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Efficiency Analysis of Non-Governmental Organizations Based in Turkey

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Abstract

All organizations, including businesses with commercial purposes and non-profit ones like non-governmental organizations (NGOs), should always be in a constant search for ways to work with high efficiency. Otherwise, they will, in the long term, have to shut down because inefficiency is not sustainable. Therefore, NGOs also must work efficiently, and should check their performances by going through efficiency analyses at regular intervals to ensure sustainability. They should take the necessary structural and financial precautions based on the results provided by these performance analyses.

This study focuses on the efficiency analysis of 5 NGOs based in Turkey serving worldwide. The model used in the study is an integrated one combining various methods, including Data Envelopment Analysis (DEA), Efficiency Analysis Technique with Output Satisficing (EATWOS), EATWOS without Satisficing Level (SL) and Operational Competitiveness Rating (OCRA). The results obtained from each method were compared. Each method used in the study revealed that the most efficient NGO in 2014 was Turkish Diyanet Foundation (TDF).

Keywords: nongovernmental organizations, efficiency analysis, data envelopment analysis, EATWOS, OCRA

1. Introduction

Every organization needs a transformation policy to easily adapt to changing circumstances and must be in a constant search for ways to renew themselves. Nongovernmental organizations (NGOs) are not an exception. Like other businesses, they must always be ready for necessary changes too, and take all the measures not to experience difficulties in maintaining activities in the long-term.

NGOs are such organizations as chambers, trade unions, associations and foundations, established for a particular purpose by individuals working on a voluntary basis. They are non-profit organizations funded by donations and / or membership dues.

For-Profit or non-profit, all organizations should conduct efficiency analyses at regular intervals to see and rectify the weaknesses. Non-profit organizations should also take it as seriously as businesses, for it is important to efficiently use the funds collected from benefactors in accordance with the purpose. Otherwise, they will fall into disrepute and have to cease to exist eventually.

Among the fundamental goals of the societies and foundations investigated in this study are to help people suffering from wars, invasions and natural disasters and to support refugees who are displaced by solid projects as well as cash and in-kind aids, anywhere and everywhere, without any discrimination.

The approximate income of each NGO in 2014 was as follows:

Deniz Feneri Association (DFA) (founded in 1998): 14.3 million USD;

Humanitarian Relief Foundation (IHH) (founded in 1995): 155 million USD;

Kimse Yokmu Association (KYA) (founded in 2002):53 million USD;

Turkey Diyanet Foundation (TDF) (founded in 1975): 220.6 million USD;

Turkish Red Crescent Society (TRC) (founded in 1868): 207 million USD;

The total revenues of these five NGOs in 2014: approximately 650 million USD. (USD1 = TL2,65);

This study employed an integrated model combining different methods to measure the efficiency of the above-mentioned NGOs in 2014. The methods used in the study are Data Envelopment Analysis (DEA), Efficiency Analysis Technique with Output Satisficing (EATWOS), EATWOS without Satisficing Level (SL) and the Competitiveness Operational Rating (OCRA). "Total Revenues" and "Total Expenses" were taken as inputs while "Total Expense for Goals and Services" and "Surplus Income" were defined as the output criteria. No such study, related to the measurement of efficiency of NGOs, has been found in the literature. Therefore, this study is believed to be the first of its kind and thought be a positive contribution to the literature.

The rest of this paper will include section 2, which presents the methodology, and section 3, which introduces data and discussion of the results. Conclusions are shown in section 4.

2. Method

2.1 Data Envelopment Analysis

An advantage of DEA is that it is easy to measure the relative efficiency of decision making units (DMU) in the existence of a multiple-input, multiple-output structure, and it still provides a single performance index. As a mathematical linear programming technique developed by Charnes et al. (1978), it is named the CCR model. The CCR model was proposed by Charnes, Cooper and Rhodes in 1978 under the assumptions of constant returns to scale (CRS). The reduction of multi-output/multi-input position for each unit of production to a single "virtual" output and a single "virtual" input is the fundamental attribute of CCR model. The ratio of the single virtual output to the single virtual input for a particular unit provides a measure of efficiency (Makni et al., 2015). Many theoretical advances and methodological extensions have been added to DEA since the conception of the Constant Returns to Scale (CRS) model. The BCC (Banker-Charnes-Cooper) model developed by Banker et al., allowing for variable returns to scale (VRS), and the Slack-Based Model (SBM), which is unit invariant with an efficiency measure monotone decreasing in each of the slacks of the input and output variables were among the most notable ones (LaPlante & Paradi, 2015).

