

# Civil Servant Behaviors Performance Evaluation : Combining DEAHP and 360- degree Feedback

*by* R. Rizal Isnanto

---

**Submission date:** 09-Aug-2018 10:28AM (UTC+0700)

**Submission ID:** 988613450

**File name:** 08350691\_Zuhrufillah.pdf (810.86K)

**Word count:** 3844

**Character count:** 19077

# Civil Servant Behaviors Performance Evaluation : Combining DEAHP and 360-degree Feedback

Irfani Zuhrifillah \*  
Department of Information System  
Diponegoro University  
Semarang, Indonesia  
fannzuh@yahoo.co.id

Farikhin  
Faculty of Science and Mathematics  
Diponegoro University  
Semarang, Indonesia  
farikhin.math.undip@gmail.com

Rizal Isnanto  
Faculty of Engineering  
Diponegoro University  
Semarang, Indonesia  
rizal\_isnanto@yahoo.com

**Abstract**— In Indonesia, the performance evaluation of Civil Servant is assessed based on SKP and Work Behavior. The proposed evaluation system is focusing on work behavior of civil servants through evaluating the subcriteria against the main criteria for each employee. The DEAHP model as a tool for the formation of multicriteria hierarchies and determining the weights by using efficient and inefficient of each alternative. DEAHP alone is not enough to earn the objective assessment so that the proposed using the 360-degree Feedback technique as a multi evaluator technique combined with DEAHP, this makes the evaluation more powerful. In the final process of DEA, in this case, proposed to aggregate by summing the subcriteria value against the main criteria on each DMU to obtain the final rank of the employee. At the final result generated rank data for each subcriteria and main criteria of each DMU. This performance evaluation has the lowest score for the main criteria is 13.6% and the highest 39.8%. The result obtains valid based on government regulation that the value of work behavior has not more than 40%. So the proposed model could be used as an evaluation tool for the performance of civil servant's behavior to support decision making of the decision maker.

**Keywords**—*DEAHP; Data Envelopment Analysis; 360 degree feedback; AHP*

## I. INTRODUCTION

Performance of Civil Servants (PNS) is the concern because there are still shortcomings in evaluating the performance of the Work Behavior process. To reach the objective evaluation performance of civil servants work behavior by multiperspective assessment according to the determined and measurable criteria. Currently, work behaviors judged by a single evaluator, the fact is single evaluator does not adequately represent the real assessment of employee's behavior at work, so that made unobjective results. This will affect employees who have good performance but have a judgment that almost similar to employees who have poor performance. The objective performance evaluation will affect employee motivation. In psychology, the motivation is one of the important factors that affect performance. Thus, managerial in an organization must be able to find the right instrument to motivate employees [2].

DEA analysis introduced by Charnes, Chooper, and Rhodes (CCR) in 1978 focuses on quantitative factor analysis and has

strong objectivity without considering the impact of dimensions which effectively prevent subjective factors and reduce errors [3]. DEA is not only used for rank but also determines effective and ineffective criteria [4]. DEA as an analytical tool to measure relative efficiency in various aspects of research, for eg. optimization of energy demand [5] and hospitality performance [6]. Meanwhile, Analytic Hierarchy Process (AHP) as a model used for multi-criteria assessment [12].

The combination of DEA and AHP is called DEAHP, the DEAHP model is able to evaluate the economic development of the government in China by ranking each alternative against the multicriteria, so performance appraisal more powerful and used Malmquist Productivity Index (MPI) as a performance comparison scale [13]. DEAHP also used to evaluate employee performance by proposed new methods on traditional AHP weight [7]. DEAHP for the evaluation of high-speed railway performance in Beijing by considering synthetic qualitative and quantitative factors in the efficiency of input data and output data [3]. In another case, DEAHP for evaluation to select the supplier in electronics companies combined with Activity-Based Costing (ABC) [4], and DEAHP also able to compare the impact of human resource practices on organization performance in Taiwan and China [14]. Based on this literature, the performance evaluation of civil servant work behavior using the DEHP as a tool to determines the multicriteria hierarchy and determining the weights by using efficient and inefficient of each alternative.

However, in this case, the consideration not only the process of calculation but also how to implement the objective evaluation, so as another technique needed to support the DEAHP assessment. From the aforementioned literature, it has been described that DEAHP method can be combined with other techniques according to evaluation needs, such as Malmquist Productivity Index (MPI), or Activity-based Costing (ABC). Thus, the 360-degree feedback model used to complement the DEAHP model. This model focusing to implement the objective evaluation of research needed, this is because the 360-degree feedback has multi perspectives of multi evaluators [1], and at the final step, the rank of DMU is calculating by MAJ model in DEA [18]. The 360-degree feedback as an understandable solution of the strengths, weaknesses, work of the employee, and the judge, as a better way[8]. 360-degree feedback as a tool of diagnostic human resource management [1], it is also using

for management of doctoral education to internal audit [8], for performance evaluation of life insurance companies [9], for improvement of management academic evaluation system [10]; and also for build a performance index system of university combined with AHP [11].

