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Goal Programming for Course Affiliation Planning

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ABSTRACT : In the complex environment, today's education institutions requires administrators who are familiar with efficient method of allocating scare resources. Many method are available have for large business enterprises, which intend to achieve multiple and conflicting goals through integration and use of limited resources. The objective of this study was to develop the goal programming approach in allocation of resources, and to determine the optimal sequence for allotment and allocation of resources that maximizes the total contribution to profit.

Keywords: goal-programming.

I. INTRODUCTION

In this paper we develop the goal-programming mode, which determine the optimal sequence for planning to get course affiliation from competent authority that maximizes the total contribution to over all development of academic institute.

Goal Programming is one of the models in this context because it can describe the activities of individual goals. Goals Programming is a mathematical technique and a variation of linear programming. Goal Programming is an approach that is capable of handling decision-making problems having multiple, conflicting goals. The objective function of a Goal Programming model can be composed of non-homogeneous units of measurement, and includes only the deviational variables (d- and d+) that are complementary to each other.

The decision-making's goals may be ranked based on priority. Goals of equal priority may be weighted differently in order of quantifiable assigned values. Therefore, the objective of Goals Programming is to minimize the summation of deviational variables (i.e., the desired goals levels), subject to a set of goals and systems constraints.

II. DATA OF THE PROBLEM

The data is collected from Govt. Senior Secondary School, Gadarwara (MP) The required information is given in the following table:

Table 1

	Operational Criteria Credit Points						Possible Credit Points
	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	
Academic Resources (I_1)	8	5	4	2	2	1	21
Infrastructural Resources (I_2)	5	2	0	1	2	0	43
Library Resources (I_3)	3	3	4	1	0	1	36
Average Point required for affiliation	1.25	1.30	1.20	2.10	2.25	3.00	

Where

Y_6 = Assure adequate salary increases for the academic staff, teacher assistants and general staff.

Y_5 = Assure adequate number of teachers by meeting desired teacher/students ratio and by having instruction available for the needed students credit hours. The upper division teacher/students requirements are considered to be twice as important as the primary teacher requirement

Y_4 = Attain a desire distribution of the academic staff with respect to rank.

Y_3 = Maintain desired teacher / staff ratio

Y_2 = Maintain desired teacher/teacher assistant ratio

Y_1 = Minimize cost on infrastructural setup

I_1 = Academic Resources (Faculty at Primary/Middle/ Higher Secondary level)

I_2 = Infrastructural Resources (Play ground/Tennis Court/ well equipped Class rooms)

I_3 = Library Resources (library/books/CD's/Computer Lab).

III. GOAL PROGRAMMING MODEL

The goal programming model developed is as follows:

Minimize $Z = P_1 d^-_1 + P_2 d^-_2 + P_3 d^-_3 + P_4 d^-_4$

Subject to the constraints:

G_1 : Targeted over all development

$1.25Y_1 + 1.30Y_2 + 1.20Y_3 + 2.10Y_4 + 2.25Y_5 + 3.00Y_6 + d^-_1 + d^+_1 = 20.25$

G_2 : Targeted Students/students Ratio

$8Y_1 + 5Y_2 + 4\ Y_3 + 2Y_4 + 2Y_5 + Y_6 + d^-_2 + d^+_2 = 21$

G_3 : Targeted availability of land and class room facility

$5Y_1 + 2Y_2 + 0Y_3 + Y_4 + 2Y_5 + 0Y_6 + d^-_3 + d^+_3 = 43$

G_4 : Targeted availability of library resources

$3Y_1 + 3Y_2 + 4Y_3 + Y_4 + 0Y_5 + Y_6 + d^-_4 + d^+_4 = 36$

The equations above however, require two slack variables, to allow the possible deviation above and below the goal achievement. Note that the d_1^- appears in the objective function with aP_1 coefficient. The reason is that, since first goal requires making at least 20.25 pts , there is no need to put any restriction on d_1^+. The objective of the second, third and fourth goals are to minimize the idle capacities of all the scare resources. This is done by including under achievement variable d_2^-, d_3^- and d_4^- in objective function with priority coefficients P_2, P_3, and P_4, respectively.

IV. RESULT AND ANALYSIS

The solution values of decision variable (Y_i's) and deviational variable (d_i's) obtained by using *QSB* + Computer Software interpreted as follows:

Y_6 = Assure adequate salary increases for the academic staff, teacher assistants and general staff.

Y_5 = Assure adequate number of teachers by meeting desired teacher/students ratio and by having instruction available for the needed students credit hours. The upper division teacher/students requirements are considered to be twice as important as the primary teacher requirement

Y_4 = Attain a desire distribution of the academic staff with respect to rank.

Y_3 = Maintain desired teacher/staff ratio

Y_2 = Maintain desired teacher/student ratio

Y_1 = Minimize cost on infrastructural setup

$Y_1 = 0$, $Y_2 = 425$, $Y_3 = 110$, $Y_4 = 10$ $Y_5 = 12$, $Y_6 = 13$ since $d_1^- = d_1^+ = 0$, $d_2^- = 1100$, $d_2^+ = 0$

$d_3^- = d_3^+ = 0$ $d_4^- = 460$ $d_4^+ = 0$

The solution values in accordance with priorities states that, the first priority goal for target is fully achieved (since $d_1^- = 0$). Concentrate more on desired teacher/student ratio and academic resources . The best combination of these will be $Y_2 = 425$ and $Y_3 = 110$.

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