In the CCR model, the efficiency value for each DMU is calculated by dividing the weighted sum of the outputs by the weighted sum of inputs. All the values obtained should be equal to or smaller than 1 for all DMUs and the input-output weights should be positive. Under the constraints defined, the efficiency scores for each DM are obtained. The aim is to find the input and output weights that maximize the efficiency score. The CCR model is:

$$Max\ h_k = \sum_{r=1}^{s} u_{rk} y_{rk} \tag{1}$$

$$\sum_{r=1}^{s} u_{rk} y_{rk} - \sum_{i=1}^{m} v_{ik} x_{ik} \leq 0\ ;\ j = 1,2,\ldots,n \tag{2}$$

$$\sum_{i=1}^{m} v_{ik} x_{ik} = 1\ ;\ j = 1,2,\ldots,n \tag{2a}$$

$$u_{rk} \geq 1\ ;\ \ r = 1,\ldots,s \tag{2b}$$

$$v_{ik} \geq 1\ ;\ \ i = 1,\ldots,m \tag{2c}$$

where h_k is the DMU; u_{rk} is the weight of the output *r*; v_{ik} is the weight of input *i*; y_{rk} and x_{ik} are output quantities *r* and input quantities *i* of the *kth* DMU respectively (Cooper et al., 2011; Özdemir & Demirel, 2013).

2.2 Efficiency Analysis Technique with Output Satisficing

EATWOS is an efficiency analysis method that allows the DMU to go for satisfying solutions rather than optimum solutions while, like DEA and OCRA, it is also employed to assess the maximum profit between output and input quantities. It is a new technique developed by Peters and Zelewski (2006) based upon "satisficing" concept. They made use of Herbert A. Simon's idea, for which Simon received the Nobel Prize in economics. Simon's assessment in efficiency analysis results in the judgment that an output quantity reaching a certain SL could be just as good as an output quantity which is better than that SL. Furthermore, it might sometimes be possible to use this way of efficiency assessment to determine potentials to increase efficiency (Peters & Zelewski, 2006).

The method was used by the developers in measuring the efficiency of heat treatment furnaces and supply change (Peters & Zelewski, 2006; Peters et al., 2012). It was also used by Bansal et al. (2014) in the evaluation of vendors.

The general EATWOS procedure is described as below (Peters & Zelewski, 2006)

Determination of the inputs and outputs to be taken into account is the first step. In addition, the DMUs to be measured should be determined by the decision maker (DM). Next, the output quantities y_{ij} and the input quantities x_{ik} for all DMUs need to be determined by the decision maker. The output matrix $\underline{Y}$, as seen Equation (3), should be made up of the quantities y_{ij} of all outputs j of all DMUs i.

$$\underline{Y} = \begin{bmatrix} y_{11} & y_{12} & \cdots & y_{1J} \\ y_{21} & y_{22} & \cdots & y_{2J} \\ \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ y_{I1} & y_{I2} & \cdots & y_{IJ} \end{bmatrix} \; with\; y_{ij} \in R_{\geq 0} \quad \forall i = 1, \dots I, \quad \forall j = 1, \dots, J \tag{3}$$

Each column of the matrix $\underline{Y}$ matches an output *j*, and each row matches a DMU *i*. A similar way is used to create the input matrix $\underline{X}$.

$$\underline{X} = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1K} \\ x_{21} & x_{22} & \cdots & x_{2K} \\ \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ x_{I1} & x_{I2} & \cdots & x_{IK} \end{bmatrix} with\; x_{ik} \in R_{\geq 0}, \forall i = 1, \dots I, \forall k = 1, \dots, K \tag{4}$$

Similar to the process followed for the output matrix, each column of the input matrix $\underline{X}$ matches an input *k* $(k = 1, \dots, K)$, and each row matches a DMU. Inputs and outputs must be cardinal measures, as EATWOS requires.

