Decision Supporting System Employee Performance Appraisal Narotama University with Simple Additive Weighting Method (SAW)

Hamzah Denny Subagyo*, Ariani**, Hersa Farida Qoriani ***, Gianto Widodo****
* Departement of Economic, Narotama University
** Departement of Economic, Narotama University
*** Departement of Informatics Engineering, Narotama University
**** Departement of Informatics Engineering, UIN Maulana Malik Ibrahim Malang

Article Info	ABSTRACT
	The quality of human resources is the most important thing to improve the productivity of an agency's performance. Narotama is one of the private university, located in Surabaya, East Java. As one of the major University in East Java, Narotama certainly has a lot of human resources or employees. To determine the level of performance and performance competence of human resources or employees in an agency, need a performance assessment. Performance appraisal is conducted to find out the achievement achieved by each employee by setting performance assessment criteria, in this study the criteria used are commitment, management, cooperation and work result. The criteria used are then processed into a decision support system using the appropriate method, in order to obtain the value of employee performance index. To determine a solution of the problem with the criteria used one of MCDM method is Simple Additive Weighting (SAW). Using secondary data in the form of 20 employees and 4 assessment criteria then processed by SAW method and classified by Arithmetic Interval method obtained result that is high performance employees as much as 4 keryawan, with performance is 7 employees and with enough performance as many as 9 employees

Corresponding Author:

Gianto Widodo,
Departement of Informatics Engineering,
UIN Maulana Malik Ibrahim Malang
Email: wido_32@yahoo.com

I. INTRODUCTION

The quality of human resources is one of the factors needed to improve the productivity of an institution's performance. In order to increase the productivity of necessary human resources are competent and reliable to support the agency performance process. Narotama is one of the private university institutions located in Surabaya, East Java. As one of the major agencies in East Java, Narotama has human resources or employees who support the process of running the business process of the agency.

To determine the level of performance and competence of employee performance in an agency, need an optimal performance appraisal system so that can be used as supporting agency in determining policy about performance performance of employee problem.

Decision support systems are the right solution when faced with complex problems and difficult to find policies or decisions. By using a method that can determine the solution of many problems encountered, decision support systems can produce a solution more precisely than determined manually. The method that can be used to determine the solution of many problems is known as the Multi Criteria Decision Making (MCDM) method and one of the most widely used methods of MCDM is Simple Additive Weighting (SAW).

Past research using SAW method in decision system optimization development is about review of MCDM method use in international research using SAW method in the last 10 years concluded that SAW method occupies the highest position with 52% percentage, this indicates if SAW method is a sufficient method Good and widely believed to be the decision-making optimization method [3].

Proceeding of International Conference on Green Technology
Vol.8, No.1, October 2017, pp. 273-277
p-ISSN: 2580-7080 – e-ISSN: 2580-7099   P a g e | **274**

The purpose of this research is to develop a decision support system for employee performance appraisal of Narotama University

2.   RESEARCH METHOD

Stages of research starts from the process of analysis and search data required, to the preparation of SAW algorithm steps.

1. Preparation Data
The data obtained for this research is secondary data from Narotama University and the result of analysis from some secondary data obtained from internet source. The data used as the variables in this study are as follows:
a. Criteria Data
Data criteria is data problem to be analyzed by using SAW method. Determination of criteria in this study based on the results of the analysis of data obtained from the employment of Narotama University. The criteria used in this research is the commitment that is the form of (honest behavior, loyal, responsibility, discipline), then management which is the form of (leadership, ability in planning, organizing, giving direction), cooperation is a form of (communication , Adaptation, various information) to fellow employees and the work is a manifestation of (quality, quantity) of work.
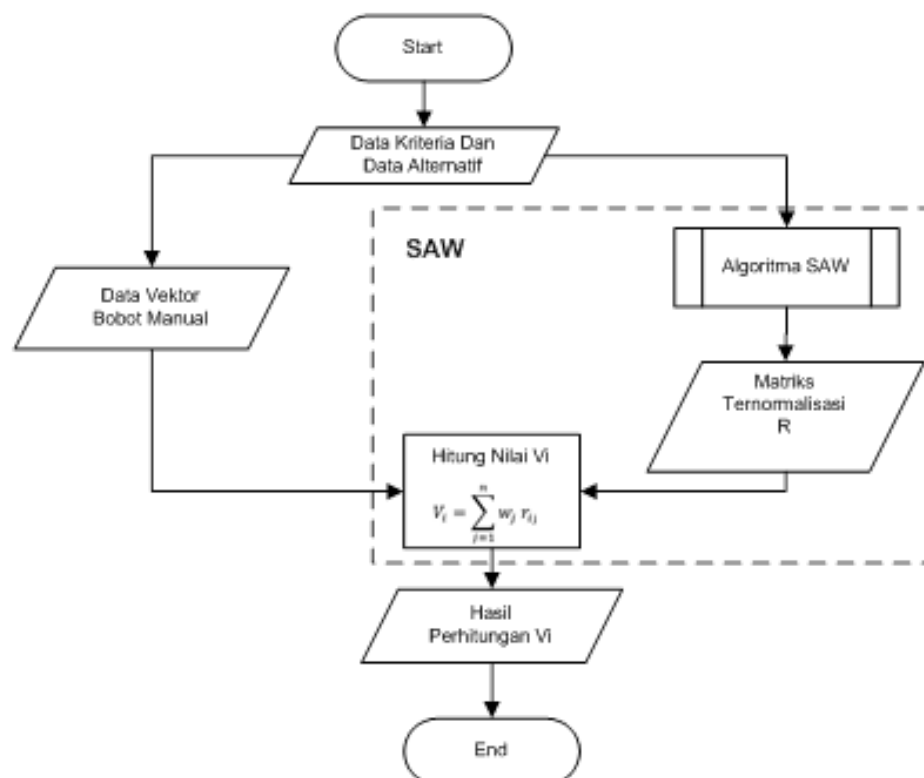b. Quality Data
The Quality data is the weighted value assigned to each of the criteria issues. Weight data is determined based on the priority value of the criteria used.
c. Employee Data
Data karyawan merupakan data yang didapatkan dari Universitas Narotama, data yang digunakan sebanyak 20 data karyawan sebagai uji coba sistem dan bahan Analisa hasil.

