

Application of Weight Product Algorithm to Determine the Best Criteria Value in an Employee Recruitment

Dhio Petra Hotdlen, Moh. Ali Romli

Abstract— The employee selection process is one of the important aspects of human resource management in a company. However, the lack of access to information on the availability of a list of vacancies that provides a clear assessment or ranking of the suitability of candidate qualifications with job requirements. This application was developed using web technology so that it can be accessed via a computer or smartphone via an internet connection. Web-based application development is carried out to increase the efficiency of a company's selection. Using this method, the application will combine relevant criteria such as education, work experience, technical skills, and interpersonal skills. Each criterion will be given a weight according to its level of importance in candidate selection. This method also involves multiplying the weight of the criteria with the candidate's score on each criterion, and summing the results of the multiplication for each candidate. The results of this ranking will make it easier for companies to determine the best candidates who meet the selection criteria. The development of employee selection applications using the web-based Weight Product method will help companies manage the selection process more effectively, efficiently, and accurately.

Index Terms— Weighted Product (WP), Web, Job Vacancy, Application, System

I. INTRODUCTION

Employee selection applications are commonly used by companies or organisations to assist in selecting the best candidates to hire. The background of using this application can vary, such as in selecting employees, companies often have to review many job applications. To improve efficiency in the employee selection process and determine objective weighting criteria in employee selection, users can easily manage candidate data, view evaluation results, and generate employee selection reports quickly. [1] With the formulation of existing problems, I decided to build an application that can assist companies in conducting employee selection objectively and effectively by using weights or values on each criterion to obtain the most suitable employees for available positions. Employee selection applications can help companies to automate and filter job applications, thus saving time and costs incurred [2]. Employee selection applications can also help companies to select employees in a more objective way, because companies can determine clearly

defined selection criteria and consistently use them to evaluate each applicant. Employee selection applications with the weight product method can help simplify the employee selection process by automatically measuring and ranking prospective employees based on the score obtained [3].

To improve the efficiency of a company's selection, the Weight Product (WP) method is an effective method for selecting employees by considering various relevant criteria [4]. This method will combine relevant criteria such as education, work experience, technical ability, and interpersonal ability. Each criterion will be given a weight according to its importance in candidate selection. This method also involves multiplying the weight of the criteria with the candidate's score on each criterion, and summing the results of the multiplication for each candidate. The results of this ranking will make it easier for companies to determine the best candidates who meet the selection criteria. The development of employee selection applications using the web-based Weight Product method will help companies manage the selection process more effectively, efficiently, and accurately.

II. METHODOLOGY

With computerisation, employee selection applications using the Weight Product method will be more efficient and objective, accurate calculation of data weights and produce relevant and transparent outputs [5]. Many applications using the Weight Product method have also been made, but the objects and data used in the application are different. The completion of the Weight Product method has stages that must be done sequentially. Starting with inputting the required data and weights, then at the next stage the calculation is carried out to determine the weight value W , then the weight value S and the last one determines the weight value V . After the calculation is done, it will produce an output in the form of a number which is the highest value and the lowest value from the calculation results of the weights that have been inputted.

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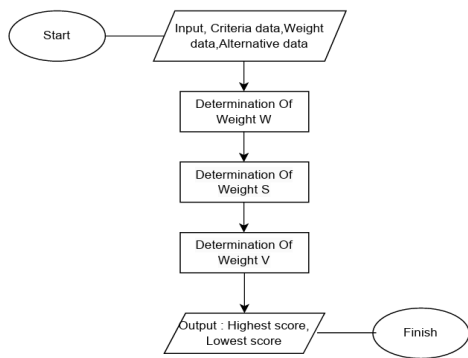


Figure 1. Research step

A. Weight Product

Weighted product (WP) is a decision-making method commonly used to combine values on each attribute, where each attribute has a weight value that can be increased, so that in the end it produces an output in the form of a rating for each attribute [6]. The Weight Product (WP) method is also known as dimensional analysis because its mathematical structure eliminates units of measurement. [7].

