J. Basic. Appl. Sci. Res., 2(11)11717-11725, 2012

ISSN 2090-4304
Journal of Basic and Applied Scientific Research
www.textroad.com

Evaluation of the Suggestions System Performance Using DEA, The Case of Isfahan's Mobarakeh Steal Company

EhsanJafarpour[1]*, NaserMollaverdi[2], FarimahMokhatabRafiei[3], S. Mohammad Arabzad[4]

[1]Department of Industrial Engineering, Najafabad Branch, Islamic Azad University, Isfahan, Iran
[2,3]Department of Industrial Engineering, Isfahan University of Technology, Isfahan, Iran
[4]Young Researchers Club, Najafabad Branch, Islamic Azad University, Najafabad, Isfahan, Iran

ABSTRACT

The performance evaluation along with the efficiency of the included units of an organization is considered as a crucial fact, affecting the whole performance, either directly or indirectly. Assessment ofhow effective the staff's potential efficiency is put in to practice, and considered as one of the sides in the performance and productivity of the organization. In order to use these competent abilities, thestaffs are required to take part in company and its affairs eagerly. As a matter of fact, a suggestionssystemplays a crucial role as one of the tools in the participation preparation. The present study tries to shed light upon the performance of various units either manufacturing, or supportive in Isfahan's Mobarakeh steal company, based on suggestionssystem, using Data Envelopment Analysis. Thus, theInputs and outputs for DEA, Units functions are determined.Finally, the approach of DEA Ranking is adopted to identify the well-run unit.

KEYWORDS: Participative Management, Suggestions System, Performance Evaluation, Data Envelopment Analysis, Ranking.

1. INTRODUCTION

Paying attention to the development and the progress indicates a crucial issue in the modern world. Resource, energy, and productive labor shortages, along with the intensive competition among the various countries to find the best methods, achieving the arranged goals have provided a big challenge for them. The labor force has been introduced as one of the main aspects, resulting in raising the productivity [1-2]. According to these scholars, the labor force is regarded as a stable competitive privilege in the improvement of the institutional performance and competition [3-4].

The researches signify that, using the controlling procedures and the restrictive rules, the administrator thwarts the institutional progress, while he does not undertake the task of managing the progress [5-6].Functioning as one of the most practical means in the participative management, suggestions system is taken into account as an advanced method, bringing about the shift from a common labor to a qualified and responsible one [7]. In fact, the labor force has a basic role to help the organization reach the arranged goals, through keepingthe effective participation to inverse the performance [8].However, the efficient productivity and the constant improvement are other objectives of the suggestions system. Khanifar analyzed the job satisfaction and professional commitment between staffs in Kermanshah [9]. Hosseini Fard et al. analyzed the organizational commitment and professional commitment between staffs Private bank in Kermanshah [10].Therefore, fundamental question deals with the reason of the improved productivity. The response would pose a severe challenge to the theoretical basis. One of the common definitions of productivity, manifesting it in the efficiency and effectiveness frame work, states that productivity aims for the better use of the resources (efficiency-the appropriate fulfillment). In other words, the efficiency and the effectiveness are regarded as the main criteria. In order to find the root of this challenge, this question can be raised that who enjoys the profits, in the productivity calculation process, and how this is calculated? Thus, after adopting any system in an organization, including the suggestions system, it is necessary to evaluate the performance along the efficiency to accomplish the constant progress and institutional plans.

Data Envelopment Analysis (DEA) helps analysts measure the organizational unit’s performance. Adopting the mathematical planning methods, this technique evaluates the unit performance and also has the ability to calculate the efficiency of the units, through the available information and using the input and output variables. Moreover, the efficient and inefficient units are distinguished and it is possible to use its reason, gained through the analysis of the determined sensitivity analysis as well as the relevant information, to choose the optimal case. In order to find out how the performance of suggestions system is estimated. The present study tries first, to identify the input and output used for DEA, based on suggestions system, gathered by MobarakehSteal committee's executives, and then, to gather and analyze the related data to the suggestions system performance indicators. Finally, efficient units are classified according to the ranking.