EATWOS provides the chance to take into account SLs for outputs. This means that the DM is capable of determining a satisficing level SL_j for each output *j*. In addition, the relative importance weights w_k of the inputs and the relative importance weights v_j of the outputs have to be determined, as EATWOS requires (Peters & Zelewski, 2006). A scoring technique or Analytic Hierarchy Process (AHP) can also help to determine the importance weights (Saaty, 2004).

Applying EATWOS without SLs (Peters & Zelewski, 2006)

As the next step, EATWOS is applied by not taking into account the SLs. The aim is to discard SLs for all outputs. The output quantities y_{ij} are standardized first. The standardization of the output quantities is done as in TOPSIS (Hwang & Yoon, 1981).

$$\exists i \quad \exists j \quad y_{ij} \neq 0: \quad r_{ij} = \frac{y_{ij}}{\sqrt{\sum_{i=1}^{I} y_{ij}^2}} \qquad \forall i = 1, \dots, I \quad \forall j = 1, \dots, J \tag{5a}$$

$$\forall i = 1, \dots, I \quad \forall j = 1, \dots, J \qquad y_{ij} = 0:, \; r_{ij} = 0 \tag{5b}$$

The standardization process gives the standardized output matrix $\underline{R}$:

$$\underline{R} = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1J} \\ r_{21} & r_{22} & \cdots & r_{2J} \\ \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ r_{I1} & r_{I2} & \cdots & r_{IJ} \end{bmatrix} \tag{6}$$

Then, for each output *j*, the maximum standardized output quantity r_j^* is determined according to the column vectors of $\vec{r_j}$ of the standardized output matrix $\underline{R}$.

$$r_j^* = max_i\{\vec{r_j}\} \tag{7}$$

The output distance measures op_{ij} are calculated according to the matrix $\underline{R}$ and the maximum standardized output quantities r_j^*.

$$op_{ij} = 1 - \left(r_j^* - r_{ij}\right), \forall i = 1, \dots, I, \forall j = 1, \dots, J \tag{8}$$

The distance measure op_{ij} suggests that the closer r_{ij} is to r_j^*, the closer op_{ij} is to one. op_{ij} is considered to be the output score.

The standardization of the input quantities is the next step. This process is a similar one to the standardization of the output quantities.

$$\exists i \quad \exists k \quad x_{ik} \neq 0:, \quad s_{ik} = \frac{x_{ik}}{\sqrt{\sum_{i=1}^{I} x_{ik}^2}} \quad \forall i = 1, \dots, I \quad \forall K = 1, \dots, K \tag{9a}$$

$$\forall i = 1, \dots, I \quad \forall k = 1, \dots, K \quad x = 0: \quad s = 0 \tag{9b}$$

So, the way the standardized input matrix $\underline{S}$ is determined is similar to the way the output matrix is standardized.

$$\underline{S} = \begin{bmatrix} s_{11} & s_{12} & \cdots & s_{1K} \\ s_{21} & s_{22} & \cdots & s_{2K} \\ \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ s_{I1} & s_{I2} & \cdots & s_{IK} \end{bmatrix} \tag{10}$$

As the next step, the minimum standardized input quantity s_k^* for each input k is measured according to the column vectors $\overrightarrow{s_k}$ of the standardized input matrix $\underline{S}$.

$$s_k^* = min_i\{\overrightarrow{s_k}\} \quad \forall k = 1, \dots, K \tag{11}$$

ip_{ik} is calculated as shown in Equation (12). s_{ik} is added to 1, and s_k^* is subtracted from the sum.

$$ip_{ik} = 1 + s_{ik} - s_k^* \quad \forall i = 1, \dots, I \quad \forall k = 1, \dots, K \tag{12}$$

It can be concluded from this distance measure that the closer s_{ik} is to s_k^*, the closer ip_{ik} is to one. The distance measure ip_{ik} must not be zero, so one is added. ip_{ik} is taken as input score, as it is done in the output score.

