

# Admission of New Academic Administration Staff Using the SAW Method

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**Abstract**— Human resource is one very important factor in an organization or company, both public and private companies. The work success of a company is great has a major influence on the management of human resources (HR) of a company. If human resources are not good enough, it will affect the lack of good sustainability of this part of the company. Therefore, in the HR management of a company is very important, especially in accepting staff the best academic administration so that it can maximize performance. Many companies have difficulty in accepting candidates for academic administration staff accordingly to company desires. For that, a decision support system is needed that can help decision making to facilitate the acceptance of new academic administration staff. For that reason, researchers are very want to help top management in making the best decisions in recruiting new staff. This study uses the SAW (Simple Additive Weighting) method using the existing criteria determined by the company, namely administrative requirements, written tests, computer literacy, communication, and work experience. The results of the study are the value of calculating employee selection using the Simple Additive Weighting (SAW) method. to be able to help make decisions quickly, precisely, and accurately.

**Keywords**— Simple Additive Weighting, Academic Administration Staff, Criteria

**Abstrak**— Sumber daya manusia merupakan salah satu faktor yang sangat penting dalam suatu organisasi atau perusahaan baik perusahaan negeri maupun swasta. Keberhasilan kerja suatu perusahaan sangat berpengaruh besar terhadap pengelolaan sumber daya manusia (SDM) dari suatu perusahaan. Apabila sumber daya manusia kurang baik, maka akan berpengaruh pada kurang baiknya keberlangsungan bagian tersebut pada perusahaan. Untuk itu, dalam manajemen SDM suatu perusahaan sangat penting sekali khususnya dalam menerima staff administrasi akademik terbaik sehingga dapat meningkatkan kinerja secara maksimal. Banyak perusahaan kesulitan dalam melakukan penerimaan calon staff administrasi akademik sesuai dengan keinginan perusahaan. Untuk itu, diperlukan sistem pendukung keputusan yang dapat membantu pengambilan keputusan guna memudahkan penerimaan staff administrasi akademik baru. Untuk itu, peneliti sangat ingin membantu top management dalam mengambil keputusan terbaik dalam penerimaan staff baru. Penelitian ini menggunakan metode SAW (Simple Additive Weighting) dengan menggunakan kriteria-kriteria yang sudah ditetapkan perusahaan yaitu Persyaratan

administrasi, tes tertulis, penguasaan komputer, komunikasi serta pengalaman kerja. Hasil penelitian berupa nilai perhitungan pemilihan karyawan dengan metode Simple Additive Weighting (SAW) dengan tujuan dapat membantu pengambilan keputusan secara cepat, tepat dan akurat.

**Kata Kunci**— SAW, Staff Administrasi Akademik, Kriteria

## I. INTRODUCTION

Currently, competition in the world of work is growing rapidly. The company competes in increasing its business field. The company also does not accept employees arbitrarily. Of course, the quality of employees or staff takes precedence because it involves the success and progress, and future of the company. In a company, both government and private institutions, human resources are very important. The existence of skilled human resources who have certain expertise and a lot of experience will support the progress and quality of the company in achieving the desired goals. Factors that are very important for the smoothness of the academic administration staff admission process can be started from the selection of academic administration staff admissions to fill the rows of administrative staff positions that have been prepared according to predetermined criteria. The work success of a company has a big influence on the management of the human resources (HR) of a company. If human resources are not good enough, it will affect the sustainability of that part of a company is not good. For this reason, in the HR management of a company, it is very important, especially in receiving the best academic administration staff so that it can improve company performance. Sometimes companies have difficulty accepting employees to work in the company. For that, we need a fast decision support system according to the criteria.

In the process of admitting administrative staff, several criteria have been made by top management based on qualification, written tests, computer literacy, communication, and work experience. From several predetermined criteria will help management in making decisions more quickly. The purpose of this study is to develop the SAW method to assist top management in making decisions to accept new academic administration staff to be placed anywhere based on predetermined criteria and weights and to facilitate the admission process for staff admissions to get fast, precise and

accurate results.

