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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/14409

DOI URL: <http://dx.doi.org/10.21474/IJAR01/14409>



RESEARCH ARTICLE

APPLICATION OF THE GOAL PROGRAMMING METHOD IN HEALTH CARE

Kavita

Department of Mathematics OPJS University, Churu, Rajasthan-331303.

Manuscript Info

Manuscript History

Received: 18 January 2022

Final Accepted: 20 February 2022

Published: March 2022

Key words:-

Goal Programming Model, Algorithm
Goal Programming, Theory of Multi-
Attribute Utility, Model Formulation,
Minimization of Expenses

Abstract

The Subject is the application of goal programming to the planning of medical care. The paper, in particular, introduces a resource allocation model for hospital management based on goal programming. In a health-care agency with insufficient human resources, the Goal Programming (GP) model will help in strategic planning and shipment. This study aims to delegate staff to the correct shift hours so that management can achieve the goal of lowering overall payroll costs while keeping patients happy. The data generated by a Midwest-based health-care agency is used to demonstrate a Goal Programming model. The objectives have been established and prioritized. In health-care organizations, the Goal Programming model implementation provides understanding of resources allocation planning functions. The proposed model can be easily applied to other HR planning processes.

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Introduction:-

Goal Programming (GP) is an effective and adaptable approach that can be used to solve a wide array of multi-objective decision dilemmas. It should be noted, however, that GP is not a panacea for today's decision-making issues. The truth is that GP is only valid under such conditions [1,2]. The majority of GP implementations have been limited to deterministic problems with well-defined parameters. Also, the primary research was restricted to finding an optimal solution that maximizes target achievement while staying within defined constraints. Many refinements and additional research are needed to improve target programming as a universal decision-making analysis.

A literature review on the multi-objective target programming model was conducted by Tamiz M et al. [2020]. With their request field, the results of two leading goal programming approaches, such as "lexicographic and weighted goal programming," were identified. Some procedures were debated, as well as the possibility of using goal programming as a method, and the best goal programming approaches were suggested. To solve the load balancing assignment problem, Khouja M and Conard R [2020] proposed two approaches: zero-one objective programming and heuristic-based laws. In the context of order market, the two methods are contrasted and analysed. The method of using zero one objective programming to solve the load balancing assignment problem has proven to be more advantageous [3-5].

Climaco J [2020] to plan for improved power output, they used a multi-objective linear programming model. Three target functions (environmental effects, supply chain efficiency, and net present cost for expansion plans) are studied, as well as three types of constraints (budget, operational restrictions and load requirements). For power system expansion, there are three generating technologies to consider (Coal, nuclear and oil) [6-8].

Corresponding Author:- Kavita

Address:- Department of Mathematics OPJS University, Churu, Rajasthan-331303.

The outlines of the creation of a controlling tool to allow a multi-objective guided electricity design process were suggested by Mills D et al. [2020]. Model of multi-criteria decision-making allows for the calculation of choices in a hierarchical system against a broad range of conditions [9-11]. Almost all managerial decision-making models have ignored the unique organizational context, hierarchical decision-making mechanism, and multiple overlapping organizational goals. In practice, these are significant factors that have a significant impact on the decision-making process. The target programming approach is explored in this study as a method for optimizing multiple goals by taking into account the current decision environment explicitly.

Goal Programming Concept

Goal Programming is an extension of linear programming that was first traced by Romero (1992), and it was initially researched and used by Charnes Cooper and Ferguson (1955). The Target Programming method entails optimizing the best path to the defined goals. Ijiri invented the idea of priority factors in 1965, which assigns different weights to targets of the same priority levels. The principle of objective/goal programming, which is an extension of linear programming, was discussed by Lee (1972) and Ignizio (1976). In the past, profit maximization was thought to be the primary objective of management. However, in today's competitive market world, management's aim is to include non-economic priorities such as social responsibility, public relations, industrial relations, and labor relations, among others. In today's market environment, management is tasked with achieving a number of competing goals. Goal Programming is used to handle various parameters. For various goals, different measurement units are used [12,13]. Rupees, hours, time, tons, and other units of measurement may be used. The relevance of the goal to the organization determines how priorities are organized. There are linear relationships between all goal constraints. In target programming, unlike linear programming, there are no single objective functions. The relative value of objectives is used to minimize variations in objective function. The Target Programming approach is recognised for its ease of usage and simplicity. This results in many Goal applications areas such as accounting, stock management, agriculture, web site selection, inventory control, production, human resources, area studies, forestry, telecommunications, and waste management, among others. Goal programming has the advantage of being able to handle a wide number of variables and constraints. Different targets with multiple objectives are referred to as constraints.

