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Overview on Application of Operation Research in Various fields

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Abstract: ***In any area of human endeavour, whether it is a production system, business system or service system where an objective is to be optimized. Operation research as coined by Europeans or operations Research by Americans is relatively a new discipline that deals with the application of analytical methods to gain a better decision. Operation research finds a solution to a problem is by breaking down the problem into basic components and then solving it in defined steps by mathematical analysis.***
Keywords: Operation Research, Decision Planning, Management technique

I. INTRODUCTION

Operation research is a major part of applied mathematics widely used in decision making & management planning issues, determining the criteria for the success of program & goals. Based on the recent application different models are developed & applied in the form of process models in the operations.

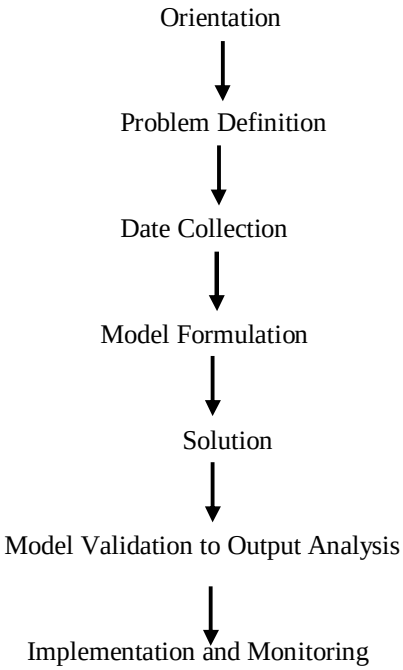
O.R. is problem solving & decision taking technique. It is considered a kit of scientific & programmable rules which provides the management quantitative basis for decisions concerning the operation under its control.

II. THE OPERATION RESEARCH APPROACH

O. R. represents integrated framework to help make decisions. This approach followed by the following 7 sequential steps:

i) Orientation ii) Problem Definition iii) Data collection iv) Model formulation v) Solution vi) Model Validation and Output Analysis vii) Implementation and Monitoring.

The diagrammatic flow-chart of construct the framework of any problem by using O. R. is as follows:



III. SOME AREAS OF MANAGEMENT WHERE O. R. TECHNIQUES HAVE BEEN SUCCESSFULLY UTILIZED ARE AS FOLLOWS

1) *Allocation & Distribution in projects:* In industrial area O.R. is used for optimal allocation of resources such as men, materials, machines, time and money to project. To determine the proper work force, to schedule, monitoring & control the project area.

2) *Production & facilities planning:* O. R. is used to decide the factory size and location decision. To estimate the number of facilities required for project. To prepare of forecast for the various inventory items and computation of economic order quantities & reorder levels. For transportation of material and product manufactured by Industry.
3) *Construction Industry:* O. R. gives the solution for transportation problems with internal Control, managing of fund, and resolving disputes of scheduling production aver different time period for construction materials. It is also Calculate the time period required for construction of any site by using the simplex method, L.P.P.
   O. R. is used for solving many problems the arising at all the levels of the Construction process. Today, in the construction field, the decision maker has to provide functionally, formally and economically derived optimal solution. Concluding that it is applicable as well to the tasks and Interrelationships of the Participants in the construction problems and also gives beneficiary in all way possible.
4) *Operation Research in computer Science:* O.R. in computer is the study mathematical problems that arise in computer system. It is a branch of applied mathematics that uses mathematical methods to solve problems in computer science. O.R. in computer is concerned with the design analysis and improvement of algorithms, data structure and software system.
   With the use of machine learning or deep learning algorithms we can use different machine algorithms between frames to track the number of food sold and the amount of food wasted in our Food chain, we can optimize the number of food sold and amount of food wasted.
5) *Operation Research in Advertisement:* Operation Research is used in media selection , setting the budget , assigning time and place , performance .It is used in the field of advertising by formulating & analyzing various models using empirical methods determining parameter, adhering to given constraints ; to derive a quantitative solution to media scheduling ,advertisement budgeting & selection of media for communication to have maximized and effective outreach to desired segmented market. The main objective of communication firms or the advertising division of a firm is to gain maximum and effective media coverage for its Clients/Firm.
   It is used in scientific decision making as it quantifies the cast-benefit & Optimum alternative decisions which can be taken subject constraints. O.R. methodologies such as linear program mining, Stochastic model, multiple regression models, knapsack problems, scheduling algorithm & goal programming are widely used in determining the optimal level of advertisement, Spending the correct media to be selected with respect to consumer perceived effectiveness segmentation of the market. O.R. is also used to find suitable method to contact customer thereby minimizing contact timing.
6) *Manufacturing Optimization:* O.R. models can be determine the optimal production quantities, raw material requirements and machine assignments to meet demand while minimizing cost.
   They can also help to make location planning, where the objective is to identify the best location for manufacturing plants or distribution centers to minimize transportation and operating cost.
7) *Logistics and transportation:* The logistics and transportation industry is usually based on O.R. methods for route planning, vehicle scheduling and network design. OR techniques like network flow optimization and constraints programming are also used in airline scheduling, crew rostering & fleet management to ensure efficient use of resources while meeting customer demand & operational constraints.
8) *Financial modelling & Portfolio optimization:* OR plays a very important role in the financial sector such as portfolio optimization, asset allocation and risk management. Models like the Markowitz portfolio theory & stochastic programming are used to construct optimal portfolios that maximize returns while minimizing risk.
   It is also applied in credit risk analysis, fraud detection and option pricing, helping financial institutions make informed decision and mange risks effectively.
9) *Healthcare Operations:* Now a days healthcare industry widely used OR methods to improve patient flow, resource allocations and operational efficiency. Techniques like queuing theory, simulation modeling and integer programming are used to optimize hospital staffing, scheduling and capacity planning.
10) *Other Application of OR:*