***Corresponding Author:** EhsanJafarpour, Department of Industrial Engineering, Najafabad Branch, Islamic Azad University, Isfahan, Iran, ehsan.jafarpour@gmail.com

The main goal of this study is performance evaluation of different units of organizations based on suggesting system. In order to determine the efficiency, identification of performance factors in organization units is crucial. In this paper, each organization units considered as a decision making unit (DMU) which its performance affects by a set of inputs and outputs. Also, determining desirable inputs and outputs that can truly measure the efficiency of units is essential.

The remainder of the paper was organized as follows: in second section deals with the review of literature, the third one expresses the methodology.In the section 4, the suggestions systems in Isfahan Mobarakeh Steel are introduced, as the case study.In the end, in the section 5, conclusions are discussed.

2. LITERATURE REVIEW

2.1. Suggestions system

The suggestionssystemis taken into account as one of the most fruitful means in changing the job status and making the room for the employee's participation. The general target of a suggestions system is more staff participation, resulting in evident advantages such as time saving, higher sale rates, and unseen advantages like the high motivation among the stuff [11].The suggestion or the individual continual improvement plays a constantly inventive and progressive role in the organization to internalize institutional management as well as to connect the lowest level and the highest one. Also, most staffs participate within the system [12].

As Yousefiputs, the significant impediments in suggestions system include staff obstructions among the executive, structural, cultural and managing ones[13]. Furthermore, Habibniabelieves in five elements, including the education, institutional status, payments and services, the experience along with the staff age have an important function in suggestions system[14]. Investigating the impact of the personality characteristics of the staff in the Education Ministry of Khorasan-e-Razavi on participation rate in suggestions system,Moghimihas come to this point that there is no meaningful relation among personality characteristics, control source, the accordance with employee's status and self-esteem[15].

Moreover, among the staff's background indicators, just the gender and the education result in a significant meaningful relation between the participative and non-participative staff in the suggestionssystems. Lorens et al. believe that the active participation of the staff and adopting suggestions system could improve continually[16]. Also, wells states that there are some key elements, used in an effective handling of the suggestions system, including the CEO's support, the simple ways of suggestion, the appropriate procedure to evaluate the suggestions system, a practical planning for making the connection between a suggestions system, a practical planning for making the connection between a suggestions system and a fair prize-giving according to an appropriate evaluation framework[17]. Jeromos defines the suggestions system as a system in accordance with the institution culture[18].

The researcher here mentions the staff participation as a final goal ending in money saving, more sales and raised motivation. Tonisen puts that the staff participation is a key issue to reach the constant inventions, and the organizations can use the employee's ideas to manage well through a Participative Management [19]. Additionally, Plessis and Paine represent a logical relation among the number of the accepted suggestions, the tie to respond the suggestions, and the impact of this reaction on the staff which is usually ignored[20].

2.2. DATA ENVELOPMENT ANALYSIS

The non-parametric methods, used in the efficiency calculation as well as the evaluation of Decision MakingUnits(DMUs), were founded by an economist called Farrel[21]. Examining a system containing twoinputs and oneoutput in 1957, he analyzed the efficiency units through a non-parametric method for the multiple input and output systems, and therefore, the progressed mathematical planning models have been called Data Envelopment Analysis. Charnes,Cooper and Rhode's model in which the output on the scale is fixed, has been called CCR as well [22]. In 1984, Banker, Charnes and cooper used CCR for the cases with the output on the variable scale. This method is known as BCC, and analyzes the efficiency of DMU_k(K=1,2,…,n) by means of solving the linear planning problem [23].

The output based BCC is represented as follow:

$$\text{Min } Z = \sum_{i=1}^{m} v_i x_{io} + w \qquad (1)$$

s.t.

$$\sum_{r=1}^{s} u_r y_{ro} \lambda = 1$$

$$\sum_{i=1}^{m} v_i x_{ij} - \sum_{r=1}^{s} u_r y_{rj} + w \geq 0 \qquad (j = 1,2,\dots,n)$$

$$u_r, v_i \geq \varepsilon$$

$y_{rj}$is the number of the output r in level of J (r=1,….,s), whereas$S$ stands for the number of output$x_{ij}$is the number of the input I in level of J, (i=1,….,m), where$m$ stands for the number of input.(n=the number of decision making units.)