2. Procedur of SAW Algorithm
SAW algorithm is a method of quality the performance rating on each alternative [4]. SAW method requires the process of normalizing the decision matrix (X). The steps in the SAW method look like Figure 1.

Picture 1. The flow of calculation on the SAW method

Proceeding of International Conference on Green Technology
Vol.8, No.1, October 2017, pp. 273-277
p-ISSN: 2580-7080 – e-ISSN: 2580-7099   P a g e | **275**

Tahapan perhitungan nilai Vi diawali dari proses normalisasi matriks dengan menggunakan persamaan 1 yang terlihat dibawah.

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{\underset{i}{Max}\, x_{ij}} & jika\ j\ adalah\ atribut\ keuntungan\ (benefit) \\[4mm] \dfrac{\underset{i}{Min}\, x_{ij}}{x_{ij}} & jika\ j\ adalah\ atribut\ biaya\ (cost) \end{cases}$$
(1)

xij   : Kriteria berdasarkan posisi baris i dan kolom j
rij   : Rating kinerja ternormalisasi dari alternatif Ai pada atribut Cj;i=1,2,..,m dan j=1,2,.n.

The calculation of the value of Vi is the stage of the average seeker of the result of normalization multiplied by the weight, this process uses equation 2.

$$V_i = \sum_{j=1}^{n} w_j r_{ij}$$
(2)

wj   : The quality of the criteria corresponds to the position of column j
rij   : The normalized performance rating of Ai alternatives on attributes Cj;i=1,2,..,m and j=1,2,..,n.
if: Vi A larger indicates that the alternative Ai has the highest priority.

The data obtained has been processed using the procedure in SAW method shown in figure 3 above, while the process is as follows:
1. The data obtained has been processed using the procedure in SAW method shown in figure 3 above, while the process is as follows:
2. Enter the match rating on each criteria from each observation point.
3. Searches the maximum value in each criteria column for benefit criteria, and looks for the minimal value on the cost criterion by using equation 1.
4. Divide the value of each criterion with the maximum value of the calculation stage 3 for benefit criteria, and divide the minimum value of the calculation result of the 3rd stage with the criteria value for the cost criteria.
5. Rearrange the results in stage 4 to obtain a normalized matrix R.
6. The weighting process uses equation 2. Weight is used based on the priority of the criteria of the problem.
7. Performed a ranking process to generate employee performance value.

3. RESULTS AND ANALYSIS

Of the 20 employee data used for system testing, it is analyzed by the steps shown in Figure 1. The phases shown in Figure 1 explain the process of the SAW algorithm in calculating the criterion value to yield the value of Vi. Vi value is the value obtained from the process of SAW algorithm.

3.1. Vi calculation
The criteria data used in the calculation process is shown in Table 1.

Table 1. Criteria Data

Criteria (C)	Name of Criteria
C1	Commitment
C2	Management
C3	Colaboration
C4	Work Result

Proceeding of International Conference on Green Technology
Vol.8, No.1, October 2017, pp. 273-277
p-ISSN: 2580-7080 – e-ISSN: 2580-7099

P a g e | **276**

The criteria in Table 1 are obtained from the secondary data analysis obtained from Narotama University. These criteria are processed using expert preference weights. The weight for the calculation process obtained from the secondary data analysis based on the level of priority of each criterion, the weight appears as Table 2.

