

Model in Operation Research

When we present a real life situation in some abstract form whether physical or mathematical, bringing out the relationships of its important ingredients, we call it as model. Thus, model need not described all the aspects of this situation, but it should signify and identify important factors and their interrelationships to describe the total situation.

There are number of models used in Operation Research. Some of the basic types are described below.

1. Physical Models

These models provide a physical appearance of the real object under the study of either reduced in size or scaled up. Physical models are useful only in design problems because they are easy to observe, build and describe. Physical models are classified into the following two categories.

- i. Iconic Models: These models represents the system as it is but in different size. Thus, Iconic Models are obtained by enlarging or reducing the size of the system. In other words, they are images, examples of iconic models are blueprints of a home, maps, globes, photographs, drawings, air planes, trains, etc.
- ii. Analogy Models: These models do not look like the real situation but represent and behave like a system under study. For example, the organization chart represents the structure, authority and responsibilities relationship with boxes and arrows and maps in different colors represent water, desert and other geographical features.

2. Symbolic Models

These models use symbols (i.e. letters, numbers) and functions to represent variables and their relationship to describe the properties of the system. These models are also used to represent relationships which can be represented in a physical form. Symbolic models can be classified into two categories.

- i. Verbal Models: These models describe a situation in written or spoken language. Written sentences, books, etc are examples of verbal models.
- ii. Mathematical Models: These models involve the use of mathematical symbols, letters, numbers and mathematical operators (+, -, x,) to represent relationships among various variables of the system to describe its properties or behaviour.

3. Heuristic Models

These models use intuitive rules or guidelines to solve a particular problem. These models are not based on any definite mathematical expression or relationships, but problem solving based on past experience or approach formulated on the basis of definite stepped procedure. These models need an ample amount of creativity and experience by the decision maker.

Advantages and Limitations of Operation Research

Operation Research is useful for improving quality of managerial decision making. By using various tools and techniques of Operation Research we can get optimal solution of the problem. However, besides certain advantages, Operation Research has some limitations.

Advantages

- a) It compels the decision maker to be quite explicit about his objective, assumptions and his perspective to constraints.
- b) It makes the decision maker to very carefully about what variables influence the decisions.
- c) Quickly points out gaps in the data required to support workable solutions to a problem.
- d) Its models can be solved by a computer, thus the management can get enough time for decisions that require quantitative approach.

Limitations

- a) Often solution to a problem is derived either by making it simplified or simplifying assumptions and thus, such solutions have limitations.
- b) Sometimes models do not represent the realistic situations in which decisions must be made.
- c) Often decision maker is not fully aware of the limitations of the models that he is using.
- d) Many real world problems just cannot have an OR solution.

Applications of Operation Research

Some of the industrial/government/business problems which can be analysed by OR approach have been arranged by functional areas as follows;

- 1) Finance and Accounting
- 2) Marketing
- 3) Production Management
- 4) Personnel Management
- 5) Techniques and General Management
- 6) Stock re-ordering policies
- 7) Transport schedules
- 8) Product mix and Production flows
- 9) Allocation problems i.e. which jobs should be allocated to which machines
- 10) Time wasted queuing at issuing, counters
- 11) Scheduling of activities in a complex project
- 12) General congestion problem.