In order to obtain an efficiency score for each DMU, the input scores and the output scores are used.

$$E_i = \frac{\sum_{j=1}^{J} v_j * op_{ij}}{\sum_{k=1}^{K} w_k * ip_{ik}} \quad \forall i = 1, \dots, I \tag{13}$$

When E_i of a DMU i is low, this means the efficiency is relatively lower than the other DMUs, while E_i is high the efficiency is high. The efficiency scores of the DMUs are ranked from high to low.

Applying EATWOS with SLs (Peters & Zelewski, 2006)

In this step, EATWOS with SLs SL_j is applied for minimum one output j with $j \in \{1, \dots, J\}$. Applying EATWOS with SLs is smilar to applying it without SLs.

This model uses five logical constraints. This idea belongs to from Yan, Yu, and Cheng (2003). The following five constraints are applied for all the outputs for which SLs are specified by the DM:

$$\left(\frac{SL_j - y_{ij}}{SL_j}\right) + z_1 \leq 1 \tag{14a}$$

$$\left(\frac{SL_j - y_{ij}}{SL_j}\right) * z_2 \geq 0 \tag{14b}$$

$$z_1, z_2 \in \{0; 1\} \tag{15}$$

$$z_1 + z_2 = 1 \tag{16}$$

$$a_{ij} = \frac{y_{ij}}{SL_j} * z_2 + 1 * z_1 = f(y_{ij}) \tag{17}$$

The constraints (14a) and (14b) are used to limit the probable values of the logical variables. z_1, z_2 are described as binary variables by Constraint (15). The duty of constraint (16) is to allow only one logical variable to take one, and the other zero by considering constraint (15).

The probable values that the logical variables can take in constraint (17) are calculated by using (14a), (14b), (15), and (16).

If an SL SL_j is calculated for the related output, the standardized output quantities a_{ij} are obtained by applying (14a), (14b), (15), (16), and (17). These quantities are necessary for making up the standardized output matrix $\underline{A}$. However, unless an SL is determined for an output j, the respective column vector $\vec{a}_j$ in the matrix $\underline{A}$ is equal to the column vector $\vec{r}_j$ in the matrix $\underline{R}$.

$$\underline{A} = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1J} \\ a_{21} & a_{22} & \cdots & a_{2J} \\ \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ a_{I1} & a_{I2} & \cdots & a_{IJ} \end{bmatrix} \tag{18}$$

Next, the maximum standardized output quantity a_j^* is calculated for each output *j* using the maximum value of each column vector $\overrightarrow{a_j}$.

$$a_j^* = max_i\{\overrightarrow{a_j}\} \qquad \forall j = 1, \dots, J \tag{19}$$

The maximum standardized output quantity a_j^* is used to determine the output distance measures. It is also calculated for all DMUs *i* and for all outputs *j*.

$$op_{ij}^{SL} = 1 - (a_j^* - a_{ij}) \qquad \forall i = 1, \dots, I \qquad \forall j = 1, \dots, J \tag{20}$$

A performance score is calculated for each DMU, as before. But this time, E_i^{SL} incorporates the distance measures op_{ij}^{SL} so that output SLs can be considered.

$$E_i^{SL} = \frac{\sum_{j=1}^{J} v_j * op_{ij}^{SL}}{\sum_{k=1}^{K} w_k * ip_{ik}} \qquad \forall i = 1, \dots, I \tag{21}$$

To provide a rank order R^{SL} of the efficiency of the DMUs, the efficiency scores E_i^{SL} are sorted fom high to low once again.

