

# The Role and Application of Operational Research in Industry & Management

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## KEYWORDS ABSTRACT

Operational research, Industry Management, cost, decision making.

**I**n this present time the role and application of operation research is very useful and scientific method, tools , models which can be employed in planning , administration monitoring and decision making of industry management . Write from many researcher started the role and quantities application of operation research .Industry management make provision for supply chain, decision making service industry and production management in India with the ever growing population . In this paper researcher makes an attempt to role a various operation research technique such as formulation of the problem , liner programming simplex method transportation method job sequencing game theory etc .

To explain these theory in industry management will not only help in reducing the cost and other prevailing issues in industry management but also reduce cost , higher efficiency and increase productivity .Any business and industry discipline depends upon operational research tool and technique. Industry and management provides a better decision making with the help of operational knowledge to reduce constraint . In this research paper , it has been signified about various scientific sources . Operational research technique contribute a lot of task such as planning, organizing controlling , scheduling , budgeting etc.

## **1 INTRODUCTION**

The science of mathematics is now essential to every discipline and occupation. Production and industry are affected by this. For the purpose of better managing a group of components that call for mathematical calculations. Operations In making decisions and managing planning concerns, research science or the aim of practical mathematics from earlier eras was utilized, however briefly.

In making decisions and establishing the standards for the success of programmes and objectives in decade 1950 and 1960, quantitative mathematical approaches were extensively used. In actuality, objectives and restrictions define research knowledge in real-world operations. On the basis of this, many models are created and employed in the operation as process models. According to the requirement for growth in the management, mathematics progress is one of the elements of each scientific advancement and the most significant factor of the growth and development of industry management. The science of operations research must be taken seriously. The research has been put into practice to help us accomplish this objective. In this essay. Based on the findings of studies that have been reviewed in the area of the use of operational research methodologies in industry management. It has been given attention to how operational research approaches work and what role they play in managing the industry.

## **2. LITERATURE AND RESEARCH BACKGROUND**

The systems approach, first via the work of founders like Churchman and Ackoff and later through innovations like soft systems, has been closely linked with the development of OR and management science. In this essay, an assessment of systems thinking's more recent contributions, particularly to the practice of OR, is done. Systems thinking is a regularity in and of itself, with numerous theoretical and methodological extensions.

However, due to its generality, it is also applicable to practically any area of difficulty, thus any review of it must always be selective. The literature has been examined from both a theoretical and an applied perspective. Consider the original systems theories and approaches in the first section in light of their most current advancements as well as their implementations.

We explore the primary application domains in the second section, including strategy, information systems, organizations, production and operations, ecology and agriculture, and medicine and health. The general conclusion is that, despite the fact that academic departments may not have a strong institutional foundation, the system is extremely healthy in terms of the volume and diversity of its applications (Mingers & White, 2010).

Problem-solving techniques are a subset of participatory approaches in general. Despite the fact that the phrase "problem structuring" was just recently added to the operational research (OR) lexicon It have developed a sizable number of structures throughout the previous 50 years. Systemic issue structuring and other participatory techniques are frequently cited as having important benefits by operational researchers and social scientists. Therefore, when they offer proof for these claims, it is frequently based on isolated case studies of inter venation.

There haven't been many attempts to evaluate various interventions and strategies used by different persons. The reason for this is that, in each local intervention, the context, the researcher's abilities, and the stakeholder's objectives all have an impact on whether a strategy is regarded to be successful or unsuccessful. Therefore, the requirement to take into account what is special about each intervention makes the use of conventional criteria for comparing methods problematic. But can a single assessment strategy be created that can allow both longer-term method comparisons and locally meaningful evaluations (Midgley et al., 2013)?

## **2.1 OPERATIONS RESEARCH**

Operations Applied mathematics from earlier eras or research science were utilized, albeit briefly, in management planning and decision-making. However, the idea and practice now date back to the 1950s and 1960s.

During this time, decision-making and establishing the standards for the accomplishment of programmers and objectives have frequently used quantitative method. Indeed, goals and restrictions define research knowledge in real-world operations. Based on this, many models are created and used in the operation called process models.

