

# Employee Performance Assessment Using Simple Additive Weighting (Saw) Method

Hery Mustofa and Syaiful Bakhri

Universitas Islam Negeri Walisongo Semarang, Indonesia

Jl. Walisongo No.3-5, Tambakaji, Kec. Ngaliyan, Kota Semarang, Jawa Tengah, Indonesia

herymustofa@walisongo.ac.id, syaifulbakhri@walisongo.ac.id

## Abstract

An employee performance appraisal system is used to assess employees who have good performance. The agency or company conducts performance appraisals on employees to evaluate, motivate, verify and improve employee performance. The decision support system will assist the company in the process of evaluating employees quickly and objectively. The *simple additive weighting* (SAW) method is a good method and can be applied in a decision-making system. From the research results, it is known that the *simple additive weighting* (SAW) method can determine employee performance appraisals using four criteria, namely attendance, behavior, workload, and work realization. The highest-ranking value was obtained with a value of 86.25, while the lowest value was obtained with a value of 66.6.

## Keywords

ranking, performance, simple additive weighting, employee, improve

## 1. Introduction

Employee performance appraisal is a measuring tool used to evaluate employee performance. Performance appraisals are also used to assess the success of company or agency targets, assist in making promotion, dismissal, transfer decisions and provide feedback for employees on how their supervisors or superiors perform assessments. (Mujiastuti et al. 2017)

Each company or agency has a standard for evaluating the performance of their respective employees. The assessment is determined by the respective criteria according to the characteristics of the company. Employees are a supporting factor in a company, because, with employees who have company qualification standards, the company's productivity must be maintained and increasing. (Naution et al. 2020)

One method of decision support system (DSS) or *decision support system is simple additive weighting* (SAW). This method is a weighted numbering method in which the pre-determined assessment criteria are assigned a weighted value of each which then the value of each of these sums will produce the performance value of each employee. (Sholeh et al. 2021)

The SAW method is one of the most widely used decision support system methods. A study conducted by R. Dedek Cahyadi Panjaitan et al compared the use of the SAW method with the *weight product* (WP) method for the case of selecting extracurricular activities. From this research, it is known that the SAW method is more relevant for the decision-making system in the selection of extracurricular activities. (Panjaitan et al. 2021).

The SAW method is also used in the selection of participants for the BI Entrepreneurship Program (WUBI). In Erawan's research, the process of selecting the WUBI program using the SAW method is explained. four criteria to be considered are business survey, innovation, creativity, and financial management. By implementing SAW in the selection of WUBI programs, it can help the decision-making process to get WUBI participants with quality objectively. (Erawan et al. 2018)

The recommendation system for house selection can also be done using the SAW method. In Sofi Nur Rochmawati's research, SAW was applied in the selection of houses, with the SAW method it can be seen the right house recommendations for people who want to buy a house. (Rochmawati and Marisa 2018)

In this study, the application of the SAW method will be carried out to evaluate the performance of employees in companies or agencies. The criteria used are attendance, behavior, task load, and employee work results.

## 2. Method

Employee performance appraisal is a form of decision support system (DSS). The calculation of this employee performance appraisal uses the *simple additive weighting* (SAW) method. SAW is also known as weighted addition. The steps in performing the SAW method are as follows:

1. Formulate criteria.
2. Formulate attributes in each criterion
3. Give the value of each alternative on each criterion
4. Make a suitability *rating* of each alternative on each criterion
5. Create a decision matrix based on criteria
6. Perform matrix normalization. Matrix normalization can be made with the following equation

$$R_{ij} = \frac{X_{ij}}{\text{Max } X_{ij}} \quad (1)$$

If the criteria have a *cost attribute*, then the normalization of the matrix uses the equation below:

$$R_{ij} = \frac{\text{Min } X_{ij}}{X_{ij}} \quad (2)$$

Where :

- $R_{ij}$  = Normalized performance rating
- $X_{ij}$  = Row and column matrix
- $\text{Max } X_{ij}$  = Highest value of each row and column
- $\text{Min } X_{ij}$  = The lowest value of each row and column

7. Ranking. The ranking results are obtained from the addition of the multiplication of the row elements of the normalized matrix with the preference weights that correspond to the matrix column elements. Here are the games used for ranking:

$$V_i = \sum_{j=i}^n W_j R_{ij} \quad (3)$$

Where :

- $V_i$  = Rank for each alternative
- $W_j$  = Weight value for each criterion
- $R_{ij}$  = Normalized performance rating value

## 3. Results and Discussion

In accordance with the steps described in the previous section, the first step taken in using the first *simple additive weighting method* is to determine the criteria or references used in the evaluation of the weighting. say decision. The criteria used in this study are as in Table 1.