2.3. Data Envelopment AnalysisRanking

Ranking DMUs is one of the main problems in DEA. Traditional DEA models, such as CCR and BCC do not allow for ranking DMUs, specifically the efficient ones. Respectively, Andersen and Petersen first developed the super-efficiency model, a model which can rank efficient units [24]. Recently, several ranking methods have been introduced into the DEA context (e.g. Jahanshahloo et al., [25]; Makui et al.,[26]; Wu et al., [27]).The present study adopts Wang and Luo's modelin which, based on TOPSIS tools, efficiency will be calculated, through two phases, defining the Ideal positive and Negative DMU_s as wel as calculating the interval between the options and these Units [28-29].

$$\text{Max } \theta_{jo} = \sum_{r=1}^{s} u_r y_{rjo} \quad (2)$$

S.t

$$\sum_{i=1}^{m} v_i x_{ijo} = 1$$

$$\sum_{r=1}^{s} u_r y_j^{\max} - \sum_{i=1}^{m} v_i \left(\theta^*_{IDMU} x_i^{min}\right) = 0$$

$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \le 0 \quad , j = 1, \dots, n$$

$$u_r, v_i \ge \varepsilon \quad , \ \forall r, i$$

Whereθ^*_{IDMU}equals the number of the optimal efficiency IDMUand$J_0$is still being investigated.ADMU model functions as follow:

$$Min\varphi_{jo} = \sum_{r=1}^{s} u_r y_{rjo} \ (3)$$

S.t

$$\sum_{i=1}^{m} v_i x_{ijo} = 1$$

$$\sum_{r=1}^{s} u_r y_j^{\min} - \sum_{i=1}^{m} v_i \left(\varphi^*_{IDMU} x_i^{max}\right) = 0$$

$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \ge 0 \quad , \quad j = 1, \dots, n$$

$$u_r, v_i \ge \varepsilon \quad , \ \forall r, i$$

In these models, θ^*_{jo} and θ^*_{IDMU} are the possible highest efficiency for IDMU, DMU_0which are counted based on the first model. Also, φ^*_{jo} and φ^*_{IDMU}stand for the possible worst relative efficiency which are the results of the second model.

RC which is the indicator of the relative contiguity, will be calculated to combine the best and the worst efficiency in DMU ranking. The indicator of the relative contiguity is defined as:

$$RC_{jo} = \frac{\varphi^*_{jo} - \varphi^*_{ADMU}}{\left(\varphi^*_{jo} - \varphi^*_{ADMU}\right) + \left(\theta^*_{IDMU} - \theta^*_{jo}\right)} \ (4)$$

The greaterRC_{jo},the more efficient DMU_0.

3. Case Study : Isfahan's Mobarakeh Steal Company Isfahan's

Mobarakeh Steal Company is of the largest industrial complexes ofIran, with a production capacity of 7.5 million tons of various hot and cold rolled flat steel products, tinned, galvanized and color coated ranging in thickness from 0.18 to 16 millimeters.It is located on a plot of land 35 square kilometers in areas, near Mobarakeh city and 75 kilometers to the south west of Isfahan city. The including units of the company are selected according to the organizational diagram of suggestions systems which will be introduced later.

3.1. The Suggested Approach

As it is shown in Figure 1, in the suggested model, first inputsand outputsof DEAmodel are identified, based on suggestionssystem, by Mobarakeh Steal executives of suggestionssystem committees. Next, related data to the performance evaluation indicators which were identified in two previous phases will be gathered and then, the efficiency of the unit is assessed using BCC-output oriented model.Finally, the efficient units are categorized by employing theranking technique.