II. METHODOLOGY

The first step of the evaluation process is to establish criteria and sub-criteria based on government regulation and related civil servant data. In the data processing step, AHP is responsible for preparing the hierarchy to restrict the problem to be handled by the system, illustrated in Figure 1.

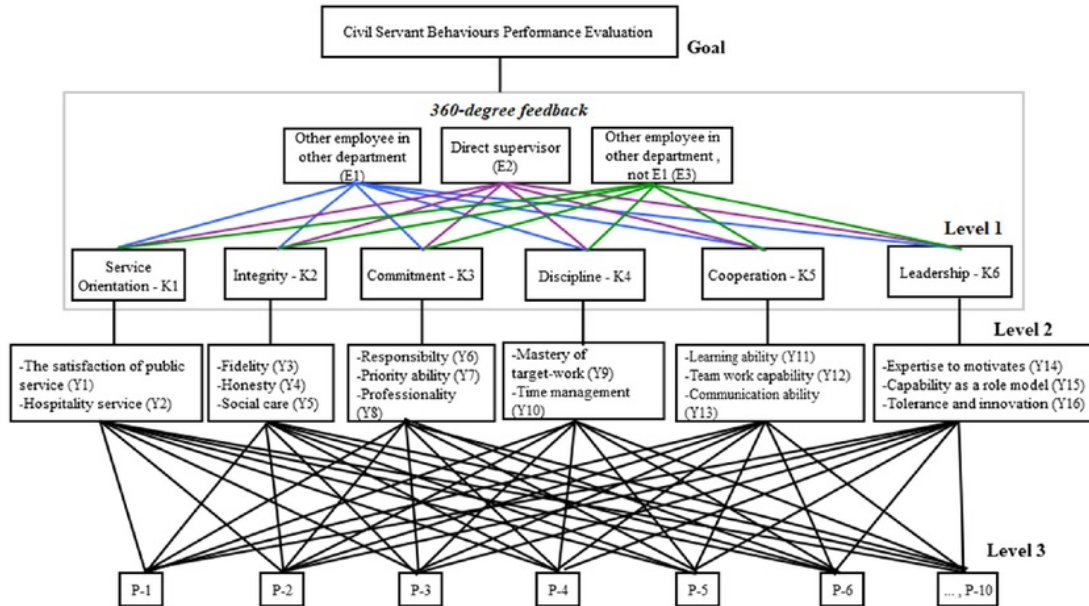


Fig. 1. AHP hierarchy that used

In the application of mathematical formulas or its calculations, there are no change formulas from the literature either in the AHP or DEA process. The proposed models and techniques focus more on how to design and build an evaluation system framework that can provide a solution to the objective of an evaluation of the employment behavior assessment of civil servants. In order to compare the difference between proposed evaluation system and current evaluation system can be seen in Figure 2. The framework of the proposed system is started from the 360-degree Feedback, and then the AHP step and at the final is ranking process of employees at the DEA step. To be able to rank more specifically, the efficient DMU must be recalculated using MAJ model in the DEA. The general description can be seen in Figure 3.

A. 360-Degree Feedback

The 360-degree Feedback model serves as a multi evaluator evaluation model [1],[2] executed at the time of the selection of the employee. The employee is called alternative (Pn) will be assessed by the evaluators (En) against to the subcriteria (Yn). In this case, there are 10 employees who set as an example in this performance evaluation. The 360-degree Feedback process begins with a selecting department will be assessed, and then evaluators are randomly selecting (E1 and E3) according to the

longest period-work in their department. The Evaluator who proposed in this research is the staff in the section/department that is not the same as the valued employee as evaluator-1 (E1), the appraiser officer as the direct supervisor in this case the head of the department or the decision maker as evaluator-2 (E2), and the staff in the section/department not the same as valuable employees and not E1 as evaluator-3 (E3). Because of the consideration of 360-degree Feedback technique, the evaluation belongs to the staff judgment only. If it extended to assessment above the staff level then the proposed system will conflict to the government regulations.