That is, we use mathematical functions to map and change the variables. In this regard, if we can quantify qualitative variables using statistical formulas and mathematical functions, we may also be able to draw conclusions about them. OR analyses provide a crucial and practical use in these situations.

The key benefit of using OR models to manage decisions is that we can now delve further into the details. Mathematical models had a lot of applications by 1980. Numerous variables in qualitative problems prevent the definition and evaluation of mathematical functions on the basis of those functions. The non-numerical soft analyses are listed below. Since 1980, Thomas has been utilized in hierarchical analyses and soft or soft analyses (using objective and informal data to solve problems).

## 2.2 MCDM

A group is the focus of the operations research subdiscipline and fully developed branch known as MCDA1 or MCDM2 (Lootsma, 1999). Mathematics, behavioral decision theory, economics, computer technology, software engineering, and information systems are just a few of the disciplines that are used in MCDA/MCDM. Since the 1960s, there have been several theoretical and applied papers and books published in the MCDA/MCDM field (Roy, 2005). The goal of MCDA/MCDM approaches is to identify a preferred alternative, group alternatives into a limited number of categories, and/or rank alternatives according to subjective preference. Researchers and practitioners have given MCDA or MCDM techniques a lot of attention when analyzing, rating, and ranking alternate in a variety of sectors. Among the several MCDA/MCDM techniques created to address realworld decision issues, TOPSIS3 has proven to be effective in a variety of applications (Behzadian et al., 2012).

The majority of researchers and decision-making theorists have concentrated their efforts over the past 20 years on using MCDM models to analyze complicated decisions. These models introduce decision-making patterns as a procedure that can result in multi-criteria decisions that are at odds with one another.

There are various contradicting criteria, just like in organizational decisions (strategy selection, organizational development). Multi-criteria decision-making techniques can be categorized into two main groups. The most well-known of these models is Armani fashion. Models for Multi-Attribute Decision Making (MADM) include the ones below. Compensatory models: These models, which include the basic Approach for quantative technique

### TOPSIS

- Use Topsis when Appropriate
- The following situations involve using the Topsis model.
- Choosing and forming the main legal organizations
- Organizational formation and choice of supplementary strategies
- Making social decisions
- System for buying and suggestion-making
- Choosing the right fixes
- Choose the best vendor
- Selecting and talking about sales models
- selection of the market and distribution methods
- Design One Strategic Production Planning
- optimum selection and prioritization of investment initiatives
- optimum product development
- Innovative
- Equipment design and installation

- the ideal location for factory induction

In truth, managerial duties in the sector have a lot to do with operational research approaches. The following tasks are performed by the management of the industry with the aid of operational research techniques.

- Make decisions
- Making a plan
- Control and observation
- Budgeting
- Cost management