Step 1. Specifying the appropriate inputs and outputs:

The first step in each evaluation problem is determining suitable attributes. So, in this paper, at first, some attributes were determined with regard to performance evaluation of whole organization based on suggesting system. Performance evaluation attributes are Received suggestions, participation percentage, number of suggestion seeds, Mean time of responsibility, Mean time of fulfillment and Percentage of suggestion accomplishments. In this study, these attributes were used as inputs and outputs of DEA model. Thus, received suggestions, participation percentage and number of suggestion seeds are three inputs and Mean time of responsibility, Mean time of fulfillment and Percentage of suggestion accomplishments considered as outputs.

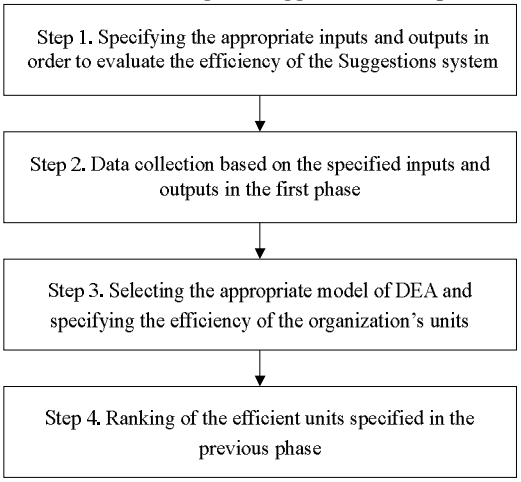

Figure1: The suggested model's suggestionssystem performance by using DEA

Step 2. Data collection:

There are 17 main areas in Mobarakeh Steel Company and considering sub-areas, there are totally 84 units. In this study, 17 main units, i.e., Deputy for Technology, Iron Making Area, Steel Making Plant 1, Steel making plant 2, Hot Strip Mill, Cold Rolling 1, Cold Rolling 2, Saba Area, Production, Energy and Fluids, Main Repair Center, Laboratory, Central Maintenance, Automation and Instrumentation, Technical and Supportive services, Labor Force and Staff were considered as decision making units. In should be mentioned that profile data for each units considering performance attributes were collected from Industrial Engineering department of Mobarakeh Steel Company in 2011.

Step 3.Selecting the appropriate DEA model and specifying the efficiency:

Since based on suggestions system, increasing values in inputs of DMUs will not increasing in performance of outputs, the base form of DEA, i.e., CCR is not suitable. Therefore, the improved DEA model, i.e., BCC model has used. On the other hand, since the most attention has focused on outputs, BCC-output oriented was implemented. Finally, Using BCC model based on suggestions system, efficient and inefficient units will be apart.

Step 4. Ranking of the efficient units:

In the last step, the efficient units were ranked using Wang and Lu (2006) ranking model. Then, a complete ranking comprise of efficient and inefficient units will be achieved.

4. METHODOLOGY

According to the suggested model for each DMU, one input and output by the help of$U_r$and$V_i$weights will be formed. The optimal weights usually are transferred from one DMU to another one. Therefore, in DEA, weights will be the outcome of the data and are not determined beforehand. Hence, regarding this capability of DEA, it is possible to reform the possible weak point in the performance evaluation of the suggestions systems, for each indicator, and to calculate the best collection of weights for each DMU.

4.1. The common procedure to evaluate the suggestions system in MobarakehSteel Company

The method to calculate the performance coefficient of suggestions system units in Mobarakeh steal is that by the start of every period, for six indexes of received suggestions the participation percentage the number of the suggestion seed, the mean duration of responsibility assignment, the mean of performance duration and the percentage of the suggestion implementations, some are considered for the six suggested indexes as the related plan for that period consequently, at the end of the period, the real fulfillment of every indicator of suggestionssystem units will be determined,regarding the real amount resulted by every indicator. Eventually, the performance coefficient for each unit is calculated through multiplying each weight by the fulfillment percentage for each index and then adding them.

In calculation of the performance coefficient of suggestions system, an issue will expressed; the available ratios can indicate a satisfactory outcome for the analyzed units, however, combining the above ratios and considering the final outcome by multiplying the determined weight for each index in every period without heeding the real amount of each index for calculation seem impossible. Therefore, in some occasions, although a unit may have a fine performance, a low performance coefficient will be assigned to it due to the calculated numbers for each indicator with a determined weight.On the contrary, in the suggested model, all indicators along worth the efficient border for them are taken into consideration. Then, the optimal weight will signify a standard to calculate the performance the company units.