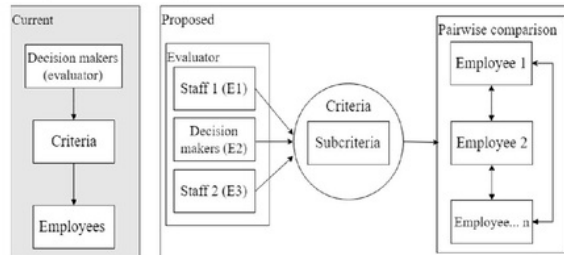


Fig. 2. Current and proposed evaluation system

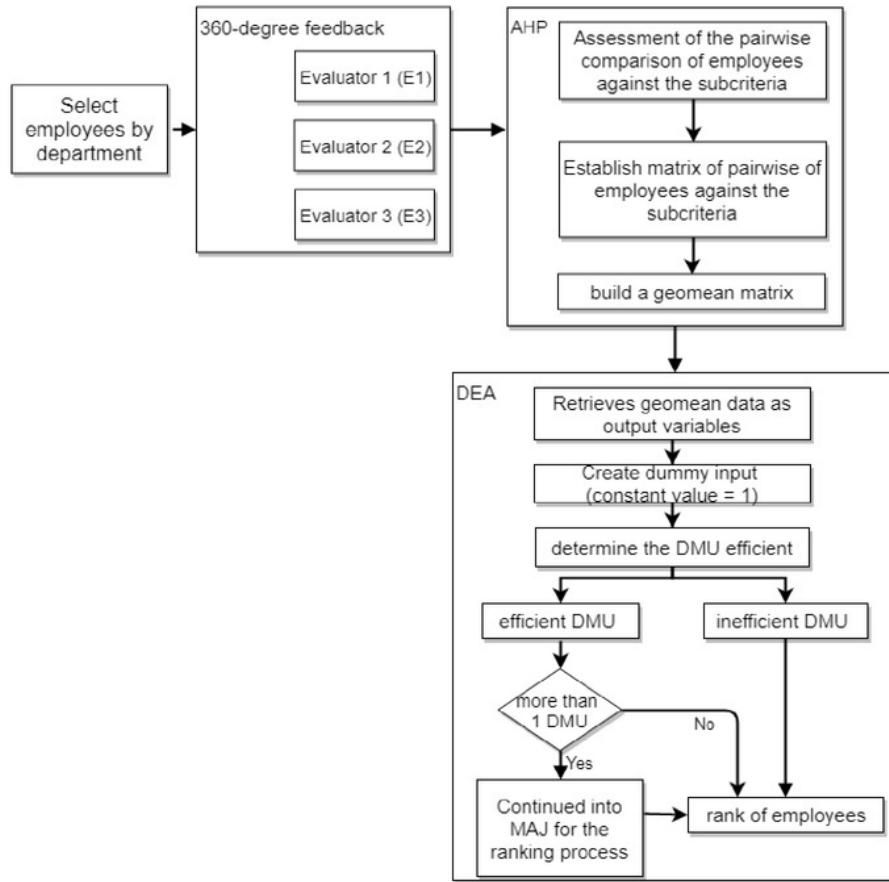


Fig. 3. The proposed evaluation system

**B. Data Envelopment Analytic Hierarchy Process (DEAHP)**

The combination of the DEAHP model that used is beginning with the AHP process to the DEA efficiency analysis process. Execution of data in the AHP process begins with the formation of pairwise comparison matrices obtained from each subcriteria. The resulting matrix that established is 48 matrices, that will form 16 geomean subcriteria matrices by calculating the value of geomean using the equation on the default software as follows

$$GM_{\bar{y}} = \sqrt[n]{y_1 y_2 y_3 \dots y_n} \tag{1}$$

where GM is a geometric mean,  $y_k$  ( $k = 1, 2, 3, \dots, n$ ) shows the  $k$ -th element of each evaluator,  $\bar{y}$  is the average of the dataset  $y$ , and  $n$  is the number of evaluators. The AHP process, in this case, doesn't need to require consistency testing because the matrix analyzed in the DEA calculations has determined the efficient and inefficient data. The table 1 showed the subcriteria Y2 geometrics matrix.

The DEA process then performs efficient analysis of input variables and output variables of each employee (DMUs) with 100% efficient value or equal to 1. Application of DEA analysis is using linear programming that requires input variables and output variables. The data from AHP process becomes output variables in DEA, but analysis DEA requires at least one input data, so in the matrix data is added dummy input column [7] as the input value of all alternatives. In table 2 showed the formation of DEA for subcriteria Y2.

TABLE I. SUBCRITERIA Y2 GEOMETRICS MATRIX.

Y2	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>6</sub>	P <sub>7</sub>	P <sub>8</sub>	P <sub>9</sub>	P <sub>10</sub>
P <sub>1</sub>	1.000	0.382	0.303	0.693	0.794	0.550	0.322	0.362	0.288	0.255
P <sub>2</sub>	2.621	1.000	0.271	0.255	0.271	0.232	0.303	0.255	0.303	0.415
P <sub>3</sub>	3.302	3.684	1.000	0.464	0.329	0.322	1.000	0.368	0.405	0.306
P <sub>4</sub>	1.442	3.915	2.154	1.000	0.437	0.347	0.329	0.794	0.288	0.500
P <sub>5</sub>	1.260	3.684	3.037	2.289	1.000	0.322	0.261	0.368	0.464	0.693
P <sub>6</sub>	1.817	4.309	3.107	2.884	3.107	1.000	0.405	0.464	0.347	0.550
P <sub>7</sub>	3.107	3.302	1.000	3.037	3.826	2.466	1.000	0.693	0.630	1.000
P <sub>8</sub>	2.759	3.915	2.714	1.260	2.714	2.154	1.442	1.000	0.585	0.347
P <sub>9</sub>	3.476	3.302	2.466	3.476	2.154	2.884	1.587	1.710	1.000	0.437
P <sub>10</sub>	3.915	2.410	3.271	2.000	1.442	1.817	1.000	2.884	2.289	1.000

TABLE II. ESTABLISHMENT OF DEA MODEL.