2.3 Operational Competitiveness Rating

Operational Competitiveness Rating (OCRA) is a simple and convenient method developed by Parkan (1994) to solve performance and efficiency analysis problems. OCRA is used in the measurement of the relative performance of the Product Units (PU) that produces similar outputs by using similar inputs. OCRA has been implemented in various areas successfully, such as investment banking, performance measurement of service buildings of public institutions, industrial enterprises, hotels and food production facilities (Peters & Zelewski, 2010).

The general OCRA procedure is described as below (Parken & Wu, 2000; Chatterjee & Chakraborty, 2012): OCRA method is only concerned with the scores that various alternatives receive for the input attribute without considering the scores received for the beneficial attribute. The lower values of non-beneficial or input criteria are more preferable. The total performance of *ith* alternative with respect to the entire input attribute is calculated using the following equation (22):

$$i^k = \sum_{m=1}^{M} a_m \frac{max_{n=1,\dots,K}(X_m^n) - X_m^k}{min_{n=1,\dots,K}(X_m^n)}, \quad k = 1, \dots, K \tag{22}$$

The function of the rating i^k is to measure the relative performance of the *kth* PU or the preference for the alternative *k*. X_m^k is the performance score of the alternative *k*, on, for example, five or nine-point scale, for the input criterion *m*. The subindex *m* in (22) refers to input criterion $m = 1, \dots, M$ and *k* refers to the alternative $k = 1, \dots, K$. The calibration constant a_m (relative importance of *jth* criterion) is used to increase or reduce the impact of this difference on the rating i^k with respect to *jth* criterion.

The ratings i^k are scaled linearly, so a zero rating can be assigned to the least preferable alternative by using the following equation:

$$I^k = i^k - min_{n=1,\dots,K}\, i^n, \qquad \forall k = 1, \dots, K \tag{23}$$

I^k represents the aggregate preference rating for alternative *k* with respect to the input criteria.

In a manner similar to the input preference rating computations, inputs are not included in this step. The aggregate performance or the preference of the decision maker for alternative *k*, on all the output criteria is measured as follows:

$$o^k = \sum_{h=1}^{H} b_h \frac{Y_h^k - min_{n=1,\dots,K} Y_h^n}{min_{n=1,\dots,K} Y_H^n}, \quad k = 1, \dots, K \tag{24}$$

The subindex *h* in (24) refers to output $h = 1, \dots H$. Y_h^k is the performance score the alternative *k* receives for the output criterion *h* using the same scale as the input scores. The higher an alternative's score for an output criterion, the higher is the preference for that alternative. b_h is calibration constant or weight importance of *jth* output criteria. The higher an alternative's score for an output criterion, the higher is the preference for that alternative. It can be mentioned that

$$\sum_{m=1}^{M} a_m + \sum_{h=1}^{H} b_h = 1 \quad (25)$$

In order to obtain a zero rating for the least preferable alternative, the ratings calculated by (26) are scaled linearly.

$$O^k = o^k - min_{n=1,\ldots,K}\, o^n, \qquad \forall k = 1, \ldots, K \quad (26)$$

O^k is the preference rating of alternative k with respect to the output criteria.

The overall preference rating for alternative k is obtained by scaling the sum $I^k = O^k$ so that the least preferable alternative receives a rating of zero. The overall preference rating E^k is calculated as follows:

$$E^k = (I^k + O^k) - min_{n=1,\ldots,K}(I^n + O^n), \qquad \forall k = 1, \ldots, K \quad (27)$$

The alternatives are ranked according to the values of the overall preference rating. The alternative with the highest overall performance rating receives the first rank.

3. Data and Discussion

The model used in the study analyzed the 2014 performances of 5 NGOs based in Turkey. "Total revenues" and "total expenses" were taken as inputs while "Total Expense for Goals and Services" and "Surplus Income" were defined as the output criteria. In the application of EATWOS, each criteria weight was taken as 0.5 while it was 0.25 with OCRA. The data used in the model, shown in Table1 below, were obtained from the official websites of the NGOs. The flow chart is given in Figure 1.

