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STRUCTURING BUSINESS PROBLEMS: INTRODUCING MODEL-BASED PROBLEM SOLVING

HISTORY

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OR was formally established as a field of research about 40 years ago during the Second World War. The British army assembled a group of scientists headed by Professor PMS Blackett, a physicist and a Nobel laureate, to investigate research into several complex problems. This group consisted of physicists, mathematicians, physiologists, engineers, army officers and others and were officially called "Army Operational Research Group". Informally, this group was known as "Blackett's Circus". Members of this group came from various disciplines and this proved to bring a multi-faceted approach to the solving of the complex problems facing the army such as the moving of convoys, logistic planning, submarine searching and others. By developing effective methods of using the new tool of radar, this team was instrumental in winning the Air Battle of Britain. Though their research on how to better manage convoys and submarine operations, they also played a major role in winning the Battle of the North Atlantic. Sir Alan Turing assisted the Island Campaign in the Pacific.

When the war ended, the success of OR in the war effort spread interest in applying OR outside the military as well. By the early 1950s, OR had been used in a variety of organizations in business, industry and government.

The increase in the use of computers further advanced the spread of Operations Research. In the 1950s Operations Research societies were established in England and in the United States. Operations Research was also made an academic discipline when it was first offered as a course in the Massachusetts Institute of Technology in 1948 and in the University of Birmingham in the early 1950s.

In the 1970s many winners of the Nobel Prize won due to their contributions to Operations Research. In this modern era, the usage of 8th generation computers will lead to the processing of information using computer models, optimization and simulations and thus Operations Research techniques will develop even further.

MODELS IN OR

Definition of Model

A model is a representation of a reality and can take the form of a graph, and can be physical or mathematical.

TYPES OF MODELS

1. Iconic Model
An iconic model is a most physical representation and includes things in an actual form. Examples: The model of a car or house is made and designed for its representation in the same.

2. Analogic Model
Analogic models are abstract physical representations to represent another set of actual phenomena. An analogic model may be in the form of a bridge, a scale, a clock, a telephone etc.

3. Symbolic Model
A symbolic or mathematical model represents a problem with the use of symbols. The model is usually a good representation of the actual system. It is usually an abstract model representing a problem with the use of symbols. The model is usually a good representation of the actual system.

4. Simulation Model
Simulation models are used when the system under study can not be used in other models or can not be used in the system.

CHARACTERISTICS OF GOOD MODEL

- The model should be:
1. Easy to understand
 2. easily implemented
 3. Based on it is not easy to obtain a solution that is not reasonable
 4. Complete in its structure
 5. Easy to present

DEFINITION OF OR (1)

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A technique for an organized manner to solve complex problems that arise from the management of an organization. Areas such as the management of resources in industry, business, government and defense. The way to analyze the problem is to build a model for which the system that include factors such as a well and others in order to have better decisions and changes that can be managed and administered to have policies and take action in a suitable manner.

Operations Research Society of India

DEFINITION OF OR (2)

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Operations Research is concerned with choosing the best way to handle operational decisions in a scientific manner using the use of better models.

Operations Research Society of India

LESSON OUTCOMES

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1. Define operations research
2. Identify the basic steps of operations research
3. Identify models in operations research and the characteristics of good models

SCIENTIFIC METHODS

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Scientific method refers to any method that can be proved. The steps that are involved in solving a problem by the scientific method are as follows:

1. Define the problem and the observation method.
2. Observations are made in various situations to understand the problem environment.
3. A hypothesis is put forward based on the observations.
4. Experiments are designed to test the hypothesis.
5. Experiments are carried out, measurements taken and reported.
6. The conclusion is examined, the hypothesis is accepted or rejected.

STEPS IN OR

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1. Identify the problem
2. Build a mathematical model that represents the system under study
3. Test the model and obtain a solution.
4. Maintain the system.

DISCUSS IN PAIR

1. "Operations Research" can be defined in many ways. Give a definition from what you understand of Operations Research.
2. What is the function of a model in decision making? Explain briefly 4 types of models. Give 4 characteristics of a good model.
3. Give 2 advantages of using Operations Research to solve problems.
4. How can Operations Research help management in decision making?
5. Model building is an important part of Operations Research. Name 3 types of models and give an example for each type of model.
6. Explain the meaning of "Operations Research".
7. Explain the steps involved in solving problems in Operations Research.