DMUs	Dummy Input (X <sub>i</sub> )	Output									
		Y2 <sub>1</sub>	Y2 <sub>2</sub>	Y2 <sub>3</sub>	Y2 <sub>4</sub>	Y2 <sub>5</sub>	Y2 <sub>6</sub>	Y2 <sub>7</sub>	Y2 <sub>8</sub>	Y2 <sub>9</sub>	Y2 <sub>10</sub>
P <sub>1</sub>	1	1.000	0.382	0.303	0.693	0.794	0.550	0.322	0.362	0.288	0.255
P <sub>2</sub>	1	2.621	1.000	0.271	0.255	0.271	0.232	0.303	0.255	0.303	0.415
P <sub>3</sub>	1	3.302	3.684	1.000	0.464	0.329	0.322	1.000	0.368	0.405	0.306
P <sub>4</sub>	1	1.442	3.915	2.154	1.000	0.437	0.347	0.329	0.794	0.288	0.500
P <sub>5</sub>	1	1.260	3.684	3.037	2.289	1.000	0.322	0.261	0.368	0.464	0.693
P <sub>6</sub>	1	1.817	4.309	3.107	2.884	3.107	1.000	0.405	0.464	0.347	0.550
P <sub>7</sub>	1	3.107	3.302	1.000	3.037	3.826	2.466	1.000	0.693	0.630	1.000
P <sub>8</sub>	1	2.759	3.915	2.714	1.260	2.714	2.154	1.442	1.000	0.585	0.347
P <sub>9</sub>	1	3.476	3.302	2.466	3.476	2.154	2.884	1.587	1.710	1.000	0.437
P <sub>10</sub>	1	3.915	2.410	3.271	2.000	1.442	1.817	1.000	2.884	2.289	1.000

DEA calculations using constant-return-to-scale (CRS) models are commonly known as CCR models [17]. The combination of input and output values in a DMU is needed efficiency as a weighted value. To calculate the efficiency is using the following equation (2) [6].

$$\max \theta_0 = \sum_{r=1}^s u_r y_{rj} \tag{2}$$

constraint to :

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

$$\sum_{r=1}^s u_r y_{rj} - \sum_{i=1}^m v_i x_{ij} \leq 0 \text{ untuk } j = 1, 2, \dots, N,$$

$$u_r, v_i \geq 0 ; r = 1, \dots, s ; i = 1, \dots, m$$

the  $x_{ij}$  variable is an input of the  $i$ -th type and  $y_{rj}$  is the  $r$ -type output of the DMU $_j$  being observed. The variable  $u_i$  ( $i = 1, 2, \dots, m$ ) is the weight value of the input,  $v_r$  ( $r = 1, 2, \dots, s$ ) is the output weight value and  $\theta_0$  is a relative efficiency score [6]. So the efficiency value of Y2 subcriteria obtained for DMU<sub>1</sub> = 0,291, DMU<sub>2</sub> = 0,669, DMU<sub>3</sub> = 1, DMU<sub>4</sub> = 0,969, DMU<sub>5</sub> = 0,991, DMU<sub>6</sub> = 1, DMU<sub>7</sub> = 1, DMU<sub>8</sub> = 1, DMU<sub>9</sub> = 1, DMU<sub>10</sub> = 1. For subcriteria Y1, Y3 to Y16 are done the same starting from the formation of input variables and DEA output variables.

C. DEA - MAJ

In the DEA analysis step does not stop until the determination of DMU is efficient or inefficient. For an efficient DMU that is worth one cannot be ranked because of equal value. Because the evaluation required specific rank then the efficient DMU need to recalculate used the MAJ model [15]. The MAJ model is given to overcome the weakness of the AP model [16], by obtaining the independence unit through the normalization of dividing the input data with the maximum input data value (treated equally for each input) for  $p$  is the DMU to be evaluated. The formulation of the MAJ model can be seen in equation (3)  $j_p^*$  is the value for rank,  $\min \omega_p$  is the linear objective value,  $X_p$  and  $Y_p$  are the non-negative input and output vectors of DMU $_p$ .  $\lambda_j$  is the weight of DMU $_j$  and for  $X_j$  and  $Y_j$  is the set of the  $n$ -th DMU [15].

$$j_p^* = \min \omega_p + 1 \tag{3}$$

constraint to :

$$\sum_{j=1, j \neq p}^n \lambda_j X_j \leq X_p + \omega_p,$$

$$\sum_{j=1, j \neq p}^n \lambda_j Y_j \geq Y_p,$$

$$\lambda_j \geq 0 ; j = 1, 2, \dots, n$$

MAJ steps:

1. Separate the DMU efficiently and inefficiently
2. Issue the DMU inefficiently.
3. Normalize the data by dividing each data by the highest value for each input and output.
4. Remove the DMU (DMU $_p$ ) from the calculation of the value of its objective function ( $j_p^*$ ).
5. Calculate the minimum  $\omega_p$  based on equation (3) and add constant value 1 to get the satisfied rank value.

