limited competition at this stage, so pricing can remain at a higher level. Both product and demand & profits are increasing, and marketing aimed at a broad audience.

(4) Maturity:

At the mature stage, sales will level off. Competition increases, so product features may need to be enhanced to maintain market share. While unit sales are at their highest at this stage, prices tend to decline to stay competitive. Production costs also tend to decline at this stage, because of more efficiency in manufacture process.

(5) Decline:

This stage is associated with decreasing revenue due to market saturation, high competition, and changing customers needs. This is the stage where packaging will often announce "new & improved".



Graph: Product-life Cycle.

Q.5. what is process planning and process analysis? what are the various information's contain in the process-sheet.

Ans 1- "Process Planning": - Process planning is a preparatory step before manufacturing, which determines the sequence of operation or process needed to produce a part or an assembly. This step is more important in job shops where one-of-a-kind products are made or the same product is made infrequently.

→ "Process Analysis": - A step by step breakdown of the phases of a process, used to convey the inputs, outputs, and operations that take place during each phase.

→ A process analysis can be used to improve understanding of how the process operates, and to determine potential targets for process improvement through removing waste and increasing efficiency.

→ Process sheet of various information :-

Process sheet is a set of manufacturing instructions for a specific batch, lot or runs that describe the operating parameters and setting for the equipment and facilities used, and any associated tooling or supplies.

→ Process sheet, contains part information, routing information and operation detail information.

we all know what a blueprint is and how it works, so, process sheet works exactly like a blueprint.

→ Process sheet is a set of instruction that can be followed to achieve the desired goal.

→ For example, a process sheet documentation designed for preparing a food item would not only consist of the recipe, but also each component mentioned in the exact quantity required. It will also consist of cooking time with a detailed description of each task, the number of workers required in each task, and also if any remarks are needed to be followed, by previous experiences.

Q.6. what is capacity planning and factors influencing effective capacity?

Ans 1 - capacity planning is a long term strategic decision that establishes a firm's overall level of resources. It extends over a time horizon long enough to obtain those resources - usually a year or more for building new facilities or acquiring new businesses.

→ Three basic strategies for the timing of capacity expansion in relation to a steady growth in demand.

(i) capacity lead strategy :- capacity is expanded in anticipation of demand growth. This aggressive strategy is used to lure customers from competitors who are capacity constrained or to gain a foothold in a rapidly expanding market.

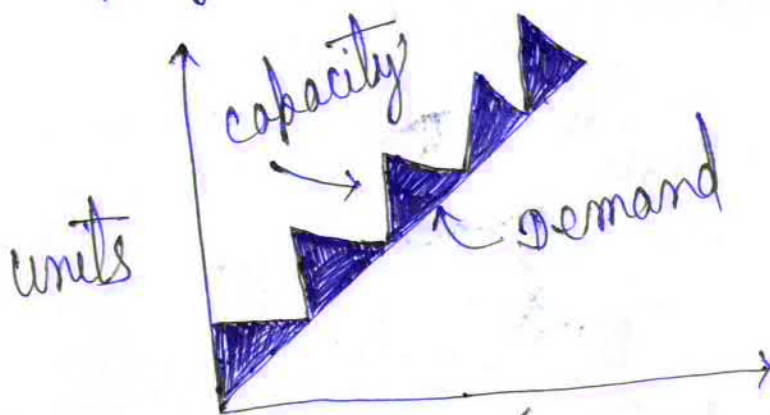


fig 1 - capacity lead strategy

(ii) capacity lag strategy :- capacity is increased after an increase in demand has been documented. This conservative strategy produces a higher return on investment but may lose customers in the process. It is used in industry with standard

Products and cost based or weak competition. The strategy assumes that lost customers will return from competitors after capacity has expanded.