4.2. Problem Features

In Isfahan's Mobarakeh steal company, there are 17 main units including some sub-units that totally result in 84 suggestion evaluating units. However, only 17 main units are studied in this paper. The main units form a supporting center represented in Table 1.

Table 1: The names of units in Isfahan's Mobarakeh Steal Company

NO	Abbreviation	Name of unit	NO	Abbreviation	Name of unit
1	TEC	Deputy for Technology	10	ENF	Energy and Fluids
2	IRM	Iron Making Area	11	CEW	Main Repair Center
3	SPR	Steel Making Plant 1	12	LAB	Laboratory
4	CCM	Steel making plant 2	13	CEM	Central Maintenance
5	HSM	Hot Strip Mill	14	TAI	Automation and Instrumentation
6	CR1	Cold Rolling 1	15	SER	Technical andSupportive services
7	CR2	Cold Rolling 2	16	PER	Labor Force
8	SCR	SabaArea	17	STA	Staff
9	PRO	Production			

4.3. Evaluation Indexes for the SuggestionsSystem Performance

Isfahan's Mobarakeh steal has used six indexes for the received suggestions, participation percentage, the number of the suggestion seeds, the mean time of the responsibility assignment, the mean time of the fulfillment and the percentage of suggestion accomplishments to calculate the suggestions system performance.In the present study, three indexes of the received suggestion seeds are taken as inputs, and three indexes of the mean time of the responsibility assignment, the mean time of are regarded as the outputs,Figure 2 displays the Input along with the output of this model schematically. Furthermore, the above data,gathered periodically, will be determined and gathered by the administration of Industrial engineering in Isfahan's Mobarakeh Steal Company. The results are expressed in Table 2.

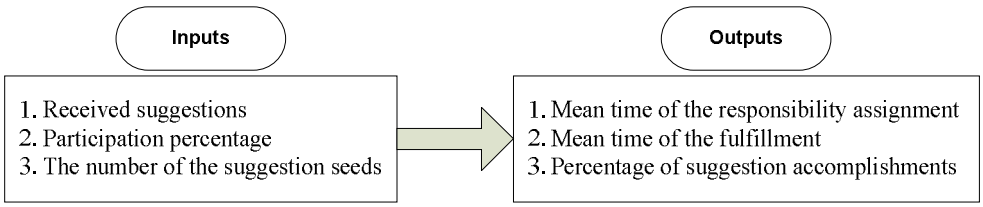

Figure 2: The suggested model's inputs and outputs in the suggestions system approach

4.4. Employing Data Envelopment Analysis Model

One of the features of DEA is the proportion of Return to Scale (RTS). It can be constant or variablereturn to scalemeans that the more input, the more output keeping the same proportion. In the variable output, the raised output is more or less than raise in input.CCR Models belong to the category of the models with the constant proportion of output on the scale. The models with a constant output are appropriate when all units function

within the optimal scale. In Units evaluation, when some limitations are imposed on the investment by the imperfect competitive circumstances, it will result in the Units malfunctioning within the optimal scale[4].As a result, due to this fact in units of suggestions system, a raise in input doesn't bring about a raise in output, then is picked.

4.4.1. The inputs and outputs in the suggested model

As noted before 3 indexes of the received suggestions, participation percentage and the number of suggestionseeds are considered as inputs and three other indexes including the mean time of the responsibility assignment, the mean time of the fulfillment and the percentage of suggestion accomplishments are regarded as the outputs for the suggested model.The information for the evaluation indexes of the suggestions system performance, using DEA is represented in Table 2.It is worth mentioning that the above information is related to anine-month period in 2011.In the suggested model, a unit is regarded as inefficient when there is no possibility of the output raise without any raise for an input or omission of the other output.

