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Finding Target by Using Value Efficiency (A Case Study of Human Resources Division in Parsian Gas Refinery Company)

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Abstract

In this paper, using the Value Efficiency in DEA pattern by taking decisive obtain. Generally, non-radial model of VE and use proper weight to reduce input and output gain are the appropriate pattern. This paper introduces a multi-objective linear programming problem and efficiency determines the value of inefficient units. Use interactive methods to solve MOLP proposed and applied. In conclusion, to study the scope of human resources Parsian gas refinery runs and the pattern of the proposed models It has been found inefficient units.

Keywords: DEA, Value Efficiency, Parsian Gas Refinery Company.

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1. Introduction

DEA is method to evaluate the performance of decision making units which was first presented by Charnes et al. through CCR model. Korhonen proposed Value Efficiency to evaluate the inefficient units. In the same way, the present article propose utilizing Value Efficiency and considering managers' opinions for finding Target of linear programming model. Generally, finding Target is first achieved by comparing the efficiency of decision-making without considering personal opinions. Second, in determining the appropriate model manager's opinions is considered and prioritized accordingly. Banker and Other in 1984 with the introduction of variable returns to scale technology BCC models offer and remove the principle of extreme radiation in the collection was the possibility of making this change. Andersen and petersen in 1993 by eliminating one efficient method for ranking efficient units under evaluation suggest that creates new models were used to determine the number of decision makers. (1). Then Cook and colleagues in 2004 for benchmarking the Bank of DEA was used. (2) With the introduction of value efficiency by Halme and korhonen in 2013 VE benchmarking used to determine the value and proposed new models. (3) Halme and partners in 2014 as well as the application of the value efficiency for Target modeled on bank branches. (4) Understanding and planning for the introduction of multi-objective structure and set of answers optimal Parato well as the pattern of decision making units and become familiar with the methods of weight Lexicographic objective function can be used English books Steuer (1986). (6) Interactive multi-objective linear programming methods for applications development DEA introduced in1988 by Golany. (5).The present article is organized as follows: In the second part the basic concepts of Value Efficiency are stated and in part three the proposed model for finding a suitable model is presented using Value Efficiency. In part four VE is recommended on base of MOLP. Finally, a case study and conclusions are provided.

2. Basic Concepts of Value Efficiency

Suppose there are n decision making units which use m inputs $X_j = (x_{ij},..., x_{mj})$ to produce outputs Format $Y_j = (y_{ij},..., y_{sj})$.

The decision-making unit P is denoted by DMUp. For evaluating the inefficiency unit of P in the involvement form under variable returns to scale technology VE model was presented by Korhonen as follows:

$$Max\ \delta + \varepsilon\left(\sum_{i=1}^{m} S_i + \sum_{r=1}^{s} S_r\right)$$

St

$$\sum_{j=1}^{n} \lambda_j x_{ij} + \delta x_{ip} + s_i = x_{ip} \qquad i = 1,...,m \qquad (1)$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - \delta y_{rp} - s_r = y_{rp} \qquad i = 1,...,s$$

$$\lambda_j = \begin{cases} free & if\ \ \lambda_j^* > \circ \\ \geq \circ & if\ \ \lambda_j^* = \circ \end{cases} \qquad (2)$$

It should be mentioned that in model (1) ε in

the objective function is a non-Archimedean number, S_i is the slack variable of the input constrain and S_r is the surplus variable of the output constraint. Also, λ^* in the convex combination of efficient units which are of utmost importance from viewpoint of the manager is specified.

3. Propose Model

In this section, through considering the manager's viewpoints in the model (1) and prioritizing input and output, the value efficiency model is proposed in the non-radial form under the variable returns to scale technology as follows:

$$Max\left(\frac{1}{t}\sum_{i=1}^{t}\sigma_i+\frac{1}{f}\sum_{r=1}^{f}\delta_r\right)$$

$$\sum_{j=1}^{n}\lambda_j x_{ij}+\sigma_i x_{ip}+s_i=x_{ip} \qquad i\in I_1$$

$$\sum_{j=1}^{n}\lambda_j x_{ij}\le x_{ip} \qquad i\in I_2 \qquad (3)$$

$$\sum_{j=1}^{n}\lambda_j y_{rj}-\delta_r y_{rp}-s_r=y_{rp} \qquad r\in o_1$$

$$\sum_{j=1}^{n}\lambda_j y_{rj}\ge y_{rp} \qquad r\in o_2$$

In model (3), $S_i, S_r \ge \circ$ and conditions of λ is hold for (2). Generally, in model (3), according to the viewpoint of the manger, I_1 inputs are in the priority of reducing and o_1 outputs are in the priority of increasing in the non-radial form. Also, in the objective function the number of members in $I_\backslash$ set and the number of $o_\backslash$ members are considered t and f, respectively. Of course, the objective function (3) can be replaced with the following equation:

$$\left(\frac{\backslash}{t}\sum_{i=\backslash}^{t}w_i\delta_i+\frac{\backslash}{f}\sum_{r=\backslash}^{f}u_r\sigma_r\right)$$

In other words, w_i and u_r weights are utilized for taking into accounts the manager's viewpoint in reducing or increasing input and outputs of I_1 and $o_\backslash$ sets, respectively.