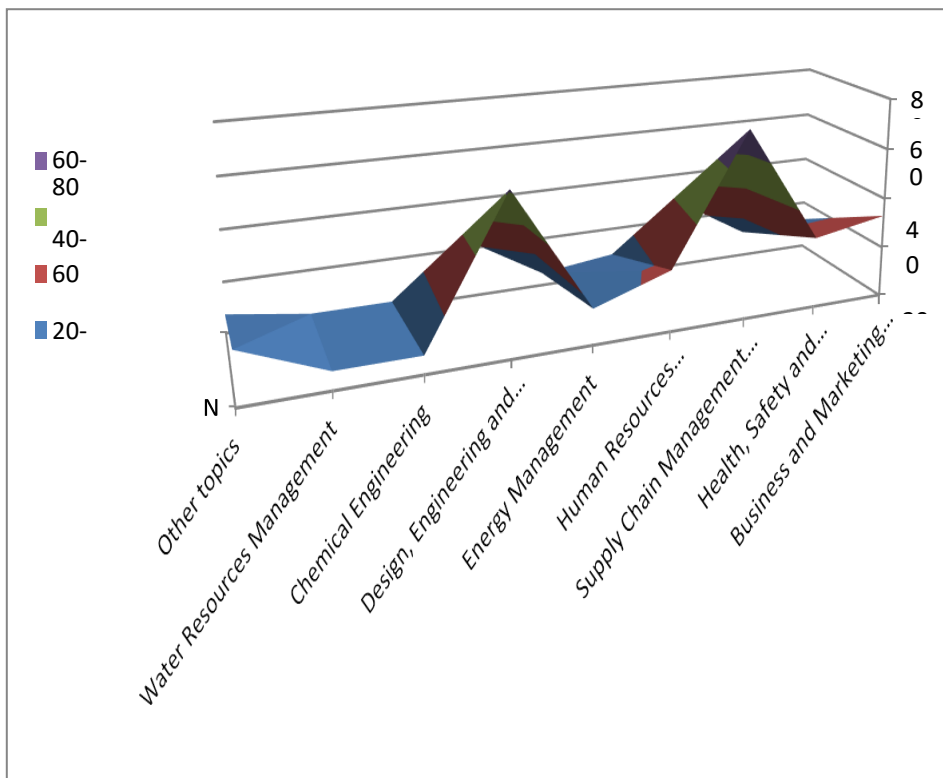


FIGURE 1 APPLICATIONAREASTOPSIS (BEHZADIAN ETAL,2012).

TABLE 1 CLASSIFICATIONOFMODELSOPERATIONSRESEARCH (AZAR,2019).

Crisp Models	Hybrid Models	Possible Models	
		Nonlinear optimization	Linear optimization
		Non-linear programming	Linear programming

Marko processes	Dynamic planning	Search methods	Transportation
Queue theory	Inventory control		Allocation
Decision analysis	Simulation		IDEAL planning
	PERT-CPM		Integer programming
			Network models

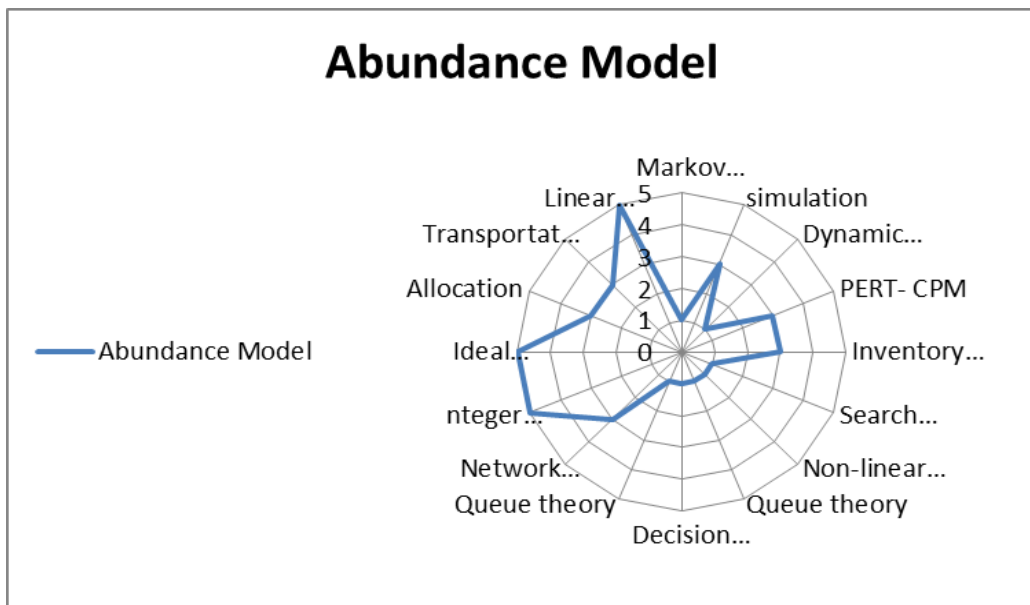


FIGURE 3 USE OF RESEARCH MODELS (AZAR, 2019).

