Introduction of Fuzzy Goal Programming Pattern
for Allocation of Resources in Educational-academic Section

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Abstract: Now days, In organizations, allocation of resources is according to traditional method and is according to experiences and mental reasoning of human force and using it causes dissatisfaction and ability of generalization and conformity doesn't have mathematical reason. The purpose of current research is presentation of Fuzzy goal programming pattern for allocation of resources in academic- education affairs of this ministry through using the mathematical theories for approach of quality and quantity of human reasoning to mathematical reasoning. the method of research is practical descriptive-sectional. The current research pattern for allocation of resources included adjusting subject of purpose with regard to ideal limitation. The subject of ideal purpose adjusted from a squared type according to minimum of squared deviation from ideals and for collecting the data related to the subject of purpose was used from matrix questionnaire and data related to ideals from documents and evidences of the year of 2004 that was analyzed and examined with the software of MatLAB and Expert- choice. After the solution of pattern with comparison of obtained results from the pattern, each of the considered ideals at the end of year of 2004 was carried out with changes. The pattern of $F(x)= 1/2 \, x'HX+ F'X$ that use from method of (Quadratic programming) each of general variables of number of student and number of faculty members in comparison with ideal was respectively (11700000 people in comparison with 116690 and 10850 people in comparison with 9855 people). Using the fuzzy goal programming caused optimization of allocation of resources. The ideals of the program have variables in regard to allocated resources in comparison with efficiency. It seems that fuzzy goal programming can be clearly effective for optimization of resource, increase in the amount of satisfaction, conformity with conditions and situations.

Key words: Fuzzy goal programming · Allocation of resources academic and educational affairs · Care and health ministry

INTRODUCTION

Planning is the process of predication of purpose and necessary action for facing with changes and uncertain factors through setting the future operation. The main purpose of planning is decrease in amount of risk taking than possible events and adoption of plans for corporation in order to get organizational achievement [1]. The allocation of resources is the most important things of manager for strategic performance and long- term plans. In other words policy and purposes of each program reflect in allocation of optimize resources to activities [1-2]. The presentation of educational service for preparation of national development with large investment needs spending national resources. In addition to financial benefits, doing the educational plants allocates to it self noticeable part of facilities, physical power, expertise and modern equipment. If the allocation of this volume of resources happens technically and economically with logical justification. The areas of growth and development is provided [2-4].

The current used method in allocation resources has disadvantage that decrease satisfaction and efficiency and effect. The most important disadvantage are:

- The intuitive method is used for allocation of resources to each of the activities and it is usually

according to weak, mental experiences and reasoning of expert and managers that has a lot of deviation mathematically.

- The organizational internal and external factors (as factors of interference) caused change in the planning of authorities, the taste, bargaining ambition in request level takes the place of standard and plan and purpose indexes.
- In the current traditional method, possibility of supervision and control of operation has not been predicted for achievement of purpose. There fore, achievement of purpose is usually to settled luck and chance without composition of control and supervision index for process of allocation of resources [5-6].

The first step for reduction of the current problem of resource allocation is ideal planning patterns that with using the ambiguous, inexact and qualitative data decrease possible of plan performance with controlling the results of plan performance to plan and technical pattern [6]. In some researches, it has been presented that the ideal planning is one of the most applicable and efficient patterns in multi-criteria and versatile planning. Using the fuzzy goal in ideal planning increase efficiency and ability of this pattern in optimization of purposes. On the contrary, in other researches it is not suitable to make patterns from mathematical tools as qualitative data.

By the way, this research wants to decide the optimization of some factors simultaneously (versatile decision – making), to find the best ideal planning. Patterns for allocation of resources and then with phasing the pattern decrease the limitation of inexact and qualitative data and finally presents the best structure of this pattern if the fuzzy goal programming pattern is determined for allocation of suitable resources. We hope with carrying out this research presents suitable solutions for increase in satisfaction, efficiency and productivity in allocation of resources. In order to take a step for growth and development in educational plans of educational deputy department and academic Affairs of health ministry.

MATERIALS AND METHODS

The research method is applied case- sectional and descriptive. In this research, we wanted to recognize the conditions on allocation of resources (descriptive) and to add adjustability to ideal planning patterns in order to present and design (an applied case) suitable allocation patterns for decision – making for allocation of resources.

The current research patterns for allocation of resources includes the ideal purpose subject is from the square type and is adjusted according to minimum square deviation from ideals. The ideals in purpose subject don't have the same weight. The limitation are divided in two groups: The idea limitation: Ideal are functional indexes that system wants to achieve them. Ideal are prepared according to parameters and show the desirable level of operation for achieving the ideal purpose. The direction of deviation in limitation is determined according to the nature of the ideal. If the both positive and negative deviations are important, the equal relation is used. If the negative deviation is important, the less or equal relation is used and if the positive deviation is important, the equal or more relation is used.