4.4.2. Solving Data Envelopment Analysis Model

As it was stated, the BCC output–oriented model is employed to solve the problem that was done using MicrosoftExcel frontier software. At last, the efficiency rate for each unit was shown in Table 3.

In the output–oriented model, the scoresmore than one signify the inefficient units and values equal to one stands for the efficient ones. Therefore, the suggestions system units including Iron plant, steal plant 1, steal plant 2, cold rolling mill 1, cold rolling mill 2, Saba, the Central Repair Shop, Labs, the Central Repairs, Automation and Instrumentation and Human force center were identified as efficient and other units as inefficient.

Table 2: performanceevaluation of Isfahan's Mobarakeh Steal Company

DMU	Received sugg.	Participation percentage	Num. of sugg. seeds	Mean time of responsibility	Mean time of fulfillment	Perce. of sugg. accomplishments
TEC	2.362	43.228	0	0.011	0.006	41.459
IRM	3.226	48.131	0	0.010	0.006	63.461
SPR	1.869	34.054	37	0.022	0.007	57.853
CCM	1.861	27.547	30	0.013	0.008	68.061
HSM	2.813	44.905	31	0.014	0.007	65.130
CR1	3.241	50.080	0	0.012	0.006	51.468
CR2	3.794	52.457	101	0.021	0.008	68.012
SCR	4.625	61.375	3	0.010	0.008	66.233
PRO	3.065	45.717	202	0.013	0.007	53.054
ENF	3.708	57.293	15	0.013	0.006	54.759
CEW	2.628	46.152	51	0.016	0.009	66.882
LAB	10.808	86.665	30	0.035	0.008	84.163
CEM	1.475	24.343	2	0.012	0.010	62.185
TAI	4.680	56.695	6	0.018	0.006	54.294
SER	3.183	44.253	110	0.015	0.008	59.126
PER	1.300	18.042	0	0.010	0.007	54.125
STA	1.489	24.146	0	0.009	0.006	43.363

Table3: The efficiency rate for the units in suggestions system based on BCC output oriented

NO	DMU	efficiency	efficient	NO	DMU	efficiency	efficient
1	TEC	1.015		10	ENF	1.253	
2	IRM	1	✓	11	CEW	1	✓
3	SPR	1	✓	12	LAB	1	✓
4	CCM	1	✓	13	CEM	1	✓
5	HSM	1.071		14	TAI	1	✓
6	CR1	1	✓	15	SER	1.145	
7	CR2	1	✓	16	PER	1	✓
8	SCR	1	✓	17	STA	1.041	
9	PRO	1.292					

4.4.3. Ranking the units by Data Envelopment Analysis Model

Now that the efficient units are identified, it is possible to use ranking technique in order to categorize the efficient units.Although there are plenty of ranking models including Anderson- Petersons, ranking technique is selected, since it also the best and the worst relative efficiency rate of DMU_S to categorize and illuminatethe persuasive outcomes. The outcomes, resulted by ranking technique are represented in 3.2., in Table 4.

Table 4: Ranking Results for the suggestions system units in Isfahan's Mobarakeh steal

DMU	DMU	BCC/IDMU	BCC/ADMU	RC	efficiency	Ranking
1	TEC	0.45912	1.06085	0.20413	1.015	11
2	IRM	0.37490	1.06275	0.20012	1.000	13
3	SPR	1.00000	1.88080	0.39024	1.000	4
4	CCM	0.73032	2.26557	0.41746	1.000	3
5	HSM	0.50900	1.38042	0.26880	1.071	7
6	CR1	0.43234	1.08487	0.20766	1.000	10
7	CR2	0.55846	1.30393	0.25805	1.000	8
8	SCR	0.29187	1.00000	0.18311	1.000	17
9	PRO	0.30667	1.00000	0.18380	1.292	16
10	ENF	0.39370	1.00000	0.18798	1.253	15
11	CEW	0.53540	1.45810	0.28423	1.000	6
12	LAB	0.69203	1.00000	0.20388	1.000	12
13	CEM	0.87844	2.53248	0.46206	1.000	2
14	TAI	0.48754	1.00000	0.19271	1.000	14
15	SER	0.44361	1.26429	0.24343	1.145	9
16	PER	1.00000	2.93893	0.51534	1.000	1
17	STA	0.67249	1.82359	0.35301	1.041	5