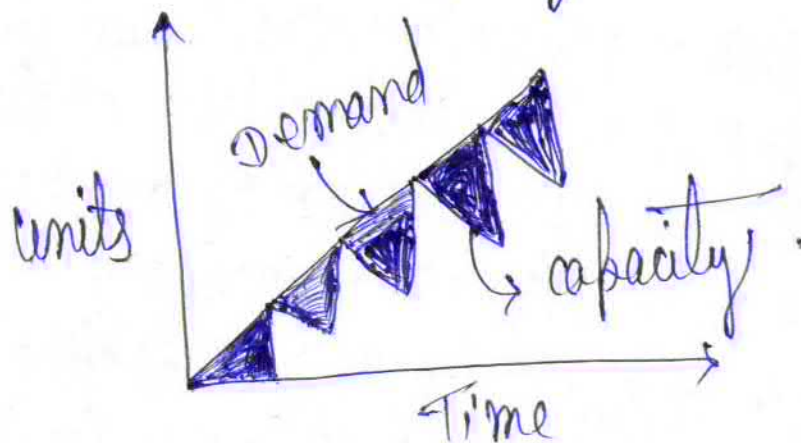
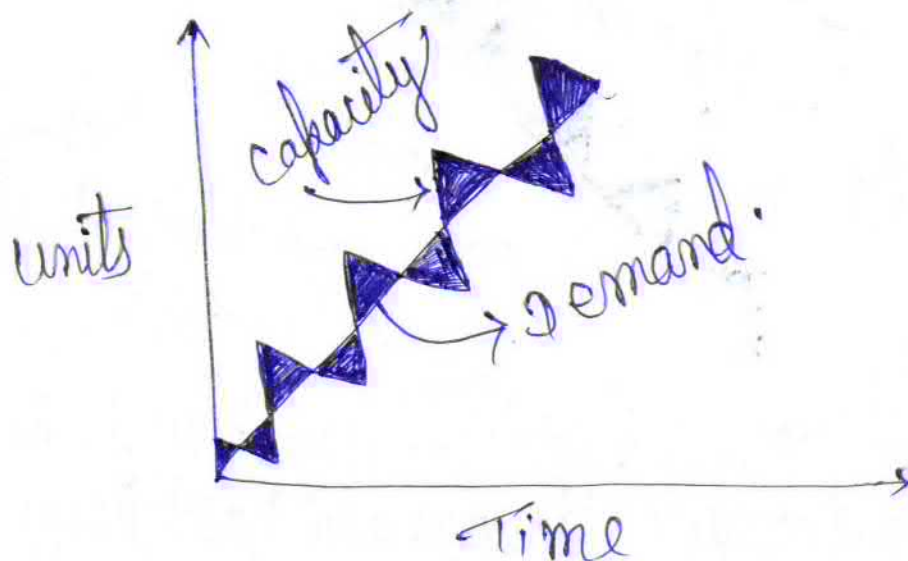


fig:- capacity lag strategy.

iii) Average capacity strategy: - capacity is expanded to coincide with average expected demand. This is a moderate strategy in which managers are certain they will be able to sell at least some portion of the additional output.



3. Subcontracting: — Subcontracting refers to offloading some of the jobs contracted to outside vendors thus hiring the capacity to meet the requirement of the organization.

4. Multiple shift operation: — Multiple shifts are going to enhance the former capacity utilisation but especially in the third shift the rejection rate is higher. Especially for process industries where investment is very high is recommended to have a multiple shift.

5. Management policy: — The management policy with regards to subcontracting, multiplicity of shifts (decision regarding how many shifts to operate), which workstations or department to be run for third shift, machine replacement policy etc. are going to affect the capacity planning.

⇒ factors influencing effective capacity; -

The effective capacity is influenced by

1. forecasts of demand
2. Plant and labour efficiency
3. subcontracting.
4. Multiple shift operation.
5. Management policies.

→ 1. forecasts of demand! - Demand forecast is going to influence the capacity plan in a significant way. As such, it is very difficult to forecast the demand with accuracy, as it changes significantly with the product life cycle stage, number of products. Products with long life cycle usually exhibit steady demand growth compared to one shorter life cycle. Thus the accuracy of forecast influences the capacity planning.

2. Plant and labour efficiency! - It is difficult to attain 100% efficiency of plant and equipment. The efficiency is less than 100% because of the enforced idle time due to machine breakdown. Delays due to scheduling and other reasons. The plant efficiency varies from equipment to equipment and from organization to organization.