### 3. METHODOLOGY OF RESEARCH

This qualitative research has a theoretical and analytical approach. In addition to collecting descriptive data from the analytical branch, this research is also descriptive. Through the use of library, archive, and online resources, its history and literature have been written. Characteristics, components, significant behavioral characteristics, and entrepreneurial personality were examined in this study by analyzing the research literature. Finally, their contribution to industrial progress was examined in light of these traits of entrepreneurs. This study attempts to approach entrepreneurship with judgement. The development of the sector based on their

experiences, views, and attitudes from studies

Case Example

A toy producer creates three different kinds of toys. The following table defines each production unit's cost and labor force.

Employee labor costs(hours)	Cost of production (Rials)
2	700
3	1000
2	500

TABLE 2 DATA CASE EXAMPLE

The factory has a 200,000 Rial total budget, and its 600 hourly employees work there. 200 units of type A toys, 300 units of type B toys, and 150 units of type C toys are needed. Toys sell for \$1200, \$1500, and \$2,000 per unit. Formulate the issue in a way that will maximize overall product profit while also meeting consumer demand for each toy.

$$\text{Max } Z = (2000 - 700)x_1 + (1500 - 1000)x_2 + (1200 - 500)x_3$$

1

$$s.t. \quad 1000x_1 + 500x_2 + 200000$$

$$2x_1 + 3x_2 + 2x_3 \leq 600$$

$$x_1 \leq 200$$

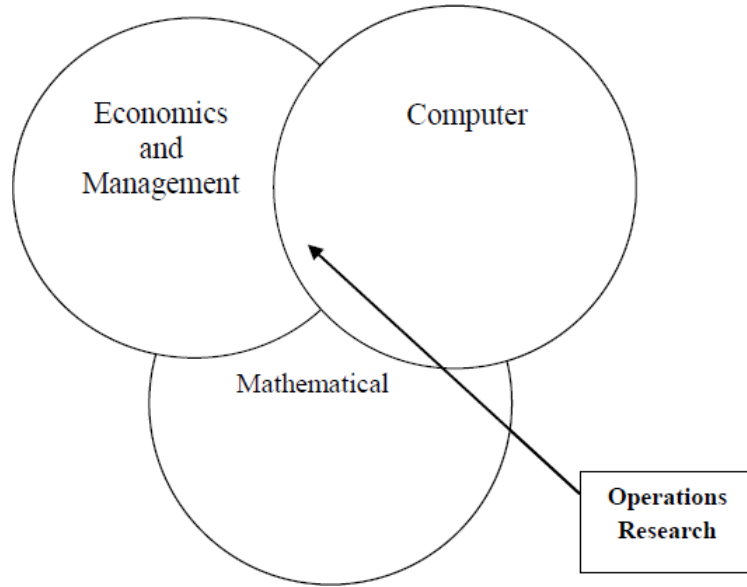
$$x_2 \leq 300$$

$$x_3 \leq 150$$

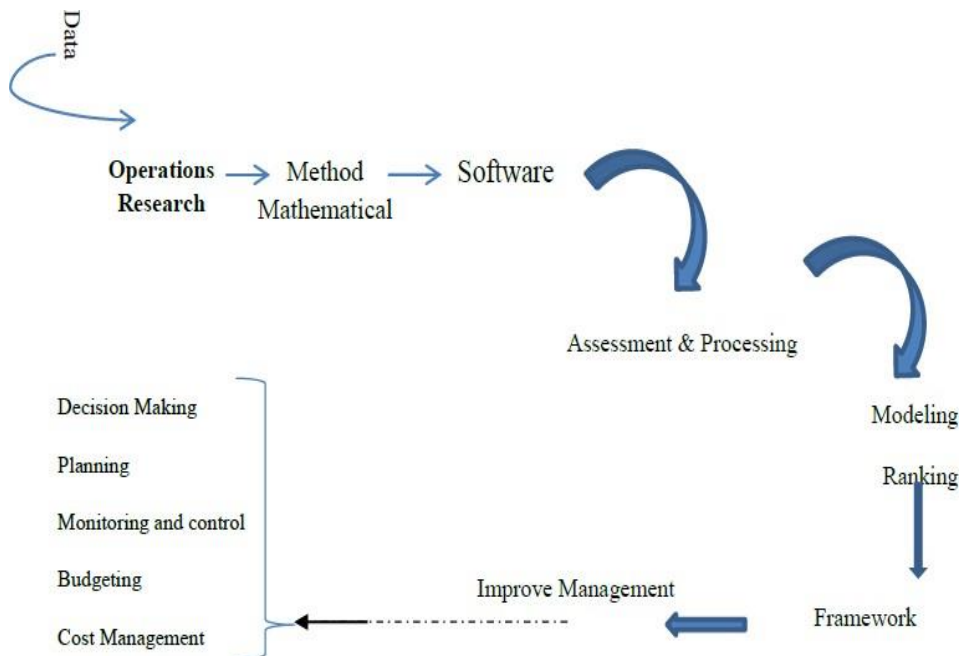
$$x_1, x_2, x_3 \geq 0$$

#### 4. FINDINGS

Based on a study and evaluation of connected subjects in the research literature, the research findings are presented graphically.