To calculate the Weight Product there are 3 steps that are carried out:

1. Determination of weight value W or normalisation of criteria weights

The calculation of the criterion weight "W" is a positive value for the profit attribute and a negative value for the cost attribute.

$$W_j = W_j \div \sum W_j$$

Description:

W_j: Attribute weight

∑W_j : Sum of attribute weights

2. Determination of S weight value

After calculating the improvement of the weight value or the normalisation process of the criteria weight, the next step is to calculate the S weight value [9].

$$S_i = \pi \frac{n}{j} = i^X i_j^{w_j}$$

Description:

S: other similar vectors S

x: criteria values

w: criteria weight

i: alternative

j: criteria

n: number of criteria

3. Determination of V weight value

The final result of the calculation is in the calculation of the weighted V value. This calculation produces a final value where the system will display the highest and lowest values for each data. Calculate the weight of the V value using the formula:

$$V_i = \frac{\pi \frac{n}{j} = i^X i_j^{w_j}}{\pi \frac{n}{j} = i^X i_j^{w_j}}$$

Description:

V: similar vector of values V

- x: criteria values
- w : criteria weight
- i: alternative
- j: criteria
- n: number of criteria

The calculation stages of the Weight product method are as follows:

- Determination of Criteria and weights
- The second stage determines Alternatives (Applicants) and Criteria
- Convert the applicant's score to determine the suitability value of each alternative on the criteria.
- Fix the weight value first so that ∑W = 1 so that the calculation of W and S is obtained.
- Perform division of S and the sum of S to get the weight value V
- Display the highest and lowest values [9].

B. Sources and types of data

The data source of this research uses Library Research, which is a way of collecting data from a number of books, journals, theses, dissertations and documents related to the weight product method. Activities carried out in document collection through library research. The function of library research is to support the research conducted. The theories used come from books, journals and similar research that can help in solving problems in the research conducted. Data processing is carried out to achieve research objectives [10].

III. PROPOSEDSYSTEM

Based on the background and problem formulation, a system analysis can be made, namely a system analysis, which is as follows:

A. Architecture

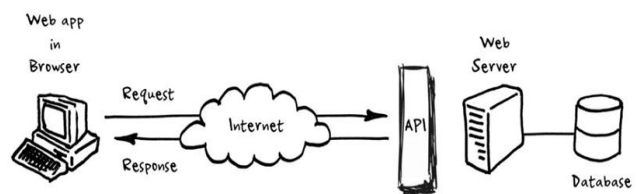


Figure 2. System architecture

Through the system created, the Web application will function as a medium of information. information. To shorten the implementation process, REST API technology is used. REST API technology that can store a type of data. In addition to displaying data, the REST API can also receive data sent by the user, the data will be forwarded to the server to be able to store the data on the server.data will be continued to the server to be able to store in the database.

B. Activity Diagram

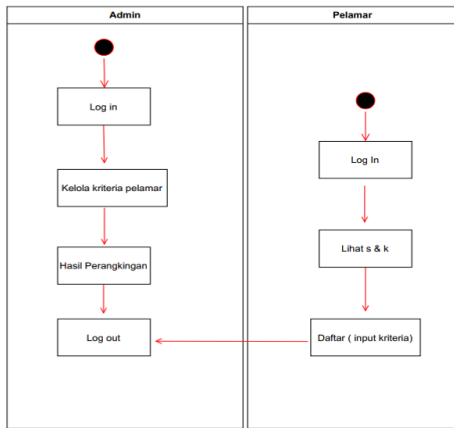


Figure 3. Activity Diagram

Activity diagrams are usually in the form of an elongated table. In each - each column the first row indicates the user or application user. Below it contains user activities in running the application. Activities that occur between admin and applicants.