4. Suggested MOLP

It is clear that the definition of multi-objective linear programming problem arises optimal Pareto solutions that may be considered superior to or defect. But it is obvious that it is necessary to find a suitable model between model questions and answers should be exchanged decision optimal Pareto questions to be referred to as a model. In general, finding the right pattern of optimal Pareto solutions using multi-linear structure planning (MOLP) is possible. In DEA finding a suitable model can only be achieved on the basis of all efficient units but in the VE with the highest efficiency with regard to the performance of MPS is determined and efficient model for inefficient units specified for the linear multi-objective planning model for inefficient unit (P) is as follows:

$$Max\{\sigma_1,\sigma_2,...\sigma_t,\delta_1,...\delta_f\}$$

s.t

$$\sum_{j=1}^{n}\lambda_j x_{ij}+\sigma_i x_{ip}+s_i=x_{ip} \qquad i\in I_1$$

$$\sum_{j=1}^{n}\lambda_j x_{ij}\le x_{ip} \qquad i\in I_2$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - \delta_r y_{rp} - s_r = y_{rp} \qquad r \in o_1$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{rp} \qquad r \in o_2$$

$$\lambda_j = \begin{cases} free & if \ \lambda_j^* > \circ \\ \geq \circ & if \ \lambda_j^* = \circ \end{cases} \qquad S_i, S_r \geq 0$$

$$i = 1 \ldots m \ , \ r = 1 \ldots s$$

To solve the model (4) of Lexicographic X-ray method can be used. But extreme in solving one of the objectives may be problematic. Total weighted using an objective function leads to a model (3). In general, the weight of the structure and function MOLP helps us as a model to be introduced first optimal Parato solutions. Second, by giving appropriate weight priority to reduce input and increase output can be done. Thirdly, with regard to MPS administrator productivity compared with the units that are most appropriate model to apply and efficient units will be determined at the end. Interactive methods Z-W, STEM to solve the model (4) is recommended. Generally, the multi-objective programming model (4) the following advantages are considered:

a) Find a suitable model for inefficient unit DMU_P from the solutions of the optimal Pareto.

b) To handle input I_1 and output O_1, reducing Input and increasing Output gain is included.

c) Do Manager viewpoint and prioritize actions to get the right model.

d) find an appropriate model using non-radial structure.

e) The use of weight control for the dual model (4) and limit the inputs and outputs

To find the right model in the proposed models of optimal solutions we use λ^*_j are placed in the following equation:

$$\{\sum_{j=1}^{n} \lambda^*_j x_{ij} \ , \ \sum_{j=1}^{n} \lambda^*_j y_{rj}\}$$

5. The Case Study In this section the following results were obtained through considering eleven units in Parsian Gas Refinery Company with four inputs and six outputs in the human resources division:

Table1. data of inputs:

DMU	I1	I2	I3	I4
1	4	21337223	47	1
2	6	16896266	42	6
3	2	24630600	43	4
4	25	9140888	37	11
5	4	9791675	37	5
6	22	13341436	41	10
7	16	13118186	39	5
8	2	15064400	41	0.5
9	205	12071948	38	9
10	36	12853325	37	7
11	53	13247116	42	8

Table 2. data of Outputs:

DMU	O1	O2	O3	O4	O5	O6
1	70	60	80	80	4.5	19
2	75	73	75	75	7	14
3	50	55	70	80	2.5	17
4	80	50	65	60	21	11
5	70	70	83	80	4	9
6	60	60	75	55	19.5	15
7	65	50	60	66	19.5	13
8	60	70	77	75	2.5	13
9	70	75	72	70	208.5	12
10	60	78	78	65	51.25	12
11	65	50	74	73	49.5	15

Considering CCR and additive models, all decision making units are efficient. Meanwhile, the efficiency scale is determined by using Russell's non-radial model and weight constrain for the first and fourth inputs and the sixth output as follows:

Table 3

DMU	Efficient Scale	DMU	Efficient Scale	DMU	Efficient Scale
1	0.78	5	1	9	1
2	0.93	6	0.82	10	1
3	0.86	7	0.85	11	0.85
4	1	8	0.94	_	_

Also, with weight restrictions on the first and fourth input without placing weights restrictions on the outputs all efficient units except DMU_7 and DMU_8 are determined with the scale efficiency of 0.96 and 0.97, respectively.

If the weight restrictions are placed on the third input all units except DMU_2 will be efficient with the scale efficiency of 0.93.

At the end, the weight restriction is considered just for the sixth input and units of DMU_2, DMU_6, DMU_7 and DMU_{11} become inefficient with scale of 0.99, 0.85, 0.96 and 0.87, respectively, and other units are efficient. Finding VE is not possible by using model (1) as all units are efficient.

With the non-radial mode for the inputs and outputs and also considering DMU_9 and DMU_{10} as units which enjoy highest productivity (M.P.S) the inefficient unit of DMU_3 is considered the unit under evaluation.

The optimal solution for model (3) equals to 1.23 and this means that for DMU_3 which is inefficient the model existed on the hyperplanes which passes through MPS, i.e. units 9 and 10.

In other case, with considering the manager's viewpoint regarding units, it is observed that satisfaction towards units of 8 and 7are 60 percent and 65 percent, respectively, so with imposing the weight restriction on the first and

fourth restrictions and also by placing priority on the first output of model (3) and using units 9, 4 and 5 on a scale of with the hyper-efficient scale of 4.33, 1.27 and 1.59 as efficient units, the optimal value of objective function (3) is equal to 1.83, which means there is a possibility of finding a suitable model for units 7 and 8 on the hyperplane which passes through units 4, 5 and 9. Overall, the proper model for decision making units can be determined by considering the manger's viewpoint and also using weight restrictions on inputs and outputs of the model (3) under constant returns to scale technology.

6. Conclusion

In this paper, under constant returns to scale technology a non-radial model is suggested through considering the manager's viewpoint and the separation of inputs and outputs based on the VE. The proposed model is used for inefficient units and it is necessary the corresponding variables of efficient units which are on the frontier be considered free. For future research finding hyper-efficient scale and returns to scale As well as use interactive methods Z-W and STEM to solve MOLP is recommended.

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