## II. LITERATUR REVIEW

There are several references that the authors took in compiling this research paper both national and international references, including:

First research by Chou Shuo Yan, et al, "Expert system for problem of facility location selection". Says that the combination of the three fuzzy (FST), factor rating system (FRS), and simple additive weighting can evaluate the alternative location of the facility. With this proposed system, facility location selection can be done quickly."[1].

Fifth research by Chen Ting Yu, this paper presents SAW-based and TOPSIS-based MCDA methods and conducts a comparative study through computational experiments. Comprehensive discussions have been made on the influence of score functions and weight constraints, where the score function represents an aggregated effect of positive and negative evaluations in performance ratings and the weight constraint consists of the unbiased condition, positivity bias, and negativity bias. The correlations and contradiction rates obtained in the experiments suggest that evident similarities exist between the interval-valued fuzzy SAW and TOPSIS rankings"[2].

Sixth research by Abrams William, et al. Says that The SAW and AHP maps were deemed valid with an agreement to moderate or greater potential zones for wells at 98% and 92% and springs at 63% and 86% respectively, and all field observation locations for both maps. Based on the SAW and AHP maps, the highest GWP is located in the Dubai/Sharjah emirates due to optimal runoff accumulation, infiltration conditions, and subsurface storage capacity. Findings of this study demonstrate the integration of remote sensing data with the adopted geospatial techniques is a practical method of groundwater prospecting in similarly data-scarce, arid environments"[3].

The eighth research by Brandl M, et al. The chirp signals are generated by SAW devices which are triggered by a low power consumption pulse generator based on an avalanche transistor. The performance of position estimation under AWGN conditions was simulated and compared with common methods. An improvement in the mean square position error in the range of the chirp compression gain was found"[4].

Eleventh research by Buyukozkan Gulcin, et al. Says that This paper first showcases an integrated HFL Simple Additive Weighting (SAW)-HFL Additive Ratio Assessment (ARAS) method. The framework's functionality is then illustrated in a case study about SW assessment. The originality of the paper is based on its evaluation framework using an integrated SAW-ARAS approach in the hesitant fuzzy environment, its research method, and case application in the logistics sector. This approach can guide managers and practitioners for an effective SW selection process"[5].

Research conducted by Hamidah et al, with the title "Application of the SAW (Simple Additive Weighting) Method in selecting favorite web-based lecturers" explains that the selection of favorite lecturers in a university can be done with several criteria based on student assessments, JJA, research,

PKM, and discipline. . From several lecturers, there is one best lecturer in the ranking calculation"[6].

Subsequent research was carried out by Shinta Siti Sundari, and yofi Firman Taufik with the title "Decision Support System for New Employee Admissions Using the Simple Additive Weighting (Saw) Method" explaining that the use of the Simple Additive Weighting (SAW) method in the application of the decision support system for recruitment of new employees. will get different selection results, because it uses the priority value or weight determined by each division that requires new employees into the system"[7].

Another research conducted by Alex Rikki et al with the title "The decision support system for hiring employees with the saw method at pt. Karya sahata medan "explains that the application of the best employee selection decision support system has been successfully made using the Simple Additive Weighting (SAW) method at PT ISS Indonesia and requires high understanding and accuracy in its use. In the application of the Simple Additive Weighting (SAW) method at PT ISS Indonesia Medan must meet the four criteria being processed, namely, attendance, SOP, Discipline, and Grooming. Then the system succeeds in determining the best employee according to the criteria and weights previously determined before calculation"[8].

Research conducted by Yasni Djamain and Herlinda De Christin with the title "Decision Support System for New Employee Admissions of PT. PLN (Persero) Head Office Using the Simple Additive Weighting (SAW) Method which explains that a Decision Support System that can be made to help make decisions in recruiting new employee candidates at PT PLN (Persero) Head Office based on the results of the analysis according to the specified criteria. Admission is carried out following the results of the administrative selection, General Aptitude Test (GAT), Academic and English Language, Psychological Test and FGD, Health and interviews the prospective new employee has. The criteria that have been determined in the interview selection stage are Discipline (C1), Period of informal / formal experience (C2), Obedience in carrying out tasks (C3), Skills (C4), Leadership (C5), Skills (C6), obtained (C7), Moral and behavior (C8), Cooperation (C9), Creativity and innovation (C10). The model used for the decision support system is the Multiple Attribute Decision Making (MADM) model with the Simple Additive Weighting (SAW) method. This method was chosen because this method determines the weight value for each attribute, then it is followed by a ranking process that will select the best alternative"[9].

