Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/14408
DOI URL: http://dx.doi.org/10.21474/IJAR01/14408

RESEARCH ARTICLE

THE GOAL PROGRAMMING TECHNIQUE: A STUDY

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, Weighted Goal Programming, Weighted Goal Programming

Abstract

The benefits of goal Programming (GP) over linear programming (LP) are mentioned inside the context of the healthcare industry. Decision-makers ought to provide substantial attention to the method of a GP model. However, long- and short- time period answers ought to no longer be careworn. Answers also require implementations, which can be impractical or tough. The whole utilization of centers is usually recommended in a try and lessens unit costs and increase output. The sector of goal programming is continuing to expand at a speedy pace. New editions of the intention programming model are being brought into the literature and present editions are mixed collectively to form a more complete and bendy modeling shape. Goal programming is also being applied to wide various contemporary applications and is increasingly more being used in combination with different techniques from operations research and artificial intelligence to beautify its modeling flexibility.

Copy Right, IJAR, 2022,. All rights reserved.

Introduction:-

In operations research, the GP approach was developed as a widely used technique (OR). The GP model is one of the variations that have been used to tackle multi-criteria decision-making challenges on a wide scale In the 1960s, Charnes and Cooper were the first to use the GP scheme [1-3]. Ijiri (2020) "introduced the idea of pre-emptive priority factors, assigning different priority levels to incommensurable goals and different weights to goals at the same priority level, extending this resolution approach". Lee (2020) is a GP expert who has written textbooks on the topic. GP has been used to solve several issues, together with planning, resource utilization, policy analysis, and functional management [4-6]. The GP Method is a more advanced method for addressing multi-objective problems. GP is one of the most sophisticated methods for dealing with multi-object decision making (MODM) problems. This model allows for the instantaneous consideration of a large number of factors when pursuing the best resolution from a large number of options. The GP approach is an investigative structure that a decision maker may use to find the best answers to a variety of priorities that are sometimes conflicting. GP is a unique type of treatment [7-10]. This approach used a straightforward method of obtaining the best result of a single- dimensional or multiple-dimensional target task by combining a set of constraints in a linear form.

In the complex financial environment of today's healthcare industry, there is a great need for administrators to be familiar with efficient methods of allocating scarce resources. Many healthcare facilities have become similar to large business enterprises; they are complex organizations established to achieve certain objectives through integration and the use of limited resources [11]. One might think of an HCF as an organization whose primary production output goal is service. The inputs consist of:

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

1. labor of various types (physicians, nurses, aides, technicians),
2. fixed assets (buildings, beds, equipment) and
3. Working capital, converted to tangible variable assets (food, drugs, bedding, supplies).

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 [12-14]. This research aids management in making informed decisions. 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.

Goal Programming

Brody GH et al. [2019] identified a theoretical source and an experiential test of family involved preventive engagement that was specifically tailored for rural African American families with a son and daughter in their early adolescences.

This research by de Guise E et al.[2019] provides a general descriptive, cognitive portrait of a population with TBI during their acute care stay. The Rein-forcemeat Learning technique was suggested by Gaweda A E et al. [2019] as an alternative strategy for individual drug treatment for the use of renal anaemia. To evaluate dosing strategy in real time, dynamic programming methods such as Q-Learning and off Policy approximation are used. The numerical results showed that the proposed approach can be used to achieve clinical goals for a variety of human characteristics [15].

Goal Programming is the most known method in multiple-criteria decision-making, proposed by Charnes and Cooper (1961). Goal programming is a generalization of linear programming that handles multiple conflicting objective measures, where a target is set for each measure to be achieved. *e new objective function, or the "achievement function," seeks to minimize unwanted deviations from aspiration levels or a set of target values.