There are three types of goals that can be used in goal programming.

1. A one-sided lower goal
2. A one-sided upper goal
3. A two-sided goal

Algorithm For Goal Programming

Determine priorities and limitations depending on resource supply or constraints that can act as roadblocks to achieving the goal [14]. Prioritize the value of each goal based on its relative importance. The most important goal may be allocated as P1, the next most important goal as P2, and so on.

Advantages Of The Goal Programming Technique

1. Goal programming has a number of advantages, one of which is its flexibility and ease of use for the user.
2. Goal Programming techniques are used in a wide range of fields
3. Goal Programming uses a large number of variables, constraints, and objectives
4. Provides further modeling flexibility
5. This is a versatile approach for addressing hurdles involving several criteria decision making.
6. Goal programming aids in the achievement of various objectives. It is possible to use the available resources.
7. The desired set of goals can be met with the resources available.
8. The best solution is to vary the amount of money available and, as a result, the objectives' targets.

Goal programming provides a lot of opportunities for economists, statisticians, managers, and technicians to work together to solve a problem. Goal programming is also useful in fields such as agriculture, finance, industry, marketing, human resources, and production management. Goal programming is a technique that can be used to improve the efficiency of management decisions. It's an objective complement to the Manager's subjective feelings. Goal programming can be used to solve a wide range of decision problems with multiple objective functions. Goal programming can be used in media strategy and product mix decisions in marketing [15]. The Target Programming methodology has made a significant contribution to the field of finance. Goal programming benefits finance areas such as portfolio selection, capital selection, capital budgeting, and financial planning. Goal programming can also

be used in production for scheduling, aggregate production preparation, and other tasks. Goal Programming may also support the academic sector in areas such as assigning schedules for teaching staff, university admission planning, and manpower planning in the HRD region. In recent advances in the areas of transportation systems and health care planning, the Goal Programming model has proven to be useful.

Application Of The Goal Programming Technique

In today's business world, focusing solely on one universal target is insufficient. It is also important to focus on social responsibility, public relations, and industrial and labor relations, among other things. Goal Programming is an efficient OR technique that is used to maximize profits when taking into accounts a variety of other objectives. This research aids management in making informed decisions [16]. By considering various objectives or targets, the analysis can be generalized for forming units or firms. Goals and restrictions may be expanded/increased, and decisions are made based on a number of goals that have been considered.

Analysis Of The Data Envelopment (DEA)

The DEA process, which stands for 'Data Envelopment Analysis,' employs a linear programming method to assess the overall efficacy of options. Charnes et al. devised DEA in order to assess the 'Program Follow Through' program of the US federal government in the field of education. Thanassoulis et al. suggested that firm productivity be defined as the proportion of all of its weighted yields to all of its weighted sources of information. The relationship with other multi-criteria strategies is striking: firms can be thought of as choices, production as criteria to be amplified, and contributions as criteria to be minimized [17]. The DEA is used to assess the performance of companies or substances (known as basic decision making units, or DMUs) that translate various contributions into a variety of outputs. The weights assigned to yields and sources of information are not distributed by clients, which distinguishes DEA. Furthermore, it does not depend on a standard set of weights for all organizations. Rather, a linear optimization technique determines an alternative arrangement of weights to display each firm in its most optimal solution. The DEA assists decision-makers in the following ways:

1. Determining a proficiency score reveals whether a company is fully proficient or has room for improvement.
2. It determines how much information must be reduced or yield increased to become proficient by setting target values for information and yield.
3. By understanding the concept of profits to scale, it can be determined if a company's scale (or size) to minimize the ordinary absolute expense, it must be minimized or raised.
4. It identifies which other firms' processes to be broken down in order to improve its own practices by establishing a collection of benchmarks [18].

