
Meaning and Definition of Operation Research:

It is the method of analysis by which management receives aid for their decisions. Though the name of this method, Operation Research (O.R.) is relatively new, but the method used for this is not a new one. Operation Research is concerned with the application of the principles and the methods of science to the problems of strategy.

The subject of operation research was born during Second World War in U.K., and was used for military strategy. During World War II, a group of scientists, having representatives from mathematics, statistics, physical and social sciences were entrusted to the study of various military operations. This team was very successful and greatly contributed to the meticulous handling of entire operation and related problems of the operation.

The need for assigning such studies for operations arose because military strategies and their decisions become so important and costly and therefore, the best scientists, under the sponsorship of military organs were grouped together to provide quantitative information by adopting scientific techniques and methods for facilitating in taking decisions.

After the World War II, it was started applying in the fields of industry, trade, agriculture, planning and various other fields of economy.

The operation research can be defined as:

Definitions:

(i) It is the application of scientific methods, techniques and tools to problems involving the operations of a system so as to provide those in the control of the system with solutions

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tion Research is a tool for taking decisions which searches for the optimum results in parity with the overall objectives and constraints of the organisation.

(iii) O.R. is a scientific method of providing executive department with a quantitative basis of decisions regarding the operations under their control.

(iv) O.R. is a scientific approach to problem solving for management.

(v) O.R. is an aid for executive in making his decisions by providing him with the needed quantitative information based on the scientific method of analysis.

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(vi) O.R. is the application of modern methods of mathematical science to complex problems involving management of large systems of men, machines, materials, and money in industry, business, government and defence. The distinctive approach is to develop a scientific model of the system incorporating measurement of factors such as chance and risk, to predict and compare the outcome of alternative decisions, strategies or controls.

(vii) It is the application of the scientific methods by scientists and subject specialists to the study of the given operation. Its purpose is to give administration, a basis for predicting quantitatively the most effective results of an operation under given set of variable conditions and thereby to provide a sound basis for decision-making.

In fact in Operation Research, research techniques and scientific methods are employed for the analysis and also for studying the current or future problems. Thus, Operation Research offers

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alternative plans for a problem to the management for decisions.

Although it is very clear that operation research never make decisions for the management, instead the method presents management with a careful scientific and quantitative analysis of problem so that the management will be in a better position to make sounder decisions.

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It can be used for solving different types of problems, such as:

- i. Problems dealing with the waiting line, the arrival of units or persons requiring service.
- ii. Problems dealing with the allocation of material or activities among limited facilities.
- iii. Equipment replacement problems.

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- iv. Problems dealing with production processing i.e., production control and material shipment.

But it may be remembered that operation research never replaces a manager as decision maker. The ultimate and full responsibility for analysing all factors and making decision will be of the manager.

In the more wide sense, operation research does not deal with the everyday problems such as output by the one worker or machine capacity; instead it is concerned with the overall aspect of business operation such as something as the relationship between inventory, sales, production and scheduling. It may also deal with the overall flow of goods and services from plants to consumers.

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The team doing operation research may have statisticians, psychologists, labour specialists, mathematicians and others depending upon the requirement for the problems.

Phases in Operation Research Study:

Since, the main objective of operation research is to provide better quantitative informationâ s for making decision. Now our aim is to learn how we can have better decisions.

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The procedure for making decisions with the OR study generally involves the following phases:

(i) Judgment Phase:

- i. Determination of operation.
- ii. Determination of objectives.

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- iii. Determination of effectiveness of measures.
- iv. Determination of type of problem, its origin and causes.

(ii) Research Phase:

- i. Observation and data collection for better understanding of the problem.

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ii. Formulation of relevant hypothesis and models.

iii. Analysis of available information and verification of hypothesis.

iv. Production and generation of results and consideration of alternatives.

(iii) Action Phase:

i. Recommendations for remedial action to those who first posed the problem, this includes the assumptions made, scope and limitations, alternative courses of action and their effect.

ii. Putting the solution to work: implementation.

Without OR, in many cases, we follow these phases in full, but in other cases, we leave important steps out. Judgment and subjective decision-making are not good enough. Thus industries look to operation research for more objective way to make decisions. It is found that method used should consider the emotional and subjective factors also.

For example, the skill and creative labour are important factors in our business and if management wants to have a new location, the management has to consider the personal feeling of the employees for the location which he chooses.

Scope of Operation Research:

In its recent years of organised development, O.R. has solved successfully many cases of research for military, the government and industry. The basic problem in most of the developing countries in Asia and Africa is to remove poverty and hunger as quickly as possible. So there is a

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great scope for economist, statisticians, administrators, politicians and technicians working in a team to solve this problem by an O.R. approach.

On the other hand, with the explosion of population and consequent shortage of food, every country is facing the problem of optimum allocation of land for various crops in accordance with climatic conditions and available facilities. The problem of optimal distribution of water from a resource like a canal for irrigation purposes is faced by developing country. Hence a good amount of scientific work can be done in this direction.

In the field of Industrial Engineering, there is a claim of problems, starting from the procurement of material to the despatch of finished products. Management is always interested in optimizing profits.

Hence in order to provide decision on scientific basis, O.R. study team considers various alternative methods and their effects on existing system. The O.R. approach is equally useful for the economists, administrators, planners, irrigation or agricultural experts and statisticians etc.

Operation research approach helps in operation management. Operation management can be defined as the management of systems for providing goods or services, and is concerned with the design and operation of systems for the manufacture, transport, supply or service. The operating systems convert the inputs to the satisfaction of customers need.

Thus the operation management is concerned with the optimum utilisation of resources i.e. effective utilisation of resources with minimum loss, under utilisation or waste. In other words, it is concerned with the satisfactory customer service and optimum resource utilisation. Inputs for an operating system may be material, machine and human resource.

O.R. study is complete only when we also consider human factors to the alternatives made

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available. Operation Research is done by a team of scientists or experts from different related disciplines.

For example, for solving a problem related to the inventory management, O.R. team must include an engineer who knows about stores and material management, a cost accountant a mathematician-cum-statistician. For large and complicated problems, the team must include a mathematician, a statistician, one or two engineers, an economist, computer programmer, psychologist etc