C. Model Data

Stage 1 : Determination of criteria and weights

Table 1. Gender assessment

Jenis Kelamin	Nilai		
	Kurang (1)	Cukup (2)	Baik (3)
Pria			√
Wanita			√

Table 1 describes the male and female gender weights. Where each criterion gets a weight value of 3

Table 2. Education minimum assessment

Minimum Pendidikan	Nilai		
	Kurang (1)	Cukup (2)	Baik (3)
>S1			√
SMA/D3/D4		√	
<SMA	√		

Table 2 describes the education minimum assessment. There are three criteria on education and each has its own weight value.

Table 3. work experience assessment

Pengalaman	Nilai		
	Kurang (1)	Cukup (2)	Baik (3)
> 3 tahun			√
1 - 3 tahun		√	
< 1 tahun	√		

Table 3 explain about work experience. Where work experience with a longer time gets the highest weight value and work experience with a shorter time gets the lowest weight value.

Table 4. Skills assessment

Skil	Nilai		
	Kurang (1)	Cukup (2)	Baik (3)
		√	
		√	
		√	

Table 4 explained about the assessment of applicants' skills. The assessment of skills is carried out with the same weight value of two.

Stage 2 : Define Alternatives (Applicants) and Criteria

List of those applying for a job (Alternative)

- A1 : Ari
- A2 : Rian
- A3 : Juan
- A4 : Lisa
- A5 : Jeni

Table 5. Data input

NO	NAMA	Jenis kelamin	Min. Pendidikan	Pengalaman	Skil
1.	Ari	Pria	>S1	1 tahun	Designer
2.	Rian	Pria	>S1	>3 tahun	Programer
3.	Juan	Pria	>S1	<1 tahun	Programer
4.	Lisa	Wanita	<SMA	3 tahun	Designer
5.	Jeni	Wanita	<SMA	<1 tahun	Designer

Stage 3 : Applicant Value Conversion Determining the suitability rating of each alternative on each criterion

Table 6. Value conversion

NO	Alternatif	C1	C2	C3	C4
1.	A1	2	3	3	2
2.	A2	2	3	1	2
3.	A3	2	2	3	2
4.	A4	2	1	1	2
5.	A5	2	2	1	2

IV. EXPERIMENT RESULT AND IMPLEMENTATION

A. formula calculation

In the formula calculation, there are three main steps to produce the final score.

1. Correct the weight value first so that $\sum W = 1$ so that it is obtained

Weight of Each Criterion:

$W = [2, 3, 3, 2,]$

Weighting:

$W1 = 2/10 = 0.2$

$W2 = 3/10 = 0.3$

$W3 = 3/10 = 0.3$

$W4 = 2/10 = 0.2$

Normalisation Based on Weighting:

$W1 = -0.2$

$W2 = 0.3$

$W3 = 0.3$

$W4 = -0.2$

2. Calculating the S Vector

Weighting:

$S1 = (2-0.2) (30.3) (30.3) (2-0.2) = 1.465$

$S2 = (10.3) (30.3) (2-0.2) (2-0.2) = 1.054$

$S3 = (30.3) (20.3) (2-0.2) (2-0.2) = 1.297$

$S4 = (30.3) (30.3) (30.3) (2-0.2) = 2.34$

$S5 = (2-0.2) (20.3) (10.3) (2-0.2) = 0.933$

3. Calculating Vector V

$V1 = 1.465/7.089 = 0.182$

$V2 = 1.054/7.089 = 0.252$

$V3 = 1.297/7.089 = 0.161$

$V4 = 2.34 /7.089 = 0.182$

$V5 = 0.933/7.089 = 0.224$

B. Implementation

The following is an overview of the implementation of the application. The implementation results shown are the implementation of the interface (user) interface.