The research was conducted by Fitri Saraswati and Yuri Fitriyan with the title "Decision Support System for Btm Amanah Bangunrejo Employee Recruitment Using the Simple Additive Weighting (Saw) Method" explaining that the Decision Support System can be made to help make decisions in the recruitment of BTM Amanah employees based on the results of the appropriate analysis. with the specified criteria. Acceptance is carried out following the results of Administrative selection and interviews with the prospective

new employee. The criteria that have been determined in the interview selection stage are Physical Category (C1), Personality (C2), Work Experience (C3), Age (C4), Education (C5), and Religion (C6). The model used for decision support systems is the Multiple Attribute Decision Making (MADM) model with the Simple Additive Weighting (SAW) method. This method was chosen because this method determines the weight value for each attribute, which will select the best alternative. The research was conducted by looking for the weight value for each criterion”[10].

Research conducted by Desi Pebriana with the title "Implementation of Simple Additive Weighting (SAW) Method in Employee Recruitment Decision Making at PT. ABC "explained that the calculation results resulted from the application of the Simple Additive Weighting (SAW) method can be used as a reference for the HRD department at PT. ABC to determine prospective employees who pass the administrative selection process and are entitled to go through the next process in the employee recruitment stage, namely the interview process by the leader[11].

The research was conducted by Hamidah et al entitled "SAW Method in Supporting the Process of Admission of New Junior High School Students which explains that the SAW method can help decision making in quickly and accurately admitting new students. Indonesian, mathematics scores, science scores, number of regency level competition certificates, provincial level competition certificates, national and zoning competition certificates. Of the 4 samples of students taken, there is 1 student who has the highest score, namely student C with a score of 0,8 and the student with the lowest score was student A with a value of 0,35”[12].

III. RESEARCH METHOD

The Simple Additive Weighting (SAW) method is often known as the method of adding weights. The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative on all attributes[13][14][15]. The SAW method requires a decision matrix normalization process (X) to a scale that can be compared with all available alternative ratings. Here's the SAW formula:

$$r_{ij} = \begin{cases} \frac{x_{ij}}{\max_i x_{ij}} & \longrightarrow \text{If } j \text{ is the benefit attribute} \\ \frac{\min_i x_{ij}}{x_{ij}} & \longrightarrow \text{If } j \text{ is cost attribute (cost)} \end{cases} \quad (1)$$

Information:

- rij: normalized performance rating value
- xij: the attribute value that each criterion has
- Max xij: the greatest value of each criterion ;
- Min xij: the smallest value of each criterion ; Benefit: if the greatest value is the best Cost: if a smallest value is best where rij is the normalized performance rating of the alternative Ai

on attribute Cj; i = 1,2, ..., m and j = 1,2, ..., n. The preference value for each alternative (Vi) is given as: (2)

$$V_i = \sum_{j=1}^n W_j r_{ij}$$

Information:

- Vi = ranking for each alternative
- wj = weight value of each criterion
- rij = normalized performance rating value A larger

Vi value indicates that the alternative Ai is preferred. This SAW method determines the weight value on each criterion to determine the optimal alternative, namely the best choice that meets the requirements and which is worthy of consideration for acceptance by the school.

