Techniques of Operations Research Applications of Operations Research and Limitations of Operations Research

Techniques of Operation Research:

Important techniques of Operation Research are being described hereunder:

Inventory Control Models:

Operation Research study involves balancing inventory costs against one or more of the following costs:

i. Shortage costs.

ii. Ordering costs.

iii. Storage costs.

iv. Interest costs.

This study helps in taking decisions about:

i. How much to purchase.

ii. When to order.

iii. Whether to manufacture or to purchase i.e., make and buy decisions.

The most well-known use is in the form of Economic Order Quantity equation for finding economic lot size.

(ii) Waiting Line Models:

These models are used for minimising the waiting time and idle time together with the costs associated therewith.

Waiting line models are of two types:
(a) Queuing theory, which is applicable for determining the number of service facilities and/or the timing of arrivals for servicing.

(b) Sequencing theory which is applicable for determining the sequence of the servicing.

(iii) Replacement Models:

These models are used for determining the time of replacement or maintenance of item, which may either:
(i) Become obsolete, or

(ii) Become inefficient for use, and

(iii) Become beyond economical to repair or maintain.

(iv) Allocation Models:

These models are used to solve the problems arising when:
(a) There are number of activities which are to be performed and there are number of alternative ways of doing them,

(b) The resources or facilities are limited, which do not allow each activity to be performed in best possible way. Thus these models help to combine activities and available resources so as to optimise and get a solution to obtain an overall effectiveness.

(v) Competitive Strategies:

Such type of strategies are adopted where, efficiency of decision of one agency is dependent on the decision of another agency. Examples of such strategies are game of cards or chess, fixing of prices in a competitive market where these strategies are termed as “theory”.

(vi) Linear Programming Technique:

These techniques are used for solving operation problems having many variables subject to certain restrictions. In such problems, objectives are—profit, costs, quantities manufactured etc. whereas restrictions may be e.g. policies of government, capacity of the plant, demand of the product, availability of raw materials, water or power and storage capacity etc.

(vii) Sequencing Models:

These are concerned with the selection of an appropriate sequence of performing a series of jobs to be done on a service facility or machine so as to optimise some efficiency measure of performance of the system.

(viii) Simulation Models:

Simulation is an experimental method used to study behaviour over time.

(ix) Network Models:

This is an approach to planning, scheduling and controlling complex projects.

Applications of Operation Research:

These techniques are applied to a very wide range of problems.

Here only some of the common applications are being mentioned:

(i) Distribution or Transportation Problems:

In such problems, various centres with their demands are given and various warehouses with their stock positions are also known, then by using linear programming technique, we can find out most economical distribution of the products to various centres from various warehouses.

(ii) Product Mix:

These techniques can be applied to determine best mix of the products for a plant with available resources, so as to get maximum profit or minimum cost of production.

(iii) Production Planning:
These techniques can also be applied to allocate various jobs to different machines so as to get maximum profit or to maximise production or to minimise total production time.

(iv) Assignment of Personnel:
Similarly, this technique can be applied for assignment of different personnel with different aptitude to different jobs so as to complete the task within a minimum time.

(v) Agricultural Production:
We can also apply this technique to maximise cultivator's profit, involving cultivation of number of items with different returns and cropping time in different type of lands having variable fertility.

(vi) Financial Applications:
Many financial decision making problems can be solved by using linear programming technique.

Some of them are:
(i) To select best portfolio in order to maximise return on investment out of alternative investment opportunities like bonds, stocks etc. Such problems are generally faced by the managers of mutual funds, banks and insurance companies.

(ii) In deciding financial mix strategies, involving the selection of means for financing firm, projects, inventories etc.

Limitations of Operations Research:

i. These do not take into account qualitative and emotional factors.

ii. These are applicable to only specific categories of decision-making problems.

iii. These are required to be interpreted correctly.

iv. Due to conventional thinking, changes face lot of resistance from workers and sometimes even from employer.

v. Models are only idealised representation of reality and not be regarded as absolute.