

The Concept Of Operations Research (OR)

Operations Research (OR): Is the use of scientific methods for the organization of activities within a complex system and includes the scope of reaching the best or optimal solution to the problems of this system from a number of possible alternative solutions.

The literature confirms that the beginnings of Operations Research date back to the period following World War II, when the Allies sought to develop scientific methods to confront the enemy. The development of Operations Research is credited to the efforts of the British mathematician A.K. Erlang (1908).

When they contributed to the discovery, development, and improvement of queuing theory, which is recognized by many as the discovery of Operations Research as a unique field independent of other written sciences. The development and continuous improvement of its methods continued until 1950.

Operations Research has become a necessity that companies must follow in organizing their work and reducing or minimizing the cost of production based on the science used to allocate resources, balance loads, and lead to optimal planning, especially with the emergence of Linear Programming models. This is a mathematical method aimed at achieving the optimal allocation of limited resources for the realization of a specific objective

There are many reasons that led to the use of Linear Programming and its expansion:

- 1-The great number of issues in different fields that can be expressed or at least estimated by them**
- 2.The availability of improved methods to solve Linear Programming problems**
- 3-The development of data where it became clear that they can be processed using Linear Programming models for analysis**
- 4-The availability of ready-made programs for solving Linear Programming models on all tables and matrices that describe the variables and constraints in the Linear Programming model. All of this can be achieved in a short time and at low costs**

In general, the Linear Programming model can be written in the following form:

$$\text{Max } Z = \sum_j$$

S.T.:

$$\sum_{i,j}^{m,n} a_{i,j} X_j \geq b_j$$

$$\sum_{i,j}^{m,n} a_{i,j} X_j \leq b_j$$

$$\sum_{i,j}^{m,n} a_{i,j} X_j = b_j$$

$$X_1, X_2, \dots, X_n \geq 0$$