In DEA CCR efficiency calculation, subcriteria Y2 obtained  $\theta_0 = 1$  for DMU<sub>3</sub>, DMU<sub>6</sub>, DMU<sub>7</sub>, DMU<sub>8</sub>, DMU<sub>9</sub>, and DMU<sub>10</sub>. Based on the steps mentioned above that the DMU $_p$  is an efficient DMU. So the result of normalization Y2 can be seen in table 3.

TABLE III. NORMALIZATION OF SUBCRITERIA Y2

Y2 <sub>1</sub>	Y2 <sub>2</sub>	Y2 <sub>3</sub>	Y2 <sub>4</sub>	Y2 <sub>5</sub>	Y2 <sub>6</sub>	Y2 <sub>7</sub>	Y2 <sub>8</sub>	Y2 <sub>9</sub>	Y2 <sub>10</sub>
0,843	0,855	0,306	0,134	0,086	0,112	0,630	0,128	0,177	0,306
0,464	1,000	0,950	0,830	0,812	0,347	0,255	0,161	0,151	0,550
0,794	0,766	0,306	0,874	1,000	0,855	0,630	0,240	0,275	1,000
0,705	0,909	0,830	0,362	0,709	0,747	0,909	0,347	0,255	0,347
0,888	0,766	0,754	1,000	0,563	1,000	1,000	0,593	0,437	0,437
1,000	0,559	1,000	0,575	0,377	0,630	0,630	1,000	1,000	1,000

Linear program calculation for DMU<sub>3</sub> by determining objective function value  $j_3^*$  using equation (3) by remove the DMU<sub>3</sub> from variable solution or the calculation. The mathematical model can be seen as follows.

Min  $\omega_3$

constraint to :

$$\lambda_6 + \lambda_7 + \lambda_8 + \lambda_9 + \lambda_{10} \leq 1 + \omega_3$$

$$0,464.\lambda_6 + 0,794.\lambda_7 + 0,705.\lambda_8 + 0,888.\lambda_9 + \lambda_{10} \geq 0,843$$

$$\lambda_6 + 0,766.\lambda_7 + 0,909.\lambda_8 + 0,766.\lambda_9 + 0,559.\lambda_{10} \geq 0,855$$

$$0,950.\lambda_6 + 0,306.\lambda_7 + 0,830.\lambda_8 + 0,754.\lambda_9 + \lambda_{10} \geq 0,306$$

$$0,830.\lambda_6 + 0,874.\lambda_7 + 0,362.\lambda_8 + \lambda_9 + 0,575.\lambda_{10} \geq 0,134$$

$$0,812.\lambda_6 + \lambda_7 + 0,709.\lambda_8 + 0,563.\lambda_9 + 0,377.\lambda_{10} \geq 0,086$$

$$0,347.\lambda_6 + 0,855.\lambda_7 + 0,747.\lambda_8 + \lambda_9 + 0,630.\lambda_{10} \geq 0,112$$

$$0,255.\lambda_6 + 0,630.\lambda_7 + 0,909.\lambda_8 + \lambda_9 + 0,630.\lambda_{10} \geq 0,630$$

$$0,161.\lambda_6 + 0,240.\lambda_7 + 0,347.\lambda_8 + 0,593.\lambda_9 + \lambda_{10} \geq 0,128$$

$$0,151.\lambda_6 + 0,275.\lambda_7 + 0,255.\lambda_8 + 0,437.\lambda_9 + \lambda_{10} \geq 0,177$$

$$0,550.\lambda_6 + \lambda_7 + 0,347.\lambda_8 + 0,437.\lambda_9 + \lambda_{10} \geq 0,306$$

based on the model the results obtained lambda respectively are  $\lambda_3 = 0$ ,  $\lambda_6 = 0$ ,  $\lambda_7 = 0$ ,  $\lambda_8 = 0,423$ ,  $\lambda_9 = 0,614$  dan  $\lambda_{10} = 0$ . For min value  $\omega_3 = 0.0372$  so that the objective function value  $j_3^* = 1.0372$ . In the same way, the values of  $j_6^*$  to  $j_{10}^*$  are 1.236, 1.546, 1.111, 1.438 and 2.289, respectively.