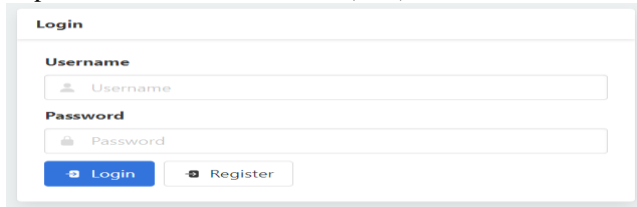


Figure 4. Login page

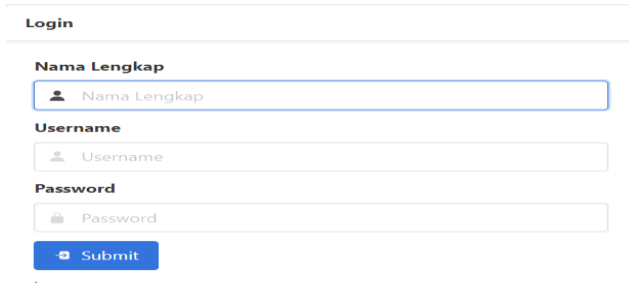


Figure 5. Register page

Figure 5 is a view of the register page for users. If the applicant does not have an account to log in, the user registers to create an account.

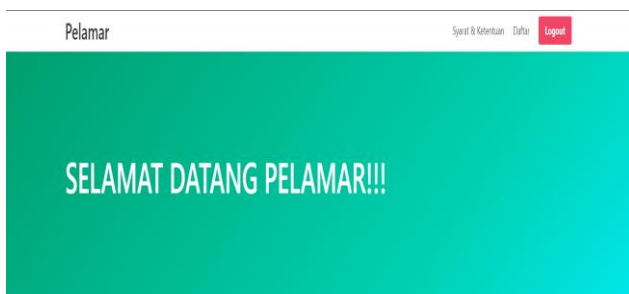


Figure 6. Dashboard page

Figure 6 is a view of the dashboard page of the user. On the user dashboard page there are several menus such as terms & conditions, register and also logout.

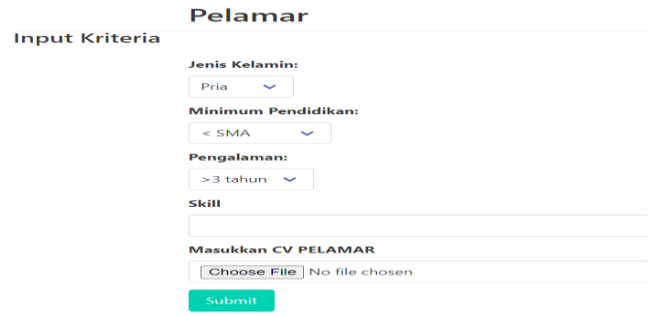


Figure 7. Application page

Figure 7 is a view of the user registration page. Users can register themselves by inputting the required criteria.

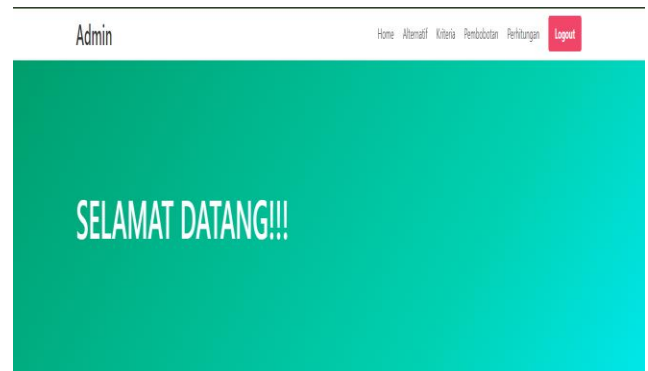


Figure 8. Dashboard page admin

Figure 8 is a view of the dashboard page of the admin. On the admin dashboard page there are several menus such as alternatives, criteria, weighting, calculations and also logout.

No	Kode Alternatif	Nama Pelamar	Aksi
1	A1	Ani	u d
2	A2	Rian	u d
3	A3	Juan	u d
4	A4	Lisa	u d
5	A5	Jeni	u d

Figure 9. Alternative tabel

Figure 9 is a view of the alternative table page from admin. On this page the admin can add alternative codes and applicant names. Admins can also delete data.