Table 1. Criteria Data

No	Criteria	Code	Weight
1	Absence/attendance	CC1	30
2	Behavior	CC2	20
3	Workload (quantity)	CC3	25
4	Realization of work (quality)	CC4	25

The following is an explanation of each criterion:

1. Attendance/attendance is obtained through a recapitulation conducted within one month. The less alpha, permission, or illness an employee has, the higher the rating.
2. Behavior is the number of warning letters (SP) obtained by employees. The less SP the employee gets, the higher the score he gets.
3. The workload is the amount of work obtained by the fencer from the company. The more jobs you get, the higher the score you get
4. Work realization is the percentage of the amount of work completed by the employee from the workload given. The higher the presentation, the higher the score will be.

After forming the criteria, the next step is to assign attributes to each criterion. The cost attribute is given if the smallest value is the best value, while the benefit attribute will be given if the highest value is the best value. Table 2 is a table of criteria attributes

Table 2. Criteria Attributes

No	Criteria	Code	Attribute
1	Absence/attendance	CC1	Benefits
2	Behavior	CC2	Cost
3	Workload (quantity)	CC3	Benefits
4	Realization of work (quality)	CC4	Benefits

The next step is to assign a value to each criterion. The provision of criteria limits can be seen in Table 3.

Table 3. Data Crisp

No	Criteria	Crisp	Mark
1	Absence/attendance	<=70%	1
		>70 % and <=80%	2
		>80% and <=90%	3
		>90% and 100%	4
2	Behavior	No SP	1
		SP1	2
		SP2	3
		SP3	4
3	Workload (quantity)	<=2 jobs	1
		> 4 and <=5 jobs	2
		>6 and <=9 jobs	3
		>10 jobs	4
4	Realization of work (quality)	<=70%	1
		>70% and <=80%	2
		>80% and <=90%	3
		>90% and <=100%	4

Then create employee value data based on predetermined criteria. Data were taken within one month. Looks like in Table 4.

Table 4. Employee Value Data

No	Name	Criteria			
		Presence	Behavior	Workload	Job Realization
1	Sa'diyah	90%	SP1	7	90%
2	Ervi	95%	TSP	8	80%
3	Bakhri	90%	TSP	6	95%
4	Kiwil	80%	TSP	5	95%
5	Yudi	90%	SP1	6	90%
6	Yasir	95%	TSP	9	85 %
7	Ershad	85 %	TSP	7	95%
8	Ainul	95%	TSP	8	95%
9	Mostopha	90%	SP2	7	90%
10	Rizky	85 %	TSP	11	80%

Based on the table of *crisp data* above, the next step is to make a suitability *rating* for each alternative on each criterion.

Table 5. Compatibility Rating

No	Name	Criteria			
		Presence	Behavior	Workload	Job Realization
1	Sa'diyah	3	2	3	3
2	Ervi	4	1	3	2
3	Bakhri	3	1	3	4
4	Kiwil	3	1	2	4
5	Yudi	3	2	3	3
6	Yasir	4	1	3	3
7	Ershad	3	1	3	4
8	Ainul	4	1	3	4
9	Mostopha	3	3	3	3
10	Rizky	3	1	3	2

rating table is then made into the matrix form below:

$$\begin{bmatrix} 3 & 2 & 3 & 3 \\ 4 & 1 & 3 & 2 \\ 3 & 1 & 3 & 4 \\ 3 & 1 & 2 & 4 \\ 3 & 2 & 3 & 3 \\ 4 & 1 & 3 & 3 \\ 3 & 1 & 3 & 4 \\ 3 & 1 & 3 & 4 \\ 3 & 3 & 3 & 3 \\ 3 & 1 & 3 & 2 \end{bmatrix}$$