III. RESULT

The final result is the ranking for each subcriteria and the main criteria of Civil Servant Behaviors Performance Evaluation of Ministry of Religious Affairs of Banggai Regency. Table 4 shows the DMU<sub>0</sub> ranking for the Y2 subcriteria.

TABLE IV. RANK OF SUBCRITERIA Y2

DMU <sub>0</sub>	Subcriteria Y2	
	Final Result	Rank
DMU <sub>1</sub>	0,291	10
DMU <sub>2</sub>	0,669	9
DMU <sub>3</sub>	1,037	6
DMU <sub>4</sub>	0,969	8
DMU <sub>5</sub>	0,991	7
DMU <sub>6</sub>	1,236	4
DMU <sub>7</sub>	1,546	2
DMU <sub>8</sub>	1,111	5
DMU <sub>9</sub>	1,438	3
DMU <sub>10</sub>	2,289	1

Linear simplex programming calculations were performed on two applications to compare and validate the final values of Y2 subcriteria. Table 5 shows that there is a difference between DMU<sub>3</sub> and DMU<sub>8</sub>, but does not change the ranking order so that it can be said that the value obtained has the correct calculation.

TABLE V. VALIDATION WITH TWO LP APPLICATIONS

DMU <sub>0</sub>	Subcriteria Y2			
	Excel Solver	Rank	PomWin Software	Rank
P <sub>1</sub>	0,291	10	Inefficient	10
P <sub>2</sub>	0,669	9	Inefficient	9
P <sub>3</sub>	1,037	6	1.626	6
P <sub>4</sub>	0,969	8	Inefficient	8
P <sub>5</sub>	0,991	7	Inefficient	7
P <sub>6</sub>	1,236	4	1,236	4
P <sub>7</sub>	1,546	2	1,546	2
P <sub>8</sub>	1,111	5	1,108	5
P <sub>9</sub>	1,438	3	1,438	3
P <sub>10</sub>	2,289	1	2,289	1

Furthermore, after calculating the efficient value of  $j_p^*$  in all subcriteria, we get the main criteria value. To get the final result of DMU<sub>0</sub> ranking against the main criteria by summing the efficient values of all subcriteria. The ranking results obtained for each criteria and subcriteria can support the decision maker to make real decision, ie the leader or appraiser officer knows what criteria should be maintained or need to be improved for each employee. Improving the criteria value also has an impact on performance improvement and employee motivation. The following graph showed the final value of civil servant evaluation, that is presented in Figure 4 and in Figure 5.

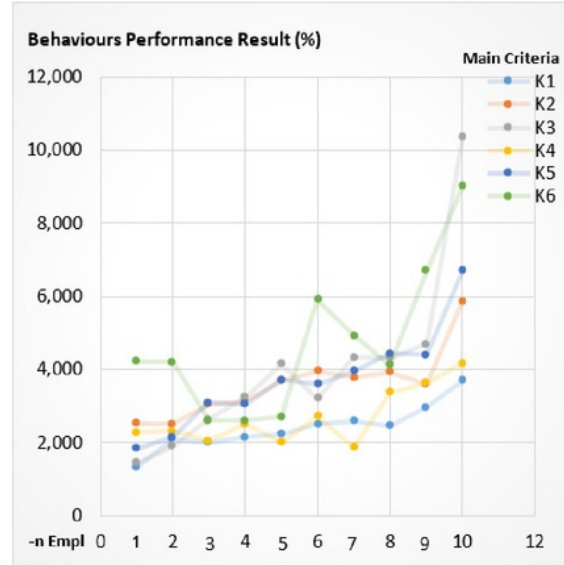


Fig. 4. Behaviour performance of employees againts the main criteria

Based on the current systems, there are any data provide that evaluation of work behavior for P<sub>1</sub> to P<sub>10</sub> almost perfect which means almost 40%, but in fact, it is not. The proposed system shows the value of civil servant behavior, one and another has a wide range value, this is because the evaluation is done by several evaluators and applied more complex calculation. In Figure 4 it can be seen in which subcriteria an employee has the lowest and highest point, then the decision maker evaluates based on the results.

IV. CONCLUSION

This performance evaluation system is a decision support system that can provide ranking information to employees who evaluated. The evaluation process performed by assessing the employees in pairs based on 6 main criteria against the 16 proposed subcriteria. From the system results, the lowest value of performance is 13.6% owned by DMU<sub>1</sub> and the highest value is 39.8% owned by DMU<sub>10</sub>. Since the maximum weight of work behavior performance is 40%, employees with a value under 20% are recommended to repair the performance because they are considered to be of poor value, the weight range of 20% -

30% is recommended for performance improvement meaning the performance results have been good but need to be improved, and for employees who have a weight above 30% should maintain performance to be the best.