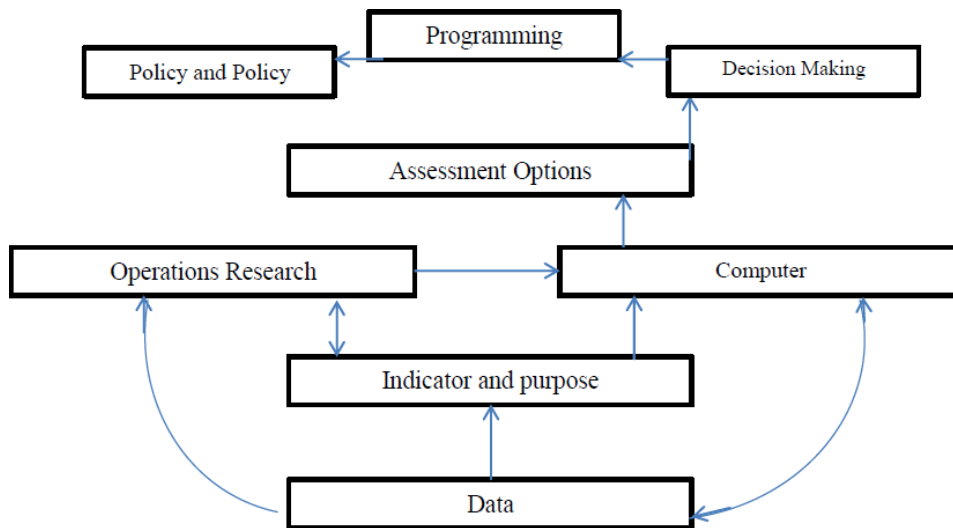


**FIGURE4 COMBINED KNOWLEDGE OPERATIONS RESEARCH**



**FIGURE5 PROCESS OPERATIONS RESEARCH**





**FIGURE6 APPLICATION OF MODELS OPERATIONS RESEARCH**

## 5. DISCUSSIONAND CONCLUSION

Management duties in the sector have a lot to do with operational research approaches. The following tasks are performed by the management of the industry with the aid of operational research techniques. Making decisions, planning, keeping an eye on things, budgeting, and cost management. Operations Applied mathematics from earlier eras or research science were utilized, albeit briefly, in management planning and decision-making.

However, the idea and practice now date back to the 1950s and 1960s. During this time, decision-making and establishing the standards for the accomplishment of programmes and objectives have frequently used quantitative mathematical methods (for predicting, estimating, and updating of planning variables). Indeed, goals and restrictions define research knowledge in real-world operations. Based on this, many models are created and used in the operation called process models.

That is, we use mathematical functions to map and change the variables. In this regard, if we can quantify qualitative variables using statistical formulas and mathematical functions, we may also be able to draw conclusions about them. OR analyses provide a crucial and practical use in these situations.

The key benefit of using OR models to manage decisions is that we can now delve further into the details. Mathematical models had a lot of applications by 1980

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