5. DISCUSSION AND CONCLUSION

The suggestionssystemfunctions as a connective tunnel through which people can inform the administrators about their theoretical and practical skills. This system has been employed by many institutions for many years and has caused the cost reduction. Moreover, this system has increased the institutional performance effectiveness enormously. In organizationsthe performance of various units is not evaluated positively and effectively according to the suggestions system, instead the main subject is to assess the suggestionssystemproperly, i.e.,it is being investigated to find out which technique is available to assess the performance of suggestionssystem within the organization units and to pick the most efficient unit. In other words, the appropriate selection of the efficient unit according to the suggestions system, affects both effectiveness and the participative spirit among the staff.

In this paper, DEA was employed to evaluate the suggestionssystem performance in Isfahan's MobarakehSteal Company. First, the efficiency of the suggestionssystem units is calculated using the output – based BCC, and next, theunits were categorized. In the first phase, 11 units out of 17 were identified as efficient. Ranking is used to recognize the most efficient unit as the most well- run one. The ranking results show that Human Force unit occupies the first place, with proximity index of 0.51534 Centralized Repair unit with the proximity index of 0.46206 is in second place and finally, the third one is Automation and Instrumentation unit with the proximity index of 0.4176. The available indexes for the performance evaluation of the suggestionssystem are used in Isfahan's Mobarakeh Steal.

Nowadays, increasing productivity has been considered more than ever by managers and it is identified as an organization and managers performance measurement tool. For this reason, employees must participate willingly in the affairs of the organization. Suggestion system is identified as a tool for providing this participation. Any attempts organizations do in this field result moving their future based on quality. Therefore, in this research efficiency and effectiveness of organizations are measured based on suggestion system using DEA with following aims:

- Achieving solutions for improving evaluation of suggestions system.
- Raising the awareness of managers about the strengths and weaknesses of organization units.
- Qualitative and quantitative improve, reduce costs, improve operational processes and so on through establishing appropriate suggestions system.
- Improving efficiency of organization units and aligning goals of units and organization through benchmarking.
- Promoting motivation among organization units through providing quantitative results.
- Improving bonus system based on obtained results.

However, it is possible to use the common indexes of the great suggestions system model in future, including the executive suggestions, the annual suggestion revenue ratio per capita, the suggestions system training hours, and the suggestion saving participate to those who make a suggestion. Also, it is possible to use this model to evaluate. Also, it is possible to use this model to evaluate the suggestion performance in other organizations such as service and productive industries and to introduce this model as a standard framework to evaluate the suggestions system.

REFERENCES

[1] Delaney, J. T., and M. A. Huselid., 1996. The Impact of Human Resource Management Practices on Perceptions of Organizational Performance. Academy of Management Journal, 39(4) : pp949-969.

[2] Jackson, S. E., and R.S. Schuler., 1995. Understanding Human Resource Management in the Context of Organizations and Their Environments .Annual Review of Psychology, 46 : pp237-264.

[3]Barney,J., 1991. Firm Resources and Sustained Competitive Advantage. Journal of Management., 17(1) , 99-120.

[4] Wright, P. M., and G. C. McMahan., 1992. Theoretical Perspectives for Strategic Human Resource Management. Journal of Management, 18:295-320.

[5] Selden, S. C., P. W. Ingraham, and W. Jacobson., 2001. Human Resource Practices in State Government: Findings from a National Survey. Public Administration Review 61(5) :pp 598-607.

[6]Steijn, B., 2004. Human Resource Management and Job Satisfaction in the Dutch Public Sector. Review of Public Personnel Administration, 24(4): pp291-303.

[7] Horton, S., 2005. Participation and Involvement of Senior Staff in the Reform of the British Civil Service. Review of Public Personnel Administration,, 25(1), pp 56-68.

