OPERATIONS RESEARCH

UNIT-I

The term Operations Research was coined in 1940 by MC Closky & Trefthen in Uk. OR is the use of scientific and Mathematical techniques in finding the optimal solution of the complex problems arising in the management of scare resources to achieve organizational objectives of Maximization with least cost.

OR is a scientific method of providing executive departments with a quantitative basis for decisions under their control – Morse & Kimbal.

Features of OR

(i) Decision Making
(ii) Scientific Approach
(iii) Objective oriented Approach
(iv) Interdisciplinary Approach
(v) Quality of Solution
(vi) Goal oriented optimum soltion
(vii) Use of models
(viii) Reduces complexity

Scope of OR

The techniques of OR can be applied by Economists, Statisticians, Administrators, Politicians and technicians working in a team to slove the problems of socio economic nature faced by the public.

- In Agriculture
- In Finance
- In Industry
- In Marketing
- In Personnel Management
- In Production Management

Role of OR

The OR may be regarded as a tool which is utilized to increase the effectiveness to management decisions.

- It provides better control, better coordination and better decision making to the management authorities to develop a system characterized by high productivity, least cost and effective resource management.
- It is useful in finding out a profit plan for the company.
- To determine the optimum resource allocation and replacement policies.
- It is useful in designing, selecting and locating facility sites.
- To find the number and size of output and the minimum per unit sale price.
- It is useful in economic and social planning for a country.

- It is useful in marketing, agricultural policy and military defence scheme.

OR Models

(i) Allocation Models
(ii) Inventory Models
(iii) Waiting line (Queuing) Models
(iv) Competitive (Game theory) Models
(v) Network Models
(vi) Sequencing Models
(vii) Replacement Models
(viii) Dynamic programming models
(ix) Ma morkov chain Models
(x) Simulation models
(xi) Decision analysis models

PHASES OF OR:

(i) Judgement Phase:

- Determination of the Operation
- Determination of objectives and values associated with the operation
- Determination of Effectiveness Measures
- Formulation of the problem relative to the objective.

(ii) Research Phase:

- Observation and data collection for better understanding of the problem
- Formulation of relevant Hypothesis and Models
- Analysis of available information and verification of Hypothesis
- Prediction and Generlization of results & consideration of alternative methods.

(iii) Action Phase

Methodology of OR:

(i) Formulation of the problem
(ii) Construction of a Mathematical Model
(iii) Deriving the solution from the Model
(iv) Validity of the Model
(v) Establishing control over solution
(vi) Implementation of the final results.

Benefits of OR:

(i) Better control

(ii) Better systems

(iii) Better Decision

(iv) Better coordination

Limitations of OR:

- Inherent limitation concerning mathematical expressions
- High costs are involved in the use of OR Techniques.
- OR does not take into consideration the intangible factors i.e non measureable human factors
- Or only a tool of analysis and not the complete decision making process
- Other limitations: Bias, Inadequate objective functions, internal resistance, competence, Reliability of the prepared solution.

Applications of OR:

- Finance, budgeting and investment
- Marketing
- Physical distribution
- Purchasing, procurement and exploration
- Personnel Management
- Production Management
- Research and Development

Linear Programming

- In 1947, Geroge Dantzig and his associates
- Maximum Profit , Minimum Cost
- Refers to the process of determining a particular plan of action from amongst several alternatives.
- The word linear stands for indicating that all relationship involved in a particular problem are linear

LINEAR PROGRAMMING PROBLEM (LPP) - 3 components

- Decision Variable (Activities)
- Goal (The objective)

- The constraints

Basic Assumptions:

(i) Certainty
(ii) Divisibility (or Continuity)
(iii) Proportionality
(iv) Additivity

Advantage of LPP:

(i) Quality of decision
(ii) Possible solution
(iii) Use of productive factors
(iv) Re evaluation
(v) Emphasise Bottlenecks

Limitation of LPP:

(i) Assumption of non reality for linearity
(ii) Co efficient are constraints
(iii) Fractional solutions
(iv) Complexity
(v) Possibility of more than one objectives

Applications of LPP:

(i) Media selection problem
(ii) Portfolio problem
(iii) Profit planning problem
(iv) Transportation Problem
(v) Assignment Problem
(vi) Man power scheduling problems.

Steps in LPP formulation:

(i) Determine Key decisions
(ii) Identify decision Variables
(iii) Develop feasible alternatives which are set of values
(iv) Formulate objective function

(v) Formulate constraints