The application of OR span numerous other domains, including:

a) Energy system: Optimization of power generation, distribution and renewable energy integration.
b) Telecommunications: Network design, resource allocation & capacity planning.
c) Public Sector : Urban planning, emergency response logistic & poling analysis

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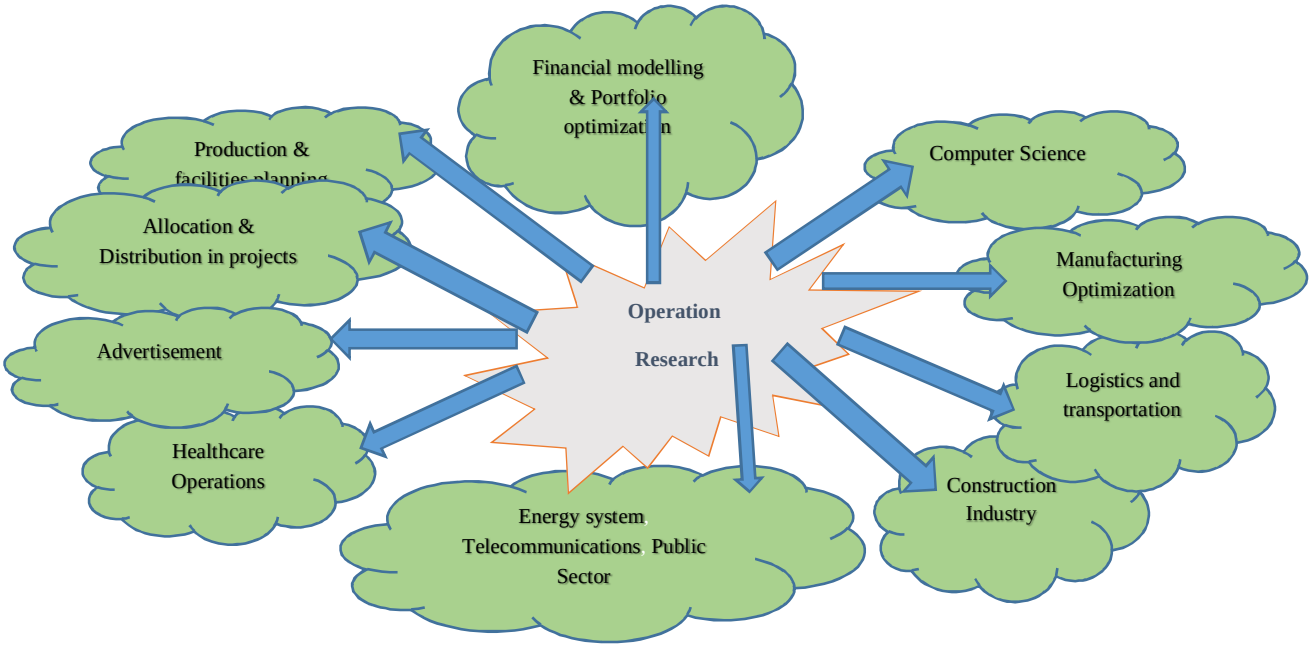
The graphical illustration of the disciplines and problems related to operations research:



OR has several limitations including the assumption of rationality, incomplete information, model assumption, complexity & cost. The Imitations of OR include a higher cost than other systems, replying on technology, not accounting for the human element and potential that estimates used could be wrong.

