Operation Research as Decision Making System

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Introduction

Operations Research can also be treated as science in the sense it describing, understanding and predicting the systems behavior, especially man-machine system. Thus O.R. specialists are involved in three classical aspect of science, they are as follows:

i)   Determining the systems behavior
ii)   Analyzing the systems behavior by developing appropriate models
iii)   Predict the future behavior using these models

The emphasis on analysis of operations as a whole distinguishes the O.R. from other research and engineering. O.R. is an interdisciplinary discipline which provided solutions to problems of military operations during World War II, and also successful in other operations. Today business applications are primarily concerned with O.R. analysis for the possible alternative actions. The business and industry befitted from O.R. in the areas of inventory, reorder policies, optimum location and size of warehouses, advertising policies, etc.

Definition

1. Morse and Kimball have stressed O.R. is a quantitative approach and described it as " a scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control".
2. Saaty considers O.R. as tool of improving quality of answers. He says, "O.R. is the art of giving bad answers to problems which otherwise have worse answers".
3. Miller and Starr state, "O.R. is applied decision theory, which uses any scientific, mathematical or logical means to attempt to cope with the problems that confront the executive, when he tries to achieve a thorough-going rationality in dealing with his decision problem".

Stages of Development of Operations Research

The stages of development of O.R. are also known as phases and process of O.R, which has six important steps. These six steps are arranged in the following order:

Step I: Observe the problem environment

Step II: Analyze and define the problem

Step III: Develop a model

Step IV: Select appropriate data input

Step V: Provide a solution and test its reasonableness

Step VI: Implement the solution

O.R. Tools and Techniques

Operations Research uses any suitable tools or techniques available. The common frequently used tools/techniques are mathematical procedures, cost analysis, electronic computation. However, operations researchers given special importance to the development and the use of techniques like linear programming, game theory, decision theory, queuing theory, inventory models and simulation. In addition to the above techniques, some other common tools are non-linear programming, integer programming, dynamic programming, sequencing theory, Markov process, network scheduling (PERT/CPM), symbolic Model, information theory, and value theory.

Applications of Operations Research

Today, almost all fields of business and government utilizing the benefits of Operations Research. There are voluminous of applications of Operations Research. Although it is not feasible to cover all applications of O.R. in brief. The following are the abbreviated set of typical operations research applications to show how widely these techniques are used today:

Accounting: Assigning audit teams effectively, Credit policy analysis, Cash flow planning, Developing standard costs, Establishing costs for byproducts, Planning of delinquent account strategy.

Construction: Project scheduling, monitoring and control, Determination of proper work force, Deployment of work force, Allocation of resources to projects Facilities.

Planning: Factory location and size decision, Estimation of number of facilities required, Hospital planning International logistic system design, Transportation loading and unloading, Warehouse location decision.

Finance: Building cash management models Allocating capital among various alternatives Building financial planning models Investment analysis Portfolio analysis Dividend policy making

Manufacturing: Inventory control, Marketing balance projection, Production scheduling, Production smoothing.

Marketing: Advertising budget allocation, Product introduction timing, Selection of Product mix, Deciding most effective packaging alternative.

Organizational Behavior / Human Resources: Personnel planning, Recruitment of employees, Skill balancing, Training program scheduling, Designing organizational structure more effectively.

Purchasing: Optimal buying, Optimal reordering, Materials transfer.

Research and Development: R & D Projects control, R & D Budget allocation, Planning of Product introduction.

Key Terms

OR: Operations Research.

Symbolic Model: An abstract model, generally using mathematical symbols.

Criterion: is measurement, which is used to evaluation of the results.

Integer Programming: is a technique, which ensures only integral values of variables in the problem.

Dynamic Programming: is a technique, which is used to analyze multistage decision process.

Linear Programming: is a technique, which optimizes linear objective function under limited constraints.

Inventory Model: these are the models used to minimize total inventory costs.

Optimization: Means maximization or minimization.