Consider the following model:

$$z = min \sum_{l=1}^{L} \omega_1 (n_1 + p_1) \quad (1)$$

$$f_l(x) + n_l - p_l = g_l, \qquad \forall l \in L \quad (2)$$

$$n_l \times p_l = 0, \qquad \forall l \in L \quad (3)$$

$$Ax \leq b, \quad (4)$$

$$x \geq 0, = n_l \quad (5)$$

$$p_l \geq 0$$

Where g_l specific goal of the objective function is $f_l(x) \quad \forall l \in L$ is the penalty weight. n_l and pl are the under and upper achievements of the l th goal, respectively. Equation (1) represents the objective function that minimizes the sum of the positive/negative deviations for each goal. Equation (2) is related to the decision-makers goals and computes the respective positive and negative deviations from each goal. Equation (3) ensures that at least one of the deviations must be equal to zero. Equation (4) relates to the system constraints in the decision space. Equation (5) ensures that all decision variables are nonnegative.

Goal Programming (GP) is a subset of multi-objective optimization that may or may not become a subset of multi-criteria decision analysis in the future (MCDA). This is a program for optimization. To manage several, often contradictory objective steps, it can be assumed of an extension lead or over-simplification of linear programming. Each of these metrics has a specific objective or meaning that must be met. Undesirable deviations will occur as a result of this mixture of target principles being complete in an attainment goal. It will either be a path or a subjective number based on the goal programming alternative. Since achieving the goal is thought to be close to satisfying the decision makers, a reassuring perspective is anticipated.

Three forms of determination are achieved using GP:

1. Determine the tools required to accomplish a specific set of goals.

2. With availability of resources a point should be establish where targets can be met.
3. Providing the most satisfactory clarification given a variable resource value and target significance.

Lexicographic Goal Programming

Lexicographic goal programming is used when there exists a clear priority ordering amongst the goals to be achieved. If the decision maker is more interested in direct comparisons of the objectives then weighted or non-pre-emptive goal programming should be used [16].

The algebraic formulation of a lexicographic goal programme with the number of priority levels defined as L with corresponding index l D 1; : : : ; L is given below. Each priority level is a function of a subset of unwanted deviational variables which we define as hl n; p . This leads to the following formulation:472

$$Lex\ Min\ \alpha = \{h_1\ (n,p), h_2\ (n,p), \dots\dots\dots h_l(n,p)\}$$
$$f_q\ (x) + \ n_q - p_q = \ b_q \qquad q = 1 \dots\dots Q$$
$$x \ \in F$$
$$n_q, p_{q \geq} 0$$
$$q = 1, \dots\dots . Q$$

Where each $h_1\ (n,p)$ contains a number of unwanted deviational variables

Therefore, whilst it is true that lexicographic goal programming will not be appropriate for every multi-objective situation, it can be seen that there is a class of situations in which it proves to be an effective an appropriate decision aiding tool.

Weighted Goal Programming

Barros C P and Barroso N [2019] used data envelopment analysis to reflect insurance companies operating in the Portuguese market, taking into account productivity and technological change. This study's recommendations are weighed in terms of managerial strategy. In the SGP model, Aouni B [2019] created the satisfaction intent model to freely enter in the interests of the "decision-maker

The weighted goal programme variant is covered in details in books by Romero [108] and Jones and Tamiz. Weighted goal programme can be represented by the following formulation:

$$Min\ \alpha = \sum_{w=1}^{Q} \left(\frac{u_q n_q}{k_q} + \ \frac{v_q P_q}{k_q} \right)$$

Subject to:

$$f_q\ (x) + \ n_q - p_q = \ b_q \qquad q = 1 \dots\dots Q$$
$$x \ \in F$$
$$n_q, p_{q \geq} 0$$
$$q = 1, \dots\dots . Q$$

The steps to Best Practice Goal Setting vary, but typically include the following:

1. **Create goal statements**. This statement describes what the organization is trying to accomplish.
2. **Setting Goals**. Many organizations utilize **SMART** objectives when goal setting. The utilization of this approach has been proven to align organizational strategic initiatives with goals that can be obtained.
3. **Specific**. A goal is specific when it provides a clear description of what is to be accomplished and is easily understood.
4. **Measurable**. A goal is measurable if it is quantifiable. Typically you start with baseline data, and then set a target towards which you can progress to, as well as utilization of external benchmark data. Consistent metric ranges should be used.
5. **Achievable**. Goals should be achievable. This does not mean that goals should be easy, but should be challenging and able to be accomplished.
6. **Relevant**. Relevant goals should be appropriate to and consistent with the mission and vision of the organization. Short term goals should also be relevant to the longer, broader goals of the organization.