Table 2. Quality Preference

C1	C2	C3	C4
9	8	8	8

The calculation is done on 20 data of assessment object, that is secondary data of employees obtained from Narotama University. By using the criteria data in table 1, weights in table 2 and 20 employee data, then done the process of evaluation and obtained the results of normalization matrix (X). Furthermore, the process of ranking the value of Vi. The data in table 3 shows 6 employee data that has been done.

Table 3. Ranking Result Vi.

| No	Nama Karyawan	Hasil
1	Emi istitasari	0.73529
2	Tumardi	0.69999
3	Dewi Mustikasari	0.69411
4	Gladys adella permatasari	0.69411
5	Tri indah permatasari	0.66470
6	Hersyafudin ahmad	0.66470

3.2. Group Vi

After the process of ranking the value of Vi, then proceed the classification process to facilitate the clustering of results, so that will get the number of paths contained in each classification. The range of values for the classification is shown in Table 4.

Table 4. Value Group Interval Vi

No	Group Name	Interval Value
1	High	0.68236 - 0.73529
2	Medium	0.64706 - 0.68235
3	Low	0.62941 - 0.64705

From the 20 data points observed Vi values were included in the high group class as many as 4 employees, the group was as many as 7 employees then the lower classification of 9. The number of employees of each classification group that was mentioned appears in the graph shown in Figure 2.
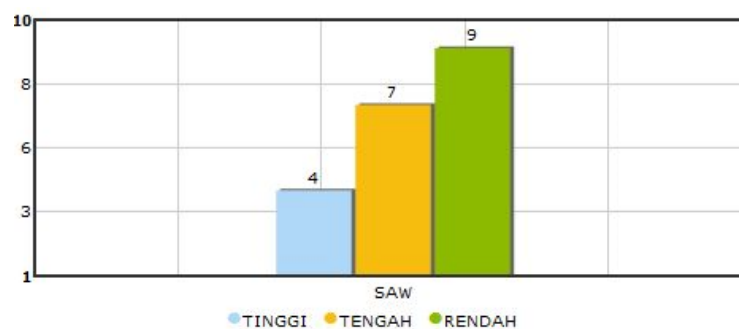
Picture 2. Graph of Group Vi.
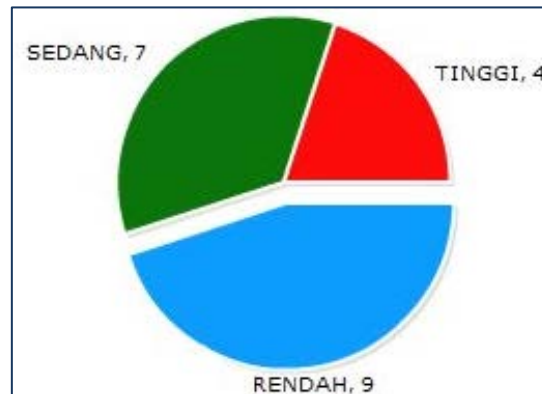
Gambar 3. Group Circle Chart Vi.

Based on the grouping is the largest interval that is the interval to 1 as a reference in determining the recommendation of the best employee performance assessment, therefore based on secondary data that dipeorses in this study recommends 4 employees to get the best predicate that is Emi with the value of Vi 0.73529, then Tumardi with the value of Vi 0.69999, Mustika with the value of Vi 0.69411, and last Gladys with the value of Vi 0.69411.

4. CONCLUSION

Based on the results data that has been analyzed it can be drawn conclusion:
1. The decision support system of employee performance appraisal can be done by using SAW algorithm as a method to optimize the best employee determination.
2. The results of the calculation recommend three classification of placement points that are differentiated by the value of Vi.
3. To further optimize the results of this study will be continued research using SAW method

REFERENCES

[1] Alireza Afshari, M. M. (2010). *Simple Additive Weighting approach to Personnel Selection problem.* International Journal of Innovation, Management and Technology, Vol. 1, No. 5.
[2] Kurdi, H. A. (2014). *Review of Closed Circuit Televisison (CCTV) Techniques for Vehicles Traffic* Management. International Journal of Computer Science & Information Technology (IJSIT) *Vol.6* , No.2.
[3] Lazim Abdullah, C. R. (2014). *Simple Additive Weighting Methods of Multi criteria Decision Making and Applications: A Decade Review.* International Journal of Information Processing and Management(IJIPM), 39-49.
[4] Turban, E. A. (2005). *Decision Support System and Intelligent Systems.* New Delhi: Asoke K. Ghosh, Prentice-Hall of India Private Limited.