The Limitation of Resources: This group of limitations shows the accessibility to the researches. I in this research, the phased resources are used. In writing of these limitation, the phased singe are used and they usually appear as less or equal.

Method of Data Collection: For the data collection, the following methods were used. For data collection related to research parameters,we used the study of official documents and evidence. For the data collection related to the purpose subject, we used the even comparative questionnaire related to the AHP method. For the data collection related to purpose and prediction of annual ideals we used the evidences and documents of program in 2004. For using the hypothetical data, incase of the data is not available, we used the ideals of experts and specialists.

Method of Data Collection and Test of Hypotheses: The final results of the preferential structures of the ideals that the analysis and studies were according to them were down with the ideal planning patterns in which the purpose subject was from the square type and was adjusted according to the deviations from the purpose. Their solutions of was carried out through AHP method and with the aid of a soft ware called DS, MATLAB, Expert-choice. The used tools were even comparative questionnaire and analysis method was done by AHP technique.

RESULTS AND DISCUSSION

The ideal planning pattern of allocation of resources included the ideal subject from the square type that was adjusted according to the minimum square of deviation

Table 1: The comparison of real amount, ideal and amount of first and second scenario optimum

Variable	Discussion	Current situation	Ideal	First scenario (MATLAB)	Second scenario (DS)
PT	Population year 83	684674	_____	_____	_____
ST	The student in year 36	95880	116690	120200	117000
SIT	The number of associate student in the year	22650	30310	30800	32550
SET	The number of Bs student in the year	26800	34514	32610	37975
MST	The number of MS student in the year	3300	4059	8200	5425
MDT	The number of Medicine student in the year	33150	35650	29200	26700
MDAT	The number of specialized and upper student in the year	7906	10985	15700	8765
Ph.D.T	The number of specialized PHD student in the year	1074	1172	1690	1185
BT	The number of general faculty	9854	11660	12000	10850
BET	The number of lecturer faculty	2989	2989	3400	3127
BMT	The number of assistant professor faculty	5612	5612	5200	6255
BLT	The number of associated professor faculty	900	1100	1700	879
BPT	The number of professor faculty	353	400	1700	200
UST	Amount of academic space	1820656	2917250	3005700	2862500
BST	Amount of dormitory space	8416224	1633660	1683200	1719000
EST	Amount of sport- recreational space	177292	315063	324600	321250

Table 2: The comparison of budget allocation of in the year 2004 with fuzzy goal optimum amount

Variable	Discussion	Current situation	Ideal	Amount of allocation in year 2004 with million tomans	Amount of allocation in regard to phased ideal with million tomans	Amount of contradiction
PT	Population year 2003	6846743	_____	_____	_____	_____
ST	The student in year	95880	116690	392417	414561	22144
SIT	The number of associate student in the year	22650	30310	31257	44919	13662
SET	The number of Bs student in the year	26800	34514	61640	87342	25702
MST	The number of MS student in the year	3300	4059	19800	32550	12750
MDT	The number of Medicine student in the year	33150	35650	198900	160200	-38700
MDAT	The number of specialized and upper student in the year	7906	10985	71154	78885	7731
Ph.DT	The number of specialized PHD student in the year	1074	1172	9666	10665	999
BT	The number of faculty	9854	11660	_____	_____	_____
BET	The number of lecturer	2989	2989	_____	_____	_____
BMT	The number of assistant professor	5612	5612	_____	_____	_____
BLT	The number of associated professor	900	1100	_____	_____	_____
BPT	The number of professor	353	400	_____	_____	_____
UST	Amount of academic space	1820656	2917250	_____	_____	_____
BST	Amount of dormitory space	841624	1633660	_____	_____	_____
EST	Amount of sport- recreational space	315063	177292	_____	_____	_____

from the ideals. In this pattern, because the positive and negative deviations don't neutralize each other in total. We used the subject from the square type and the level of importance for each of the ideals was determined by Wi. The direction of deviation in limitation was adjusted according to the nature of the ideal (Tables 1&2).

$$\text{Min } z = \sum_{i=1}^{15} w_i \left[(d_i^-)^2 , (d_i^+)^2 \right] \qquad (1)$$

If the both positive and negative deviation were important, the equal relations of AX=b is used and if the negative deviation is important, the equal or less relation of $AX \leq b$ is used. But if the positive relation is important, their coefficient a changes to limitations of $AX \leq b$.