IV. RESULT AND DISCUSSION

A. Fuzzy SAW Analysis Method

Several SAW stages will be carried out in analyzing the SAW method, namely as follows:

1) Defining Criteria

To determine the highest ranking of the number of candidates for academic administration staff who enroll in the process processing the admission of new academic administration staff candidates, several criteria are needed, namely:

TABLE I. CRITERIA TABLE

Criteria	Name Criteria
c1	Qualification
c2	Written Tests
c3	Computer Ability
c4	Communication
c5	Work Experience

2) Determine the Weight

After defining the criteria, the next step is to determine the weights for each criterion. As for determining the weight, it is obtained from higher education experts, namely top management as the power holder in a special college managing the admission of new academic administration staff.

TABLE II. DETERMINE WEIGHT TABLE

Criteria	Weight
C1: Qualification	25%
C2: Written Tests	20%
C3: Computer Ability	20%
C4: Communication	10%
C5: Work Experience	25%

From each weight, a variable will be made. Where a variable will be converted into fuzzy numbers. Below is the fuzzy weight of C1 to C5:

- a. Very Low (SR) = 0
- b. Low (R) = 0,25
- c. Fairly High (CT) = 0,50

- d. Height (T) = 0,75
- e. Very High (ST) = 1

Based on the weight assessment of each criterion, the next step is to determine the value of the interval for each criterion C1 to C5. The determination of the interval value can be seen as below:

a) *Qualification Criteria*

This criterion is taken from the value of the qualification then converted into crips numbers.

TABLE III. QUALIFICATION CRITERIA

VALUE	INTERVAL
SMP	0
SMA	0,25
D3	0,50
D4	0,75
S1	1

b) *Written Tests Criteria*

In determining the appropriate candidates for admission of academic administration staff, it is necessary to pay attention to the written test criteria. The following are the written test criteria that have been converted into crips numbers.

TABLE IV. WRITTEN TESTS CRITERIA

VALUE	INTERVAL
0-20	0
21 - 40	0,25
41 - 60	0,50
61 - 80	0,75
81 -100	1

c) *Computer Ability Criteria*

In determining candidates for admission of appropriate academic administration staff, it is necessary to pay attention to the criteria for computer skills. The following are the criteria for computer capabilities that have been converted into crips numbers.

TABLE V. COMPUTER ABILITY CRITERIA

VALUE	INTERVAL
0-20	0
21 - 40	0,25
41 - 60	0,50
61 - 80	0,75
81 -100	1

d) *Communication Criteria*

In determining suitable candidates for admission of academic administration staff, communication criteria need to be considered. The following are the communication criteria that have been converted into crips numbers.

TABLE VI. COMMUNICATION CRITERIA

VALUE	INTERVAL
0-20	0
21 - 40	0,25
41 - 60	0,50
61 - 80	0,75
81 -100	1

e) *Work Experience Criteria*

In determining suitable candidates for admission of academic administration staff, it is necessary to pay attention to the criteria of work experience. The following work experience criteria have been converted into crips numbers.

TABLE VII. WORK EXPERIENCE CRITERIA

VALUE	INTERVAL
0-20	0
21 - 40	0,25
41 - 60	0,50
61 - 80	0,75
81 -100	1

The following is a manual calculation based on a case example to calculate the value of several prospective employees who have the following data:

TABLE VIII. WEIGHT CALCULATION

Alternative	Criteria				
	C1	C2	C3	C4	C5
Staff A (A1)	SMA	75	85	80	75
Staff B (A2)	SMA	82	80	80	75
Staff C (A3)	S1	80	85	85	81
Staff D (A4)	D3	85	80	85	81

Based on the data above, a decision matrix (X) can be formed which has been converted to the Simple Additive Weighting number as follows:

TABLE IX. DECISION MATRIX

Alternative	Criteria				
	C1	C2	C3	C4	C5
Staff A (A1)	0.25	0.75	1	0.75	0.75
Staff B (A2)	0.25	1	0.75	0.75	0.75
Staff C (A3)	1	0.75	1	1	1
Staff D (A4)	0.75	1	0.75	1	1

B. *Decision Matrix*

Where A1, A2, A3, A4, and A5 are samples taken as calculation material to determine the highest score in the admission of academic administration staff, namely:

- a. Staff A (Alternative 1/A1)
- b. Staff B (Alternative 2/A2)
- c. Staff C (Alternative 3/A3)
- d. Staff D (Alternative 4/A4)