Selection And Elimination Electre (Translating Reality)

ELimination Et Choix Traduisant la REalite e (elimination and option expressing reality) strategies, also known as ELECTRE, have a position among the concordance-based outranking techniques. The true advantage is that it takes vulnerability and complexity into account. Bernard Roy came up with the ELECTRE technique. ELECTRE is not only a technique, but also a theory of alternative support. It has recently been successfully linked in a number of different fields. The following varieties of ELECTRE are available: ELECTRE – I, ELECTRE – II, ELECTRE – III, ELECTRE – IV, ELECTRE – IS, and ELECTRE – TRI. Buchanan J, despite the fact that its extension is based on a common basis, works in different ways. A single choice or group of choices is chosen and given out for a piece of preferred options using the ELECTRE I and ELECTRE – IS selection methods. ELECTRE II, III, and IV, which function as grouping strategies, are used to rank all of the alternatives considered in a package. Finally, ELECTRE TRI relegates all options to predefined groups. Limits and the outranking concept characterize the methodology. The lack of interest limits thinking in ELECTRE, and the indifferences are described once more [19]. It is up to the policy makers to define the indifference limit. ELECTRE creates a complete set of paired outranking relationships between the options. Since the mechanism could be flawed, determining the preferred solution may be challenging. A central location for driving options is developed. When the worse choices are avoided, according to this approach, there is a clearer perception of the solutions, which is especially fair when there are just a few requirements and several possibilities for the case.

Theory Of Multi-Attribute Utility (MAUT)

MAUT (Multi Attribute Utility Theory) extends the traditional utility hypothesis to the multidimensional case. Indeed, MAUT has been one of the pillars of the advancement of MCDA and its fair execution since its inception in the MCDA region. All other MCDA methods, whether directly or indirectly, use the ideas proposed by MAUT. MAUT is based on the premise that each decision maker tries to improve, either deliberately or verifiably, an ability

that encompasses all of their perspectives. This implies that a power, called the utility function "U" by Keeney and Raiffa, can speak to the preferences of a decision maker. The decision-maker must first develop this function so it isn't well-known at the start of the decision-making phase. The utility function is a tool for calculating the attractiveness or choice of problems, also known as alternatives. MAUT's aim is to demonstrate and demonstrate the decision maker's unique framework into a utility/esteem work.

A Hospital Administration Resource Allocation Model

The method of administering in hospitals has become dynamic and demanding in modern medical sciences. In hospitals, there is a lot of space for the caring process. This is due to the need for protection in health-care institutions, as well as population growth. Furthermore, one of the causes of hospital cost increases is the rapid rise in employee wages. In addition, the difficulty of procedures has rendered the available facilities ineffective. As a result, administration is a difficult task for management to solve. It is becoming more difficult for the average person to locate hospitals that provide standardized services. For all hospitals, a suitable model must be built in uniform. Many hospitals seem to adopt similar protocols, allowing for the creation and uniform application of a standard allocation model.

Minimization Of Expenses

Here, we present the overall cost of the operation using a constraint that specifies the resources needed to meet the objectives. The target degree can be calculated for the sources listed using tools identified early on, if any. This necessity determines the total cost of the emergency clinic operation. As a result, this restriction identifies the asset requirements to achieve the administrator's collection of objectives. If a particular greatest asset has recently been determined, it can be used to determine the extent of objective achievements with the available assets. Let us discuss the usual pay figure for the *i*th work force classification, in order to strengthen the imperative. For example, for a nursing administration organization) At that point, the cost-cutting cap will be lifted.

$$\sum_{i=1}^{17} b_i A_i + \sum_{i=1}^5 C_i + \sum_{i=1}^2 B_i + d_2 27^- - d_2 27^+ = 0$$

Model Formulation

The model that is developed is based on the following assumptions:

1. Only available supply will be allocated in different Manila rural health centers. The supply satisfies the target cure rate of 85%. (as required by NTP)
2. A patient will take Type I anti-TB drug for the first two months and Type II drug for the succeeding four months to be completely healed with the disease.
3. A patient will be cured only if there is a continuous supply of Type I and Type II anti-TB drugs for six months. If there is a gap in the allocation, the patient will not be
4. Cured and will become resistant only to the drugs.
5. Local government unit will implement the new system of allocation of anti-TB drugs. f. It is also assumed that each rural health unit will have an allocation of the anti-TB drugs.

Future Scope

The Goal Programming Model can be used in a variety of other situations where benefit is a major concern. Our model can be applied to a waste disposal facility where medical waste is produced and profits are low in comparison to other wastes. My future research will focus on medical wastes, and I want to determine how effective our strategy is in the field of medical wastes, as well as conduct research on how to generate more benefit from medical wastes. In addition, creating a Goal Programming model to increase the benefit of the disposal unit and cultivating algae in the unit's surrounding area to help reduce pollution in the area.

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