

Effect of "Operations Research" in Science and Industry

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Abstract

With the progress of science and industry and updating them the accuracy of the calculations and operations, need to meet the exact way. However, as organizations become more complex and specialized, and gradually grew to become competitive environment, they need to react and make decisions quickly and accurately. The complexity and high cost of operations do need more practice makes perfect decision. The potential of application of operations research provide techniques in the field of space such as an efficient means. Today disposal of operations research models significantly expanded. A wide range of operations research techniques are of little, it can increase the utilization of a substantial improvement in science, industry, organizations and processes decide. This article will impact the use of operations research in science and industry and deals with it.

Keywords: Effect ; Operations Research; Science ; Industry

1. Introduction

With increasing degree of specialization and complexity in an organization. Allocation of resources between different parts of it in order to achieve maximum efficiency in the organization is more difficult. Explored in order to solve these problems had started provided background for Development operational research. (9)

Operations research or operations research as it stands is called OR interdisciplinary branch of mathematics, the trends such as mathematical programming, statistical algorithm uses the optimization problem is to find the optimal point. The problem of finding the optimal point of different concepts and is used in decision-making. Operations research on issues maximization (maximizing) such interest rate production line, producing more crops, more and more bandwidth or minimizing such as lower costs, reduce risk, etc.)Using one or more specified focus. The main idea Operations Research find the best answers to complex issues that are mathematically modeling the system performance can be improved or optimized. (4)

Research in industrial operations in the United Kingdom and the United States developed in different directions. Great Britain nationalized a number of industries in areas prone to applying operations research to create. Economic conditions resulting from the application of pressure leads to state in planning operations and socio-economic planning. (2)

2. Definition of Operations Research

- Definition of the Operations Research Society of Great Britain: Operations Research is the complex issues arising in the application of scientific methods to lead and manage large systems, including human , machines, materials and money in industry, business, government and defense. Differentiated approach, Operations Research, development of a scientific model of the system to measure factors such as luck and risk to predict and compare the outcomes of decisions, strategies or controls is replaced . The goal is to help management determine the scientific basis for policy and action. (15)

1. Definition of U.S. Society of the Operations Research

Operations research is a scientific approach to decision making. Operations Research is the scientific decisions to achieve the best design and operation of the system, usually in the context of limited resources is also required. (13)

3. History of Operations Research

The general philosophy of research and development operations include three phases are as follows:

• Before World War II

In the past, research and development are often limited to specific routes have been separated. Only one or two factors were considered simultaneously in research and development activities. But when mathematical techniques were developed and completed more detailed aspects of a large number of factors could be considered in a wider scale. Operations Research, said it started to come out of his shell when he predicted that alternative methods such as dice throwing techniques, they were. Men like Taylor, Arleng, Lancaster, Addison, and Levinson, all those who have contributed to the development of basic research in

operations although the name is not in operations research. In the last years of the first decade of the 1800s, pioneering scientific techniques in the fields of industrial engineering and management consultancy and planning to deliver proven. They formed in the operations research techniques are developed. Frederick Taylor's scientific analysis methods of production began about 1885 years published the results of their experiments.

Perhaps the most familiar example is the work of Bill Taylor problem. Taylor's aim was to determine the weight of the load transported by Bill so that the maximum material with minimum fatigue for workers to move. After several experiments with different weights, Taylor chose to switch to the lighter weight of the load that would normally move on the other hand, was most effective during the working day. Taylor with a new attitude, on the assumption that older workers are more efficient, more time will be replaced with the spade, affected. Taylor did not explain the new facts instead of traditional knowledge and conventional science to assess and their results can be expressed in terms of the basic principles of a new science.

• World War II

Applications of Operations Research World War II in the form of group was formed to address operational issues Initial efforts began in England. For example, Professor Blacket, problem solving, analysis, coordination, equipment, and radar fire took Sites. His group (which became famous circus Blacket) includes physiologist, physicist, mathematician, military officer, and mapping arranged. Multidisciplinary team approach also launched in the United States. (12)

• After World War II

By the end of World War II, all branches of the military operations continued in the study groups. The group is currently operational assessment team titles (Navy), Department of Operations Analysis & Company Rand (Air Force) and the Operations Research Office (ground forces) are known. As well as smaller groups of analysts within the military services are working. There are similar groups in the UK. At the end of World War II, America and Europe, the industry had grown to such an extent that the study was conducted operations in different industries. Manufacturing and industry require changes in your organization so that it can respond quickly to the needs of peacetime. The need to seek competition and rising production and demand will need to seek new markets.