7. **Timely**. Finally, a goal must be timely and include a starting and ending point. Often goals have intermediate steps, which can be assessed as the individual progresses.
8. **Basic Rules.** For Leaders, 70-80% of the evaluation should be tied to objective SMART goals; and 20-30% should be tied to organizational values and standards. For employees, 70-80% of the performance evaluation should be tied to values, standards, and job functions, with the remaining 20-30% tied to departmental goals. Each individual should not have more the 5-8 total goals, with each goal category weighted between 10-50% each.
9. **Goal vs. Tactic.** Don't get confused. A goal is the strategic objective you seek to achieve. A tactic is the action or strategy you plan to utilize to achieve the goal.

References:-

1. Charnes An et al, A model for non military personnel labor the executives and arranging in the U.S naval force. In Models of Manpower System (Smith A R ed.), (2014) 247-264.Elsevier. New York.
2. Charnes An et al, A staggered soundness model for EEO arranging. In Management Science Approaches to Manpower Planning and Organization Design (Charnes A ,et al. eds), (2014) 13-29. TIMS Studies in the Management Sciences. 8, North Holland, Amsterdam.
3. Charnes An et al, A multi-target model for arranging equivalent business openings in Multiple Criteria Decision Making. Kyoto 1975 (Zeleny.M. ed). 111-134. (2014) Springer. Newyork.
4. Charnes A, Cooper W and Ferguson R O , Optimal assessment of chief pay by direct programming. The board Science, 1(8), (2014)138-151.
5. Charnes A, Note on a utilization of an objective programming model for media arranging. The board Science, (2014) 431-436.
6. Chatburn, R.L. Priamano F.P, Decision examination for enormous capital buys, Respiratory Care, (2014) 1038-1053.
7. Chen S , Multi-target dynamic on the portfolio determination. Continuing of the sixth National Conference on Multiple Criteria Decision Making, Beijing, SCI-TECH Information Services, England, (2014) 169-172.
8. Cheng T C E, Wu Y N , A multiproduct, multicriterion supply-request network harmony model. Tasks Research, 54(3), (2014) 544-554.
9. Farrell A, VanDeveer S D, Jager J , Environmental evaluations: Four undervalued components of plan. Worldwide Environmental Change 11 (4), (2012) 311– 333.
10. Filippi C , A new view on the resistance way to deal with affectability investigation in straight programming. European Journal of Operational Research, (2012) 167-179.
11. Fortson J C and Dince R , A utilization of objective programming to the administration of a nation bank. Diary of Bank Research, 7(4), (2012) 311-319.
12. Fuller S K , Evaluating fire assurance venture choices for mortgage holders. Financial Planning Sciences, 25(2), (2012) 143-154.
13. G.C. Bento, J.X. Cruz Neto, P.R. Oliveira and A. Soubeyran, The self guideline issue as an estimated steepest drop strategy for multicriteria streamlining. European Journal of Operational Research, 235 (3), (2012) 494–502.
14. Gao R and Hu Z , A multicriteria network model for monetary arranging. Advances in Multiple Criteria Decision Making,Global Link Publishing, Hong Kong, (2012) 115-118.
15. Gao Zhen and Lixin Tang , A multi-target model for mass crude materials of enormous scope coordinated steel plant. Global Journal of Production Economy, 83-3, (2012) 325-336.
16. Gass S I and Pallabi G R , The trade off hyper-circle for multi target straight programming. European Journal of Operations Research, 144-3, (2012) 455-479.