Next is the matrix normalization process. Here is the matrix normalization process, per criteria. Matrix normalization can be done using formula number one above.

$$R_{11} = \frac{3}{\text{Max}(3,4,3,3,3,4,3,3,3,3)} = \frac{3}{4} = 0,75$$

Table 6. Matrix Normalization

No	Name	Criteria			
		Presence	Behavior	Workload	Job Realization
1	Sa'diyah	0.75	0.67	1	0.75
2	Ervi	1	0.33	1	0.5
3	Bakhri	0.75	0.33	1	1
4	Kiwil	0.75	0.33	0.67	1
5	Yudi	0.75	0.67	1	0.75
6	Yasir	1	0.33	1	0.75
7	Ershad	0.75	0.33	1	1
8	Ainul	1	0.33	1	1
9	Mostopha	0.75	1	1	0.75
10	Rizky	0.75	0.33	1	0.5

From the calculations above, the following matrix can be obtained:

$$\begin{bmatrix} 0,75 & 0,67 & 1 & 0,75 \\ 1 & 0,33 & 1 & 0,5 \\ 0,75 & 0,33 & 1 & 1 \\ 0,75 & 0,33 & 0,67 & 1 \\ 0,75 & 0,67 & 1 & 0,75 \\ 1 & 0,33 & 1 & 0,75 \\ 0,75 & 0,33 & 1 & 1 \\ 1 & 0,33 & 1 & 1 \\ 0,75 & 1 & 1 & 0,75 \\ 0,75 & 0,33 & 1 & 0,5 \end{bmatrix}$$

Next is the ranking process. In this process, the weight of the criteria that have been determined previously is multiplied with each row of the normalized matrix. Here are the results of the ranking.

Table 7. Ranking results

No	Name	Criteria				Total	Ranking
		CC1	CC2	CC3	CC4		
1	Sa'diyah	0.75	0.67	1	0.75	79.65	5
2	Ervi	1	0.33	1	0.5	74.1	8
3	Bakhri	0.75	0.33	1	1	79.1	7
4	Kiwil	0.75	0.33	0.67	1	70.85	9
5	Yudi	0.75	0.67	1	0.75	79.65	4
6	Yasir	1	0.33	1	0.75	80.35	3
7	Ershad	0.75	0.33	1	1	79.1	6
8	Ainul	1	0.33	1	1	86.6	1
9	Mostopha	0.75	1	1	0.75	86.25	2
10	Rizky	0.75	0.33	1	0.5	66.6	10

The ranking results can be presented as follows:

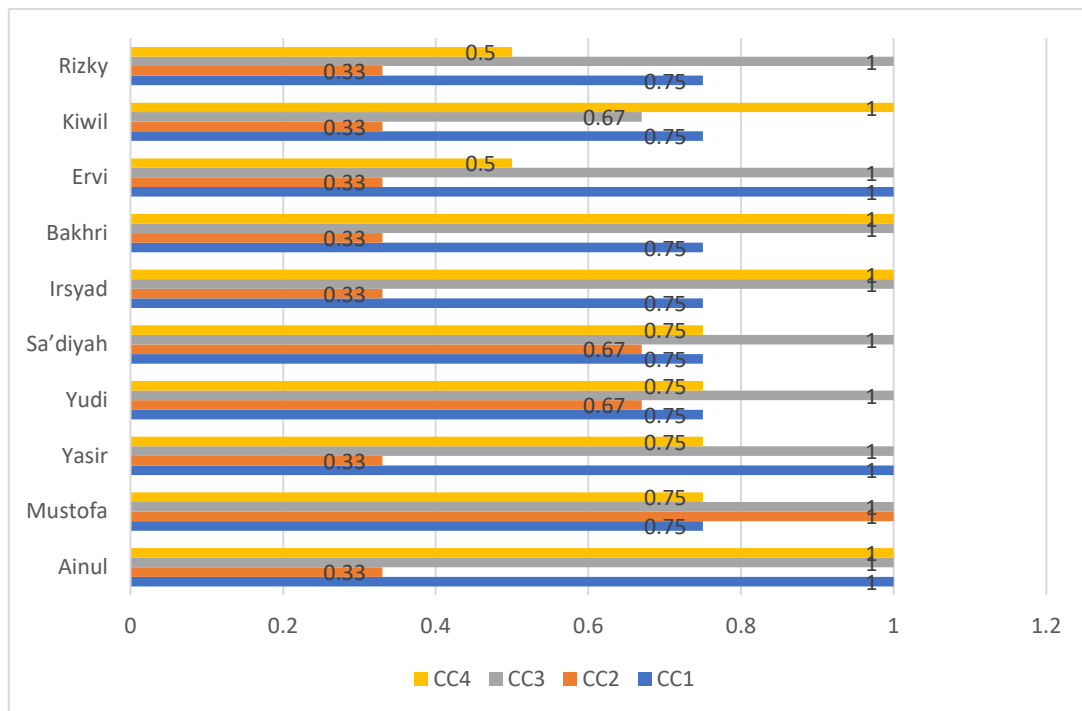


Figure 1. Ranking results

Based on the table above, it was concluded that the employee named Ainul got the best rank with a score of 86.25, then the lowest employee named Rizky with a score of 66.6.

## 5. Conclusion

The conclusions obtained from this research are as follows:

1. The *Simple Additive Weighting* (SAW) method, can be applied to perform a performance appraisal by applying four (4) criteria, namely attendance, behavior, workload, and work realization.
2. From the results of research trials, it can produce a ranking of employee ratings. The employee ranking results are in the following order: Ainul, Mustofa, Yasir, Yudi, Sa'diyah, Irsyad, Bakhri, Ervi, Kiwil, and Rizky. With the highest score on behalf of Ainul with a value of 86.25. While the lowest value in the name of Rizky with a value of 66.6.
3. The reference value or ranking that has been obtained can be used as a reference for evaluating employees objectively in giving bonuses, giving promotions, or giving sanctions to employees.

## References

- Erawan, P., Alawiyah, T. and Ratningsih, Implementation of the SAW Method in the Information System for the Selection of WUB Participants, vol. 24, no. 3, pp. 146–50, 2018.
- Mujiastuti, R., Komariyah, N. and Hasbi, M., Employee Performance Appraisal System Using Simple Additive Weighting Method, *Journal of Information Systems, Information Technology and Computers*, vol. 9, no. 2, pp. 133–41, 2017. <https://jurnal.umj.ac.id>.
- Naution, M. I., Fadlil, A. and Sunardi, Selecting the Best Employees Using the Analytical Hierarchy Process Method.” *Series of Proceedings of the National Seminar on Informatics Dynamics*, vol. 4, no. 1, pp. 190–93, 2020. <http://prosiding.senadi.upy.ac.id/index.php/senadi/article/view/154>.
- Panjaitan, D. C., Juliansa, H., Yanto, R., Comparison of Saw and Wp Methods in Decision Support Systems in Cases of Selection of Extracurricular Activities, *Binary Scientific Journal STMIK Bina Nusantara Jaya Lubuklinggau*, vol. 3, no. 1, pp. 30–38, 2021.
- Rochmawati, S. N. and Marisa, F., Web-Based Home Recommendation System Using SAW Method At PT.Inproperty, *JOINTECS (Journal of Information Technology and Computer Science)*, vol. 3, no. 2 pp. 95–98, 2018.
- Sholeh, M. B. , Prehanto, D. R. and Kunci, K., Employee Performance Assessment of the Central Bureau of Statistics Using the Simple Additive Weighting (SAW) Method, vol. 2, no. 1, pp. 1–7, 2021.

## Biographies

**Hery Mustofa** is lecture at Universitas Islam Negeri Walisongo Semarang, Jl. Walisongo No.3-5, Tambakaji, Kec. Ngaliyan, Kota Semarang, Jawa Tengah, Indonesia. Courses that are taught include Self Management, International Business, Export-import, Business Execution, Entrepreneur Project, Economic Statistics and International Marketing.

**Syaiful Bakhri** is lecture at Universitas Islam Negeri Walisongo Semarang, Jl. Walisongo No.3-5, Tambakaji, Kec. Ngaliyan, Kota Semarang, Jawa Tengah, Indonesia. Courses that are taught include Self Management, International Business, Export-import, Business Execution, Entrepreneur Project, Economic Statistics and International Marketing.