4. Operations Research Features

The main features include operations research can be

- Most research focuses on the decision-making process for managers.
- Scientific methods used in operations research.
- Looking at operations research problems and decisions are systematically investigated.
- Operations research is an interdisciplinary science that examines the various disciplines.
- Knowledge of computer operations research has a very important role.
- Use mathematical models (8).

5. Operations Research Tools

The main tools used by operations research include:

- Mathematical modeling
- Improving
- Statistics
- Graph Theory
- Theory of Games
- Queuing Theory
- Decision Analysis
- Simulation (4)

6. Operational Research Activities

• Planning

Here the purpose of planning, planning decisions in cases that are extracted through a little bit of work practices such as strategic planning, and so should not be confused with quality programming. In a factory, producing what time and at what level should it be? How is the purchase of raw materials and inventory? What we need at some point to force overtime? The answer to these questions is the uses of planning techniques of operations research techniques are considered.

• Scheduling

Each operation has a set of elements that act in conjunction with each other. Successful operation requires the concerted action of the elements. One of the aspects of coordination, synchronization time..

• Allocation of resources

Each operation requires resources. These sources of raw materials, manpower, machinery and equipment, information, money, space and time. Total operating systems are available on how to use the resources of the target system can be provided? Allocation and sharing of resources (which are limited in amount) between operations and other activities of the Operations Research is one of them.

1. Optimization

The purpose of the Operations Research optimal solution to the issues presented? The objective is to optimize or improve? Here's one of the areas of optimization in operations research activities are discussed.

• Policy and decision

As noted above, one of the problems in operations research objectives. Project selections, method of financing, choosing strategy, choose the right solution and where such activities are that arise in operations research.

• Descriptions

Describe a set of activities they feature or features of the model are described in terms of operations and systems. An example of this model queuing model in which the characteristics of a queuing system queuing models expressed in the form and other necessary features that are not accessible directly from the data collected are calculated based on the model.

• Prediction

In many cases we need hypothetical situations or systems intended for operation and to examine its behavior in that situation. Such conditions do not exist. It takes time and money to appear on the new behavior. Conditions and the behavior of the simpler ways to achieve it, the foretold. The model used to describe the process or system, different circumstances brought about by changing the model specification we solve the model predictions with the new behavior. For example, queuing models, we can model the characteristics of service providers, Queue length and waiting time can be predicted without the need to change the current system of service providers. (2)

7. Effects of various fields of operations research

These areas are:

• Industrial Engineering

Operations research, industrial engineering was a milestone in the development of procedures that result in the development of quantitative methods, mathematical algorithms etc. Effective application of the concepts were developed by Taylor et al. History of Industrial Engineering is apart from Operations Research time but philosophy is one that is both effective and efficient solutions for issues related to the design, analysis and evaluation.

The main difference of Industrial Engineering and Operations Research Analysis, models and methodologies of the each use. Initial developments in industrial engineering and manufacturing workshops highly subjective and based on systematic methods instead of using mathematical methods. (12).

• Management Science

Knowledge management is an area of research in close connection with the operation developed in the 1960s. Techniques are used in the field of operations research techniques but it differs in its application of Operations Research

Mostly in administration, business and management are used. Now do not recognize the difference between these two together, usually in the form of OR / MS are discussed (11)

8. Uses operations research models in management

The issue is complex.

1. It is a highly variable.
2. The data are reflective of the decision.
3. Usability data reflect various solutions are possible.
4. Objectives of the decision maker or an organization can be described quantitatively.

Models are applicable to the above conditions. (7)

5. Environment and supply chain

In recent decades

the issue of environmental protection has attracted much attention

and the production activities having the greatest impact on the environment

organizations to carry raw materials to production facilities and processes for the production of goods have the distribution system to distribute them among consumers. This set of activities (production - distribution - consumption) is called the supply chain.