No	Kode Kriteria	Nama kriteria	Bobot	Status	Aksi
1	C1	Jenis Kelamin	2	BENEFIT	u d
2	C2	Minimal Pendidikan	3	BENEFIT	u d
3	C3	Pengalaman	3	COST	u d
4	C4	Skil	2	COST	u d

Figure 10. Criteria Table

Figure 10 is a view of the criteria table page from the admin. On this page the admin can add criteria codes and statuses. Admins can also delete data.

No	Kriteria	Alternatif	Nilai	Aksi
1	Jenis Kelamin	Ari	2	[Add] [Delete]
2	Minimal Pendidikan	Ari	3	[Add] [Delete]
3	Pengalaman	Ari	3	[Add] [Delete]
4	Skil	Ari	2	[Add] [Delete]
5	Jenis Kelamin	Rian	2	[Add] [Delete]

Figure 11. Weighting page

Figure 11 is a view of the weighting table page of the admin. Admins can add or delete criteria, alternatives, and weight values.

No	Alternatif	Jenis Kelamin	Minimal Pendidikan	Pengalaman	Skil
1	Ari	2	3	3	2
2	Rian	2	3	1	2
3	Juan	2	2	3	2
4	Lisa	2	1	1	2
5	Jeni	2	2	1	2

Figure 12. Assessment page

Figure 12 is a display of value conversion from table 1 or data table. The value conversion display is on the calculation menu.

Bobot Tiap Kriteria :
W = [2, 3, 3, 2,]

Pembobotan :
W1 = 2/10 = 0.2
W2 = 3/10 = 0.3
W3 = 3/10 = 0.3
W4 = 2/10 = 0.2

Normalisasi Berdasarkan Pembobotan :
W1 = 0.2
W2 = 0.3
W3 = -0.3
W4 = -0.2

Figure 13. calculation of W value

Figure 13 is a display of the first calculation performed to correct the weight value first so that $\sum W=1$

Pembobotan :

$$S1 = (2^{0.2}) (3^{0.3}) (3^{-0.3}) (2^{-0.2}) = 1$$

$$S2 = (2^{0.2}) (3^{0.3}) (1^{-0.3}) (2^{-0.2}) = 1.39$$

$$S3 = (2^{0.2}) (2^{0.3}) (3^{-0.3}) (2^{-0.2}) = 0.885$$

$$S4 = (2^{0.2}) (1^{0.3}) (1^{-0.3}) (2^{-0.2}) = 1$$

$$S5 = (2^{0.2}) (2^{0.3}) (1^{0.3}) (2^{-0.2}) = 1.231$$

Figure 14. Calculation of S value

Figure 14 displays the calculation of the S vector calculated based on the equation

$$V1 = 1/5.507 = 0.182$$

$$V2 = 1.39/5.507 = 0.252$$

$$V3 = 0.885/5.507 = 0.161$$

$$V4 = 1/5.507 = 0.182$$

$$V5 = 1.231/5.507 = 0.224$$

Figure 15. Calculation of V value

Figure 15 displays the calculation of the V value where the V value will be used to generate values from highest to lowest.

Hasil

No	Alternatif	Nilai
1	Ari	0.182
2	Rian	0.252
3	Juan	0.161
4	Lisa	0.182
5	Jeni	0.224

Figure 16. Calculation result

Figure 16 displays after the calculation of the V value, the display will appear from the highest to the lowest value

V. CONCLUSION

Based on the research conducted, it can be concluded that the process of determining employee recruitment to get the best replacement begins with entering the name of the candidate (replacement), entering criteria, entering the weight of each criterion and attribution of a value. The ranking results are calculated from the highest value to the lowest value. The test results using 4 criteria and 5 sample files are based on the test results using the application system built to achieve results similar to manual calculations. From the test results, the WP method developed system can be used to determine the level of employee acceptance.

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