[8]Datta, D. K., J. P. Guthrie, and P. M. Wright., 2005. Human Resource Management and Labor Productivity: Does Industry Matter?. Academy of Management Journal, 48(1), pp 135-145.

[9] Khanifar, H. (2012). Analysis of Job Satisfaction and Professional Commitment between Staffs.Journal of Basic and Applied Scientific Research, 2(7), 6424-6429.

[10] HosseiniFard, S. M., Darabi, M., Salimi, M. and Ramezanpour, M. (2012).Journal of Basic and Applied Scientific Research, 2(7), 6537-6541.

[11] Crail, M., 2006. Fresh ideas from the floor. Personnel Today., pp30-42.

[12]Sheikhmohammadi, M. and Tolitzadeh, M., 1999 .Partnership management based on suggestions system (In Persian, ed. 2). Tehran: ISIRAN Inistitu.

[13]Yusefi, M., (2010). Allocating based on the need of health system resource and evaluating the current situation. Journal of Hakim, 50, 10-19.

[14]Habibnia, R., 2001. Studing effective factors on employee participation in suggestion system and proposing appropriate model (In Persian). M.S. thesis, Tehran university, Tehran.

[15] Moghimi, M., 2007.Surveying the relationship between personality traits and partnership level in suggestion system, The case of education staff of khorasanrazaviprovience. M.S. thesis ,Ferdosi university, Mashhad.

[16] Lorenz, A. C., & Prado, J. C., 2000. Jesus carica continous improvement and employee participation in SMES. The TQM magazine., 12(4), pp 290-294.

[17] Wells, S.J., 2005. From ideas to results .HR Magazine, 50(2), p56.

[18]Darragh-Jeromos, P., (2005). A suggestion system that works for you .Super Vision, 66(7): pp:18.

[19] Tonnessn, T., 2005. Continuous in oration through company wide employee participation. The TQM Magazin., 17(2), pp195-201.

[20] Du Plessis, A. J., Paine, S.,2007. Managing of Human Resources and Employment Relations in New Zealand's Retail Industry. The International Journal of Knowledge, Culture and Change Management., 7(2): pp83-91.

[21]Alirezaei, M., R. Sattari, 2008. Application of Data Envelopment Analysis in Performance Evaluation of Health System of Asian Countries (In Persian).Health Information Management, 7(1), 1-15.

[22] Charnes, A., Cooper, W. W., & Rhodes, E., 1978. Measuring the efficiency of decision making units.European Journal of Operational Research., 2(6), pp 429-444.

[23] Banker, R. D., Charnes, A., & Cooper, W. W., 1984. Models for the estimation of technical and scale inefficiencies in Data Envelopment Analysis. Management Science. 30, 1078-1092.

[24] Andersen, P. and Petersen, N.C. (1993) 'A procedure for ranking efficient units in Data Envelopment Analysis', Management Science, Vol.39, No.10, pp. 1261-1264.

[25] Jahanshahloo, G.R., Hosseinzadeh Lotfi, F., Shoja, N., Tohidi, G. and Razavyan, S. (2005) 'A one-model approach to classification and sensitivity analysis in DEA', Applied Mathematics and Computation, Vol.169, No.2, pp. 887-896.

[26] Makui, A., Alinezhad, A., Kiani, R. and Zohrehbandian, M. (2008) 'A Goal Programming method for finding common weights in DEA with an improved discriminating power for efficiency', Journal of Industrial and Systems Engineering, Vol.1, No.4, pp. 293-303.

[27] Wu, J., Yang, F. and Liang, L. (2010) 'A modified complete ranking of DMUs using restrictions in DEA models', Applied Mathematics and Computation, Vol.217, No.2, pp. 745-751.

[28] MohamadzadehAsl, N. Emamverdi, Gh. And Sarirafraz, M., 2010. Ranking urban prosperity attributes of different areas of Tehran (In Persian). Journal of urban research and planning., 1(1), 85-106.

[29] Ying, M., Ying, L.,2006. DEA efficiency assessment using ideal and anti-ideal decision making units . Journal of Mathematics and Computation173, pp 902–915.