Application of operations research in the fields of interaction analysis and supply chain environment can be divided into two parts:

- **Assessment of environmental effects**

Terms of environmental requirements in the supply chain how to include environmental requirements in the supply chain, the decision is always fundamental problems. Operation researches applicable To find the highest level of performance in the new situation. In this context, many questions including the extraction of raw materials improved production processes change Package changing consumer behavior and address of the manufacturers responsible for producing goods arises. It is also possible to decide on issues such as production planning, logistics, location, allocation and inventory control are pointed out.

The application of operations research problems exist in environmental management although such problems can be modeled, but it is difficult to create a useful insight. General operations research techniques can be used when choose the best option from a set of clearly defined options to be considered. The concept is best understood and the system should be optimized of operations research techniques to be structured to best serve you while environmental management issues inherent involve 3 factors complexity

and uncertainty multiple values and political influences they have other issues facing research in different operations. (3)

- **Analysis System**

Systems analysis is a systematic approach to assist decision makers in choosing a policy through review of the whole question, and alternative aims Search and compare the consequences of using appropriate analytical framework expert judgment on the issue so that the insights and influence both in operations research and systems analysis since being introduced in 1950. To determine the optimal choices, establishing and operating systems control the deal.

Operations Research according to sources, the current system focuses on the problem and proposes solutions while new systems planning systems analysis and design to do better than the current operation or operations, functions or services that have not yet applied stresses. In other words, changes in operations research practices recommend that systems while systems analysis or systems engineering the whole or part of a proposed new system to replace the system or equipment. (11)

- **Decision making**

The research aims at solving operational issues related to the decision. But this does not mean that this operation is equivalent to deciding. Operations by providing analytical tools and techniques in the study of mathematics, Scientific part of the decision-making process is even more but the need of concepts and theories of behavioral decision making, the principles, models and strategies are selected the aim of the scientific process, and logic is different from the Operations Research and the scientific method requires a different approach. (2)

Four different methods of operations research can help decision makers to:

- With the introduction of mathematical equations to evaluate numerous strategic and an uncontrolled variable.
- established scientific methods to identify variables affecting
- The results reveal decision, when the decision maker does not know how variables relate to each other.

Check and compare with the results (through mathematical equations), when the number is so high that possibility of compared them to the results is not for decision maker. (1)

- **Statistics**

More intrinsic aspects of the research process, rather than deterministic, stochastic aspects are for example, certain equipment failure does not occur and the basal instead of a coincidence. Parameters in production processes Are usually in a specified amount of control and its range is defined by it will be possible to change this parameter. Time of manufacturing or service in most cases it is a probability distribution. These terms and conditions are many other possible causes the analysis, design and evaluation requirements for Operations Research and the uncertainty associated with the condition is possible. Thus, applying concepts, techniques and tools of statistics would be inevitable. But this does not mean that the application of statistical concepts, techniques and tools of Operations Research they belong to the science of statistics. (2)

- **Economics**

The rapid growth of mathematical economics and operational research during and after World War II, is caused by a common root: Using mathematical models to understand the structure and the fact that the study only estimates. The starting point of common interest in finding the most economical problems in operations research, the overlap in the two fields. In the first days of inventory theory, there was a strong relationship between economists and specialists in operations research. These include the use of optimization techniques such as dynamic programming and traditional methods of calculation to find the optimal policy. Qualitative analysis for policy economists are mainly interested in; But experts in operations research, collaboration and more interested are helping to decide within the company and tend to have more computing.

The two fields overlap in several areas, including policy analysis, public finance, game theory and decision analysis. (6)

6. Impact on operations research organizations

Investigation Operation widely used in corporations and government agencies and private due to the nature of an operations research analyst, using their knowledge in areas of specialization into another. Some examples of operations research are as follows:

- Optimal management of carriage and road communications networks, marine, aviation and transport tubes.
- Evaluate effectiveness, efficiency and effectiveness
- When planning meetings at schools, universities and conferences aimed at reducing waste and increasing training effectiveness
- workforce allocation to jobs
- optimize the effective use of budget spending
- Structure designed to optimize the flow of materials and goods factories
- Create networks with minimal cost and ensure quality of service
- Street and road traffic management
- design of computer chips to reduce manufacturing time (therefore reducing the cost of production)
- Manage the flow of materials and goods in the supply chain (14).