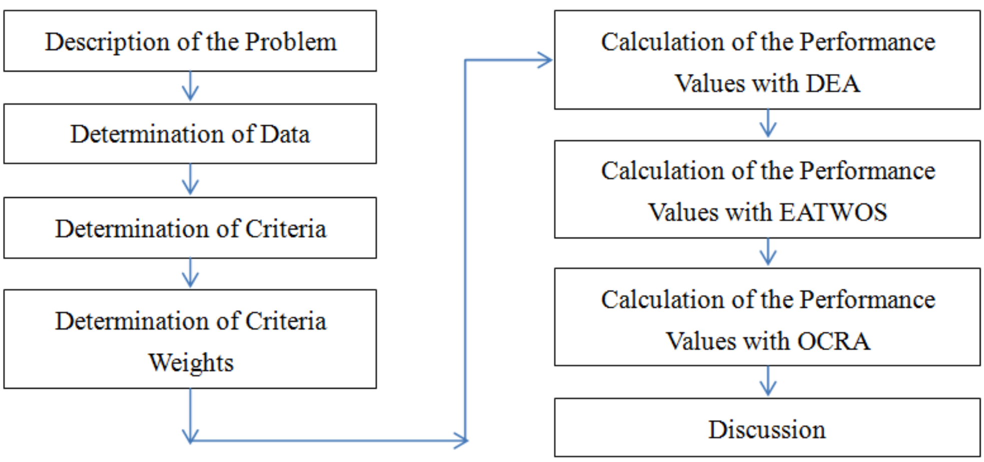

Figure 1. Flow chart

Table 1. Inputs and outputs

	Inputs		Outputs	
NGO	Total Revenues (US$)	Total Expenses (US$)	Total Expense for Goals and Services(US$)	Surplus Income (US$)
DFA	14.339.980	2.237.081	11.929.366	173.533
IHH	155.245.637	16.953.580	123.721.648	14.570.410
KYA	52.992.515	7.213.999	45.778.516	1
TDF	220.646.511	14.602.252	130.113.633	75.930.625
TRC	206.673.432	120.429.697	67.811.502	18.432.233

3.1 The Application of the DEA Method

The scale used in the study was 'constant returns to scale'. Separate analyses were performed for each NGO. The data shown in Table 1 were analyzed by DEA, and the results shown in Table 2 were obtained. It could be concluded from the analysis of the results that IHH, KYA, and TDF were the most efficient NGOs in 2014. DFA followed these three, while TRC was found to be the least efficient of all. This means TRC was relatively less efficient than the other four NGOs in 2014.

Table 2. Efficiency scores according to DEA

NGO	DFA	İHH	KYA	TDF	TRC
Efficiency Scores	0,9730	1,0000	1,0000	1,0000	0,4596

3.2 Applying EATWOS Method without SLs

With the data given in Table 2, EATWOS method was applied without consideration of satisficing levels. Criteria weights for each input and output were taken as 0.5. The Equation (5a) was employed for the standardization of input and output quantities. The standardized input and output quantities were shown in Table

Table 3. The standardized input and output quantities

	Inputs (S)		Outputs (R)	
NGO	Total Revenues	Total Expenses	Total Expense for Goals and Services	Surplus Income
DFA	0,0417	0,0182	0,0604	0,0022
IHH	0,4510	0,1381	0,6259	0,1833
KYA	0,1539	0,0588	0,2316	0,0000
TDF	0,6409	0,1190	0,6582	0,9553
TRC	0,6003	0,9813	0,3431	0,2319

In the calculation of output distance measures, Equations (7) and (8) were used while Equations (11) and (12) were employed for the calculation of input distance measures. Table 4 shows the output and input distance measures calculated.

Table 4. Input and output distance measures

NGO	Total Revenues	Total Expenses	Total Expense for Goals and Services	Surplus Income
DFA	0,5000	0,5000	0,2011	0,0234
IHH	0,7047	0,5600	0,4838	0,1140
KYA	0,5561	0,5203	0,2867	0,0223
TDF	0,7996	0,5504	0,5000	0,5000
TRC	0,7793	0,9815	0,3424	0,1383

By using Equation (13), the efficiency score for each DMU was obtained with the help of input and output distance measures. The efficiency scores and the standardized efficiency scores are given in Table 5.