Based on the compatibility rating table above it will get the X matrix table as following:

$$X = \begin{bmatrix} C1 & C2 & C3 & C4 & C5 \\ 0,25 & 0,75 & 1 & 0,75 & 0,75 \\ 0,25 & 1 & 0,75 & 0,75 & 0,75 \\ 1 & 0,75 & 1 & 1 & 1 \\ 0,75 & 1 & 0,75 & 1 & 1 \end{bmatrix}$$

C. Normalized Matrix (X)

Matrix normalization is carried out based on each alternative with the following formula:

$$rij = \frac{xij}{Max(xij)} \quad (3)$$

Then the result of normalization (rij) forms a normalized matrix (R).

$$R = \begin{bmatrix} 0,25 & 0,75 & 1 & 0,75 & 0,75 \\ 0,25 & 1 & 0,75 & 0,75 & 0,75 \\ 1 & 0,75 & 1 & 1 & 1 \\ 0,75 & 1 & 0,75 & 1 & 1 \end{bmatrix}$$

The criteria used in determining the weight are education, written tests, computer skills, communication, and work experience. Next, determine the weight of each of the above criteria which will be used for the ranking process of each criterion.

$$\text{Weight Vector (W)} = \{0,25 \ 0,20 \ 0,20 \ 0,10 \ 0,25\}$$

The next process is to rank alternatives (Vi). To get the ranking process, that is by multiplying the weight vector (W) by the normalized matrix (R). The results obtained from multiplying the weight vector with normalized matrix (R) are calculated using the following formula:

$$Vi = \sum Wj \cdot Rij \quad (4)$$

Then the ranking results are as follows:

- V1 = 0,68
- V2 = 0,67
- V3 = 0,95
- V4 = 0,89

The results obtained are as follows:

TABLE X. RANKING RESULT

OPTIONAL ALTERNATIVE	VALUE	RATING
Calon Staff C (Alternatif 3/A3)	0,95	1
Calon Staff D (Alternatif 4/A4)	0,89	2
Calon Staff A (Alternatif 2/A1)	0,68	3
Calon Staff B (Alternatif 1/A2)	0,67	4

From the results above, it can be seen that V3 = 0.95 which is a candidate for staff 3 gets a very high score, V4 = 0.89 which is a candidate for staff 4 gets a high score, V1 = 0.68 which is a candidate for staff 1 gets a moderate score and V2 = 0.67 which

is a candidate staff 2 scores very low.

Based on the results of the table ranking above, a graph can be made by looking at the values of several sample choices which can be seen in Figure 1.

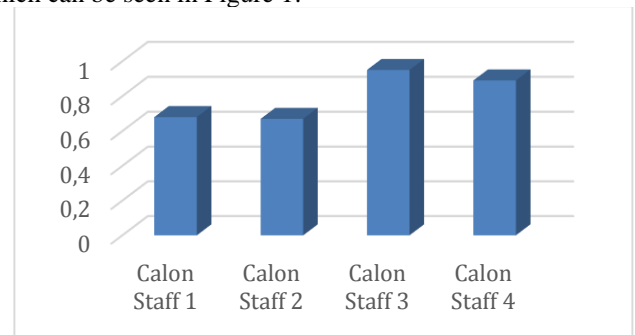


Fig .1. Ranking Graph

V. CONCLUSION

Decision support systems can be created to help stakeholders make decisions with fast acceptance of academic administration staff at their respective universities based on the results of the analysis with predetermined criteria. The criteria used are education (C1), written test (C2), computer skills (C3), communication (C4), and work experience (C5). The model used is Simple Additive Weighting (SAW). Based on the calculation results each criterion and weighting of the criteria then make a decision matrix with the final results, namely V3 = 0.95 which is a candidate for staff 3 gets a very high score, V4 = 0.89 which is a candidate for staff 4 gets a high score, V1 = 0.68 which is a candidate for staff 1 gets a moderate score and V2 = 0.67 which is a candidate staff 2 scores very low.

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