Despite the for challenges, like optimizing systems for more complex data, the future of O.R. is bright

IV. CONCLUSION

O.R .is a method of applying advanced analytical method to help for taking a better decision. In various fields OR techniques used by help of mathematical programming. Today's customers high quality products and service organization, whether in public or private need to provide products and service as effectively and efficiently and this is possible by O.R.

It is also the systematic, method – oriented study of the basic structure, characteristics function and relationship of an organization to provide the executive with a sound, scientific and quantitative basis for decision making

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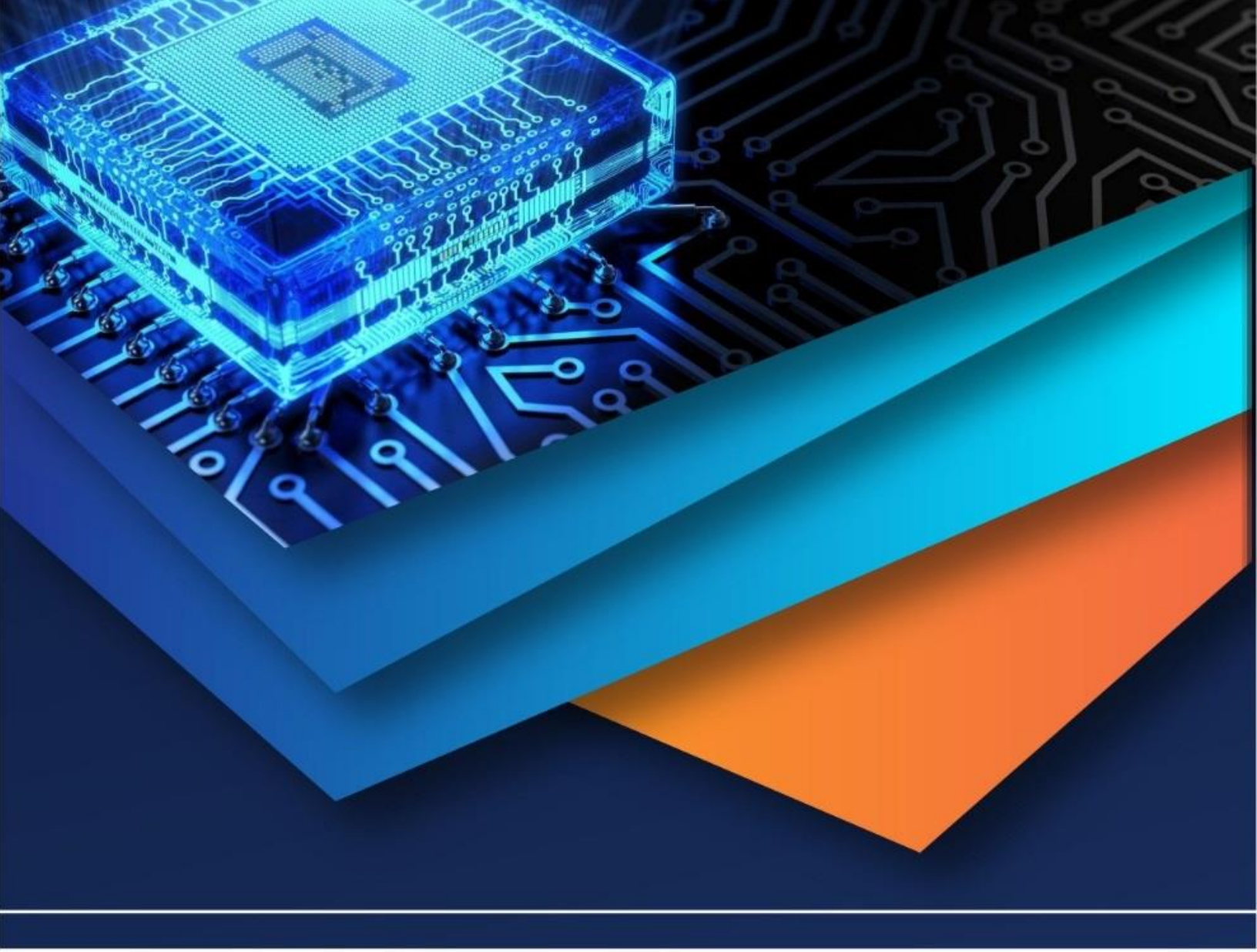

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