Table 5. Efficiency scores and the standardized efficiency scores

NGO	Efficiency Scores	Standardized Efficiency Scores	Ranking
DFA	0,2245	0,1124	5
IHH	0,4727	0,2366	2
KYA	0,2871	0,1437	3
TDF	0,7407	0,3707	1
TRC	0,2730	0,1366	4

Analyzing the results given in table 5 obtained from the EATWOS application, the ranking was found to be as follows: TDF>IHH>KYA>TRC>DFA. So, according to Table 5, the highest efficiency was performed by TDF. TDF was followed by IHH with 0, 4727. The least efficient NGO was DFA with 0, 2245.

3.3 Applying EATWOS with SLs

Using the data given in Table 2, EATWOS method was applied with consideration of satisficing levels. The satisficing level for the output "Total Expense for Goals and Services" is determined as $SL_1 = 75.000.000$, and for the "Surplus Income as $SL_2 = 19.000$), so the logical constraints, presented in Equations (14a), (14b), (15), (16) and (17) have to be applied to these outputs. The input and output values standardized by EATWOS with consideration of "Satisficing" levels are shown in Table 6.

Table 6. The standardized ınputs and outputs with consideration of SL

	Input (S)		Output (R)	
NGO	Total Revenues	Total Expenses	Total Expense for Goals and Services	Surplus Income
DFA	0,0417	0,0182	0,1581	0,0092
IHH	0,4510	0,1381	1,0000	0,7722
KYA	0,1539	0,0588	0,6066	0,0000
TDF	0,6409	0,1190	1,0000	1,0000
TRC	0,6003	0,9813	0,8985	0,9769

The output distance measures were calculated by Equations (19) and (20), and the input distance measures were calculated by Equations (11) and (12).

Table 7. Input and output distance measures with consideration of SL

	Input (S)		Output (R)	
NGO	Total Revenues	Total Expenses	Total Expense for Goals and Services	Surplus Income
DFA	1,0000	1,0000	0,1581	0,0092
IHH	1,4093	1,1199	1,0000	0,7722
KYA	1,1123	1,0406	0,6066	0,0000
TDF	1,5993	1,1008	1,0000	1,0000
TRC	1,5587	1,9631	0,8985	0,9769

By using Equation (21), the efficiency score for each DMU was obtained with the help of input and output distance measures. The efficiency score and the standardized efficiency score are given in Table 8.

Table 8. Efficiency scores and the standardized efficiency scores with consideration of SL

NGO	Efficiency Scores	Standardized Efficiency Scores	Ranking
DFA	0,0836	0,0357	5
IHH	0,7007	0,2995	2
KYA	0,2818	0,1204	4
TDF	0,7407	0,3166	1
TRC	0,5325	0,2276	3

In the light of the analysis of the results from the EATWOS with SL application given in Table 8, the efficiency ranking is as follows: TDF>IHH>TRC>KYA>DFA. In other words, the NGO with the best performance is TDF with 0.7407 while the second best is IHH with 0.7007. The last in the ranking is again DFA with 0.0836 as it is in the EATWOS without SL.

3.4 The Application of OCRA

The data in Table 2 was used for analysis in the application of OCRA also, as in DEA and EATWOS. The scaled input and output indexes and performance scores are shown in Table 9.

Table 9. Efficiency scores and the standardized efficiency scores

NGO	Input	Output	Unscaled Efficiency Scores	Scaled Efficiency Scores	Ranking
DFA	16,56	114.965	114.981	114.966	4
IHH	12,46	9.652.898	9.652.910	9.652.895	3
KYA	15,33	0	15	0	5
TDF	11,58	50.304.041	50.304.052	50.304.037	1
TRC	0,00	12.211.354	12.211.354	12.211.339	2

Table 9 reveals that TDF is the best NGO once again in the efficiency ranking whereas KYA is the worst.