Therefore, with regard to the purpose subject of the pattern, the allocation of resources includes:
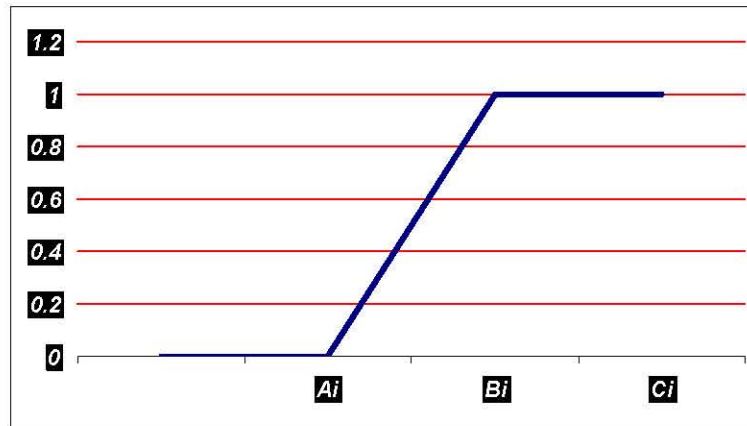
$$F(x) = \frac{1}{2} x^T Hx + F^T x$$

$$S.T = AX \leq b \qquad (2)$$

$$Aeq.X = beq$$

In which 1/2H is matrix of the second degree coefficient and F^T is matrix of the first degree coefficient.

The Fuzzy Goal Programming Pattern Design of Allocation of Resources: The effect of the out- of- control
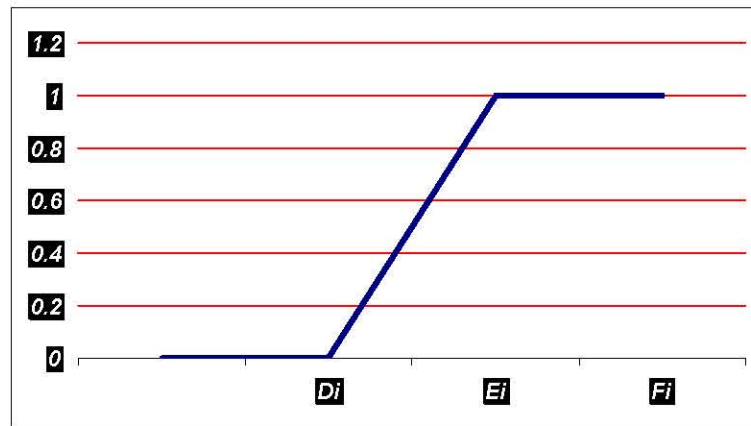
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A. The academic space

$$\mu_1(X) = \begin{cases} 0 & IF & us \lesssim 25 - T_i \\ 1 - \dfrac{(A_i - T_i) - us}{(A_i - T_i) - B_i} & IF & A_i \lesssim us \lesssim A_i + T_i \\ 1 & IF & B_i \lesssim us \lesssim B_i + T_i \end{cases}$$

Fig. 1: Formula obtained for the academic space

B. Dormitory space

$$\mu_2(X) = \begin{cases} 0 & IF & BS \prec D - _i T_i \\ 1 - \dfrac{(D_i - T_i) - BS}{(D_i + T_i) - D_i} & IF & D_i \lesssim BS \lesssim D_i + T_i \\ 1 & IF & E_i \lesssim BS \lesssim E_i + T_i \end{cases}$$

Fig. 2: Formula obtained for Dormitory space

variable causes the reduction of fixed pattern. The importance of applying phased theory in allocation of resources uses in inexact data. Therefore one of the ability of the phased theory is to adjust the mathematical patterns with verbal words. The influence of in exact data in mathematical patterns causes mathematical relations get ignored. In other words in pattern- making

instead of $\lesssim, \gtrsim$ and $\cong$ sings we should use $\cong$ and $\lesssim, \gtrsim$ (~ means almost).

In this research, resources and co- efficiency are the phased purpose subject. Phasing the resources is because influence of environmental variables and uncertainty in fulfillment of general in comes. Also phasing the co-efficiency of purpose subject is because

C. Sport- recreational space
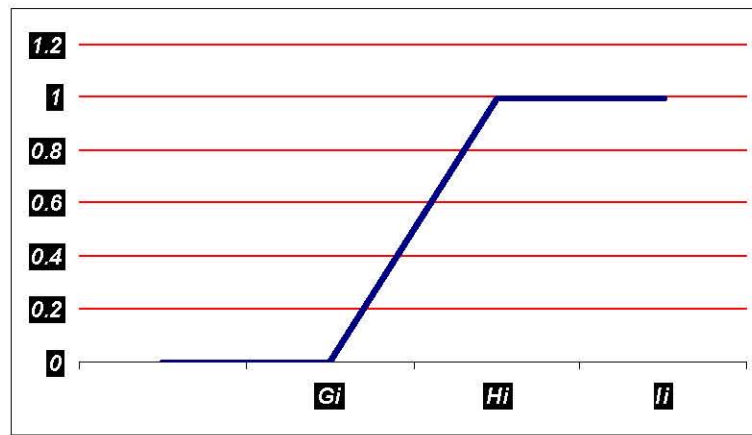
$$\mu_3(X) = \begin{cases} 0 & IF & ES \lesssim G_i - T_i \\ 1 - \dfrac{(G_i + T_i) - ES}{(G_i + T_i) - G_i} & IF & G_i \lesssim ES \lesssim G_i + T_i \\ 1 & IF & H_i \lesssim ES \lesssim H_i + T_i \end{cases}$$