Benefits and values in operations research organizations

Operations research can be linked to important values ranging from strategic to tactical move from the beginning to the end. The World Trade Organization, the military, public health centers will receive all the benefits of a major research operation that few cases are mentioned below.

- Business Prospects: Business prospects and little of the complex issues involved (10).
- Business performance improvement business performance by utilizing intelligence-based model, in connection with the collection of data for better decision making.
- Cost reduction: Looking for new opportunities to reduce costs or investment.
- Decision: Evaluate the possible results of alternative decisions and clarifying choices better.
- Prediction: provide a suitable platform for more accurate forecasting and planning.
- Improved scheduler: Scheduling efficient equipment and staff.
- Planning: the use of quantitative methods in order to support operations as well as strategic and tactical planning.
- Pricing: Dynamic pricing of products and services.
- Productivity: help organizations search for ways to make more efficient staffing and procedures.
- Benefits: Increased revenue or return on investment, increase market shares.
- Quality: Quality improvement with quantitative and qualitative balance.
- Improved: Taking advantage of better control and better profit margins.
- Sources: Taking advantage of the equipment, facilities, funds and entities.
- Risk monitoring and clarifying some critical factors in risk management and risk reduction.
- loading rate increase loading speed and reduced delays.(5)

7. Conclusion

In today's world requires creative decisions based on scientific methods is clearly evident obviously, managers and organizations are always looking for the skills and techniques in making decisions and issues they face. Operations research techniques due to her reliance on quantitative methods, more accurate and scientific creative decisions can have an impact. An organizational decision to classify the use of operations research is reliable and useful tool in the management and decision making. Operations research is the application of very accurate idea of the problems with science and industry is associated And roots are common. There is a difference discussion it has a great impact on the application of operations research to the extent

that it is no great loss.
. Due to the low cost of operations research operational decisions of interest to many managers. Operations research should be used to efficiently model and applied and the conditions of its use should be practical and with high reliability, the economic cost of the enterprise must be approved by the directors.

References

- 1) Asghar Pour, M.J. (2009). Decisions and Operations Research. Danesh publishing, Tehran.
- 2) Rokni Nezhad, M.(2009). What is Operations Research? Danesh publishing, Tehran.
- 3) Zarei, B & Zarei, A & Madres, A & Ghavi Panjeh, F. (2005). Explanation application of operations research in the field of environment. Journal of Environmental Studies, No. 38. Pp. 67-80
- 4) Zharfi, H.(2010). Operations Research or Operational Research. Samt publishing, Tehran.
- 5) Shiri, Gh.(2010). Operations Research. Iranian Operations Research Society.
- 6) Gholamali Zadeh, A. (2009). Economics and Operations Research. Method Magazine, No. 119, July, p 50
- 7) Farzad, F.(2002). A quick look at the scope and limitations associated with the use of models in Operational Research (OR) in management. Quarterly Message. No. 2. Pp. 157-166
- 8) Kafshgari Fallah, M & Jafari, H. (2009). Operations research in decision-ably Caird, Nashre No publishing, Isahan.
- 9) Ghaheri, Ali.(2008). Introduction to the field of operational research. Books Science and Technology Month. Number One. Page 59.
- 10) Ali, H.(2007). What is Operations Research? Amoozesh publishing, Shiraz.
- 11) Hicks, P. E. (1977). Introduction to Industrial Engineering and Management Science. Tokyo: McGraw-Hill.
- 12) Miller, D. M. and J. W. Schmidt.(1984). Industrial Engineering and Operations Research. New York: John Wiley & Sons.
- 13) Polloch, S.M.,M.H. Rrthkopf and A. Barnett. Eds (1994). Operations research and the publisher. North- Hollan: Elsevier
- 14) Saaty, T. L. (1988). Mathematical methods for operations research. New York: Dover.
- 15) Wilkes, F. M.(1980). Elements of Operations Research. London :McGraw-Hill.