The standardized efficiency scores obtained from the analyses are shown altogether in Table 10. All the methods used in the study demonstrated that TDF had the highest score in efficiency ranking in 2014.

Table 10. Efficiency scores

	DEA	EATWOS	EATWOS with SL	OCRA
DFA	0,2195	0,1124	0,0357	0,0016
IHH	0,2256	0,2366	0,2995	0,1335
KYA	0,2256	0,1437	0,1204	0,0000
TDF	0,2256	0,3707	0,3166	0,6959
TRC	0,1037	0,1366	0,2276	0,1689

Figure 2 shows that the model used in the study, made up of DEA, EATWOS without SL, EATWOS with SL and OCRA, proves TDF is the most efficient NGO, while all the analyses except for DEA reveals that DFA is the lowest in the ranking.

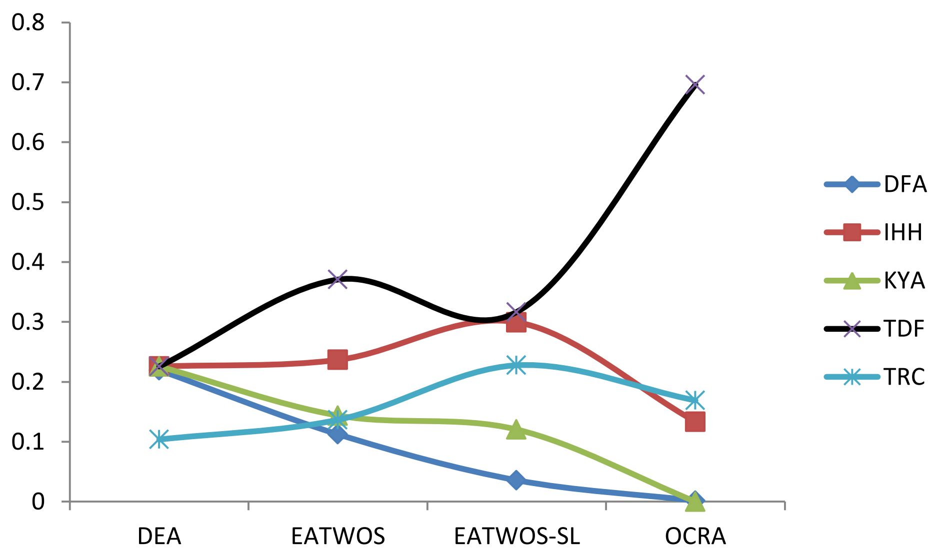

Figure 2. Efficiency scores

4. Conclusion

Like businesses, it is necessary for NGOs also to go through efficiency analyses regularly because it is important for them to maintain a good performance and work with high efficiency in order to be able to keep running. They need to check themselves for the weaknesses and make decisions about the necessary precautions. This study measured the performances of 5 NGOs based in Turkey. “Total Revenues” and “Total Expenses” were taken as inputs while “Total Expense for Goals and Services” and “Surplus Income” were defined as the output criteria.

According to the DEA analysis IHH, KYA and TDF were the best in efficiency in 2014. DEA again says that

DFA came after these three, and TRC was the most inefficient NGO.

EATWOS without SL reveals the ranking is as follows: TDF>IHH>KYA>TRC>DFA. This means that TDF used its resources most efficiently. IHH was the second best while the least efficient one was found to be DFA. According to the results provided by EATWOS with SL, the ranking is as follows: TDF>IHH>TRC>KYA>DFA. As can be seen, it is again TDF that showed the best performance. IHH is the second best while DFA is the last in ranking. OCRA demonstrated that TDF is the one with the highest efficiency ranking while KYA has the lowest performance of all.

In the light of the general analysis of the integrated model, TDF was the most efficient NGO in all the assessments. DFA was the least efficient in all but DEA. IHH came second in all analyses. TRC was the third in all efficiency rankings except for DEA. DFA and KYA shared the last places all the time. According to the results of the study, it is clear that DFA and KYA should take the necessary financial and structural precautions as soon as possible.

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