Fig. 3: Formula obtained for Sport- recreational space

of using the verbal words in choosing the goal and priority of accessibility. So if the phased pattern is the definite I of phased purpose with subordinate, the following formula is obtained (Figures 1-3):

The Academic Space: In which Ai and Bi are in limitation of a little expectable up and down from the indefinite I of fuzzy purpose and Ti Tolerance with up and down limitations.

CONCLUSION

In the first scenario, the solution of ideal planning pattern was based on the square type will the square of the deviation total data that according to the obtained result and comparison of the optimized amount with the real amount led to the optimization of allocation of resources.

The current research was carried out in 3 groups of the main variables including the student admittance in different levels, the employment of faculty members and the amount of the recreational and academic space. According to the results obtained from the pattern solution in the associate level +490 people, in the Bachelor level- 1904 people and in the master of Ms.C level +4141 people are shown that the ideal. About the faculty variables at different groups in lecturer rank +411 people, in the assistant professor rank -412 people, in the

associate rank +600 people and in total 340 people were obtained than the ideal. Also, about the sports – recreational space variables according to the campus 88450 square meter, the dormitory 49540 square meters and the sports- recreational space 9537 square meters show than the ideal at the end of 2004.

This amount is almost similar to the research result of some researches at the academic educational department in the agricultural department in associate level 1263 people, in the Bachelor of the basic science 3025 people and in the master of science in agricultural department 1858 people that was carried out with lingo language [3-5].

About faculty members 522 people and recreational–academic space is according to academic space 600000 square meters, dormitory space 600000 square meters and the sport- recreational space 500000 square meters that the much difference is for the condition of variable, ideals and the amount of the students that exist in these 2 parts.

In the second scenario, with composition of the membership subject for each of the there resources from the "S" type and the change of the fuzzy data to the final one and with the DS software, the obtained results from the solution of pattern about there creational- academic space, according to the academic space 1177750 square meters increased, the dormitory space 35800 square meters increased and sports- recreational space 3350

square meters decreased than the ideal. The similar research results of a study in the academic educational department was against the real amount of the first year of program as the university space 374285 square meters increased, dormitory space 195342 square meter increased and the sports-recreational space 456816 square meters increased that represents the close relation between the pattern, ability and pattern application in different situations is different in spite of limitations and the level of the level of the different ideal [5].

Another research by a group of researches in Spain Malagather University about the application of phased ideal planning pattern in the process of the academic decision-making about the allocation of resources showed that the phased ideal planning is very suitable technique for allocation of academic resources [6-9].

Achievement of planning is not sufficient. With regard to the allocated resources. If the practical ideal is achieved 22144000 tomans in technical budget surplus of 2004 is needed. This happens because of the lack of using the mathematical effective pattern in predictions and goal-assignments, the allocation of resources are not optimized well. With regard to the special qualities of each of the area, expectation level from the university type, a lot of combination of variables and the limitation in the level of ideals, the most important and best pattern that can pay attention to these information is mathematical pattern. Mathematical planning should not only be treated as accounting technique and optimization, but also treated as analytic method. This means that mathematical planning can match behaviors and expectations (ether related to the individual or related to the system).

The main purpose from designing the fuzzy goal programming pattern for allocation of resources in the academic- educational department of Health Ministry is to clarify on the general structure of allocation and possible abilities of the patterns. That's why we used the statistic of the exact data in 3 different groups. After the solution of the pattern in 3 scenarios:

- The ideal planning from the square type of deviations with square.
- The liner ideal planning.
- The phased ideal planning distinguished that applying the 3 scenarios led to the optimization in allocation of resources.

But the third scenario with regard to the experts' ideas seemed more logical than the real ideal. At the end, with the regard to the obtained result from solving the pattern, carrying out the structural amendment is inevitable in both student admittance in combination of different levels and in the absorption of the faculty members and recreational- educational facilities. The practical fuzzy goal programming pattern is useful and effective for the allocation of resources. This pattern is applied even in departmental level and educational groups.

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