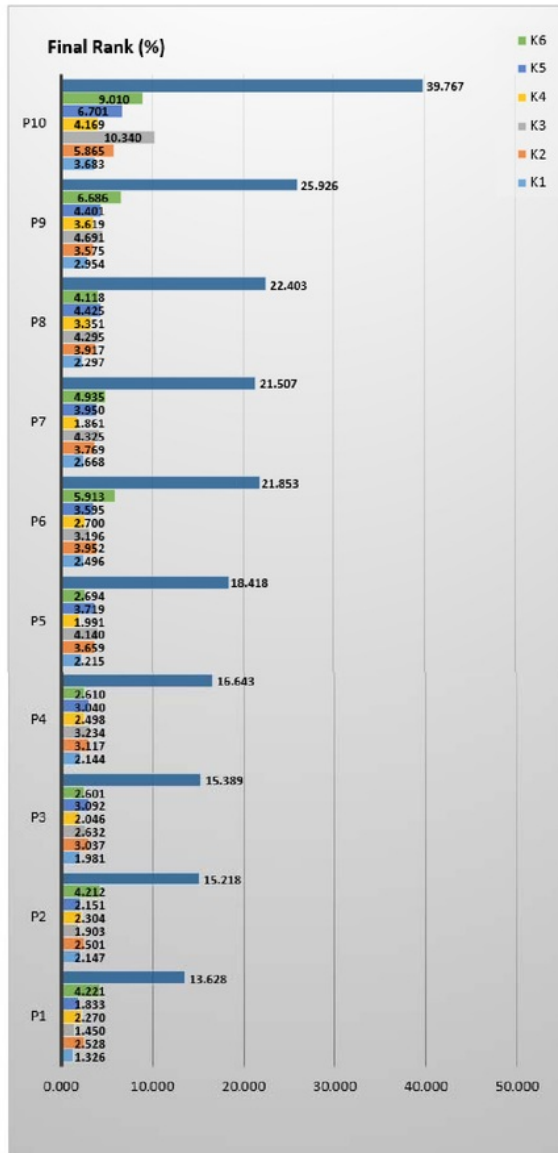


Fig. 5. Final rank

REFERENCES

- [1] S. Nanta, S. Pitikhate, "Hybrid Fuzzy-Conventional Method to Improve 360-Degree Performance Appraisal", 2016, Institute of Electrical and Electronics Engineers, 41-44.
- [2] M.K. Sanyal, S.B. Biswas, "Employee Motivation from Performance Appraisal Implications: Test of a theory in the Software Industry in West Bengal (India)", 2014, Procedia Economics and Finance 11, Symbiosis Institute of Management Studies Annual Research Conference, 182-196.
- [3] H.Y. Wen, S. Lin, "Performance Evaluation of Highway Passenger Transport Enterprises' Operation based on the Model of AHP-DEA", 2011, Institute of Electrical and Electronics Engineers, 811-815.
- [4] X. Zhang, C.K.M. Lee, and S. Chen, "Supplier evaluation and selection: a hybrid model based on DEAHP and ABC", 2012, International Journal of Production Research, vol. 50, No. 7, April 1, 1877-1889
- [5] Y. Fu, D. Li, and N. Li, "Hotel Performance Evaluation Based on Cross-efficiency DEA Models", 2011, International Conference on Management and Service Science, Wuhan, 1-4.
- [6] V.K. Yadav, D.K. Jha, and Y.K. Chauhan, "A Multi Criteria DEA Approach to Performance Evaluation of Indian Thermal Power Plants", 2012, Institute of Electrical and Electronics Engineers, 1-5.
- [7] S. Singh, R. Aggarwal, "DEAHP Approach for Manpower Performance Evaluation, Journal Operations Research Society of China, Periodicals Agency of Shanghai University", 2014, and Springer-Verlag Berlin Heidelberg (2), 317-332.
- [8] M.C.C. Moreno, "A 360-Degree Evaluation Framework for Doctoral Programs", 2014, IEEE Global Engineering Education Conference (EDUCON), 850-853.
- [9] M.L. Wang, H.F. Lin, "The Evaluation of the Performance of 360 Degree Feedback System in Insurance Industry - A Case Study of a Life Insurance Company", 2011, IEEE, 237-242.
- [10] L. Ang, "Application of 360-degree Feedback in the Appraisal of College Academic Affairs Management Personnel", 2011, IEEE, 187-189.
- [11] L. Ang, L. Huimin, and L. Junqiu, "Research of AHP-based 360-degree Feedback for College Academic Affairs Management Personnel", 2011, IEEE, 555-557.
- [12] R.Ramanathan, "Data envelopment analysis for weight derivation and aggregation in the analytic hierarchy process", 2006, Computers & Operations Research, 1289-1307.
- [13] M.L.Lin, Y.D. Lee, and T.N. Ho, "Applying integrated DEA/AHP to evaluate the economic performance of local governments in China", 2011, European Journal of Operational Research 209, 129-140.
- [14] Y.F. Tseng, T.Z. Lee, "Comparing appropriate decision support of human resource practices on organizational performance with DEA/AHP model", 2009, Expert Systems with Applications 36, 6548-6558.
- [15] S. Mehrabian, R. Mohammad, Alrizae, and G.R. Jahanshahloo, "A Complete Efficiency Ranking of Decision Making Units in Data Envelopment Analysis", 1999, Computational Optimization and Applications, 14, 261-266.
- [16] P. Andersen, N.C. Petersen, "Management Science: A Procedure for Ranking Efficient Units in Data Envelopment Analysis", 1993, Institute for Operations Research and the Management Sciences (INFORMS) Vol.39 No.10, 1261-1264.
- [17] H. Eilat, B. Golany, and A. Shtub, "R&D Project Evaluation: An Integrated DEA and Balanced Scorecard Approach", 2006, The International Journal of Management Science, 895 - 912.
- [18] S.Mehrabian, M.R. Alirezaee, and G.R. Jahanshahloo, "A Complete Efficiency Ranking of Decision Making Units in Data Envelopment Analysis", 1999, Computational Optimization and Applications 14, 261-266.