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When the war ended, the success of OR in the war effort spurred interest in applying OR outside the military as well. By the early 1950s, OR had been used in a variety of organisations in business, industry and government.

The increase in the use of computers further advanced the spread of Operations Research. In the 1950s Operations Research societies were established in England and in the United States. Operations Research was also made an academic discipline when it was first offered as a course in the Massachusetts Institute of Technology in 1948 and in the University of Birmingham in the early 1950s.

In the 1970s many winners of the Nobel Prize won due to their contributions to Operations Research. In the modern era, the usage of 15th generation computers will lead to the processing of information using complex models, optimisation and simulations and the Operations Research techniques will develop even further.

DEFINITION OF OR (1)

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A technique that uses mathematical sciences to solve complex problems that arise from the management of man-machine systems such as the management of resources in industry, business, government and defence. The way to overcome the problems is by building scientific models for the system that include both hard and soft data in order to form logical decisions and strategies. This can help managers and administrators to form policies and take action in a scientific manner.

Operations Research Society of the UK

DEFINITION OF OR (2)

MODELS IN OR

Definition of Model

A model is a representation of a reality and can take the form of a graph, and can be physical or mathematical.

TYPES OF MODELS

1. Iconic Model
Iconic model is a visual representation and may be large or small. It is made of real objects. The characteristics of an iconic model and the object that it represents are the same.

2. Analogue Model
Analogue model uses a set of physical components to represent a real set of physical components. An analogue model may be in the form of a diagram such as a flow chart, histogram, etc.

3. Symbolic Model
A symbolic or mathematical model represents a problem with the use of symbols. This model is frequently used in Operations Research. It is a model or mathematical model representation with the use of symbols. This model is frequently used in Operations Research.

4. Simulation Model
Simulation models are used when the system under study is complex and all other models can't or satisfactorily represent the system.

CHARACTERISTICS OF GOOD MODEL

- The model should be:
1. Easy to understand
 2. easily manipulated
 3. Robust i.e. it is not easy to obtain a solution that is not reasonable
 4. Complete in its structure
 5. Easy to process

LESSON OUTCOMES: Thecasesolutions.com

1. Define operations research
2. Identify the basic steps of operations research
3. Identify model in operations research and the characteristics of good models

INTER-DISCIPLINARY

LESSON OUTCOMES:

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1. Define operations research
2. Identify the basic steps of operations reserach
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HISTORY

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OR was formally established as a field of research about 60 years ago during the Second World War. The British army assembled a group of scientists headed by Professor P.M.S. Blackett, a physicist and a Nobel laureate, to investigate research into several complex problems. This group consisted of physicists, mathematicians, physiologists, engineers, army officers and others and were officially called "Army Operational Research Group". Unofficially, this group was known as "Blackett's Circus". Members of this group came from various disciplines and this proved to bring a multi-faceted approach to the solving of the complex problems facing the army such as the moving of convoys, logistic planning, submarine scanning and others. By developing effective methods of using the new tool of radar, this team was instrumental in winning the Air Battle of Britain. Through their research on how to better manage convoy and antisubmarine operations, they also played a major role in winning the Battle of the North Atlantic. Similar efforts assisted the Island Campaign in the Pacific.

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DEFINITION OF OR

(1)

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DEFINITION OF OR

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A technique that uses mathematical sciences to solve complex problems that arise from the management of man-machine systems such as the management of resources in industry, business, government and defence. The way to overcome the problems is by building scientific models for the system that include factors such a risk and chance in order to form forecast, decisions and strategies. this can help managers and administrators to form policies and take action in a scientific manner.

Operation Research Society of the U.K

DEFINITION OF OR (2)

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Operations Research is concerned with choosing the best way to handle man-machine system in a scientific manner usually with the use of limited resources.

Operation Research Society of the U.S



INTER-DISCIPLINARY APPROACH

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Operations Research uses techniques and knowledge from various disciplines. This is based on the fact that a decision maker does not have sufficient knowledge and expertise to understand all aspects of a problem facing an organisation. Hence, a group of experts is formed who can solve various types of quantitative management problems. This group consists of mathematicians, scientists, programmers, financiers, behavioural science experts and others. The multi-disciplinary approach to problem solving thus can lead to a more informed decision.

SCIENTIFIC METHODS

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STEPS IN OR

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Identify the problem

Build a mathematical model
that represents the system
under study

Test the model and obtain a
solution.

Maintain the system.