# Civil Servant Behaviors Performance Evaluation : Combining DEAHP and 360-degree Feedback

## ORIGINALITY REPORT

11%

SIMILARITY INDEX

6%

INTERNET SOURCES

10%

PUBLICATIONS

6%

STUDENT PAPERS

## PRIMARY SOURCES

- 1** Faiq Ahmad Khan, Shibli Nisar. "Design and analysis of feedback control system", 2018 International Conference on Information and Communications Technology (ICOIACT), 2018  
Publication 1%
- 2** [waset.org](http://waset.org)  
Internet Source 1%
- 3** [www.tandfonline.com](http://www.tandfonline.com)  
Internet Source 1%
- 4** Submitted to University of Sheffield  
Student Paper 1%
- 5** William Ho, Xin Ma. "The state-of-the-art integrations and applications of the analytic hierarchy process", European Journal of Operational Research, 2017  
Publication 1%
- 6** Vinod Yadav, Milind Kumar Sharma. "An application of hybrid data envelopment analytical hierarchy process approach for

supplier selection", Journal of Enterprise Information Management, 2015

Publication

- 
- |    |   |     |
|----|---|-----|
| 7  | <a href="http://etds.lib.ncku.edu.tw">etds.lib.ncku.edu.tw</a><br>Internet Source   | 1%  |
| 8  | Wen, Hui-ying, and Shan Lin. "Performance evaluation of highway passenger transport enterprises' operation based on the model of AHP-DEA", 2011 IEEE 18th International Conference on Industrial Engineering and Engineering Management, 2011.<br>Publication     | <1% |
| 9  | Luan, Zhi, Charlene Xie, Jingxia Xu, and Xiaodan Qiu. "Study of Power Enterprise Efficiency Based on Simulation and Data Envelopment Analysis", 2011 International Conference on Management and Service Science, 2011.<br>Publication                             | <1% |
| 10 | Submitted to RMIT University<br>Student Paper   | <1% |
| 11 | Svetla Stoilova, Radina Nikolova. "Study of the scheme for transportation of intercity trains in the conditions of stochastic variation of passenger flows", 2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), 2016 | <1% |

12

[www.iweeee.org](http://www.iweeee.org)

Internet Source

<1%

---

13

[docplayer.fi](http://docplayer.fi)

Internet Source

<1%

---

14

Submitted to University of Leeds

Student Paper

<1%

---

15

Submitted to Universitas Diponegoro

Student Paper

<1%

---

16

[www.grootersnet.nl](http://www.grootersnet.nl)

Internet Source

<1%

---

17

"Intelligent Techniques in Engineering Management", Springer Nature America, Inc, 2015

Publication

<1%

---

18

International Journal of Managing Projects in Business, Volume 7, Issue 1 (2013-12-14)

Publication

<1%

---

19

Nanta Sooraksa, Pitikhate Sooraksa. "Hybrid Fuzzy-Conventional Method to Improve 360-Degree Performance Appraisal", 2016 International Symposium on Computer, Consumer and Control (IS3C), 2016

Publication

<1%

---

20

[m-hikari.com](http://m-hikari.com)

Internet Source

<1%

21

[toc.proceedings.com](http://toc.proceedings.com)

Internet Source

<1%

22

"Table of contents", 2011 IEEE 18th  
International Conference on Industrial  
Engineering and Engineering Management,  
2011.

Publication

<1%

Exclude quotes Off

Exclude matches Off

Exclude bibliography Off

# Civil Servant Behaviors Performance Evaluation : Combining DEAHP and 360-degree Feedback

---

## GRADEMARK REPORT

---

FINAL GRADE

**/0**

GENERAL COMMENTS

**Instructor**

---

PAGE 1

---

PAGE 2

---

PAGE 3

---

PAGE 4

---

PAGE 5

---

PAGE 6

---