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Application Of The Weighted Product (WP) Method In The Selection Of Prospective New Employees Using Assessment Indicators At PT. Delta Sukses Sejahtera

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ABSTRACT

In running a business, the success of a company is largely determined by the quality of its employees. To obtain quality employees who meet the required qualifications, companies must carry out a selection process in recruiting qualified new employee candidates. PT. Delta Sukses Sejahtera is a private company that operates in the field of recruitment services. This recruitment service serves companies by taking over the job of recruiting candidates. Each assessment is taken into account and considered according to the company's needs. So far, the selection process for prospective employees has experienced difficulties because they are still comparing the test results of prospective employees one by one to determine potential new employees. This process takes a long time. Apart from that, the old employee selection system created an element of subjective assessment. So it is necessary to build a decision support system using the Weighted Product (WP) method as an alternative solution so that it runs effectively and reduces the occurrence of subjective assessments. Weighted Product (WP) is a method in a decision-making system that connects attribute ratings using a multiplication technique, where the rating for each attribute needs to be raised to the power of the relevant attribute weight before calculation, this process is similar to the normalization stage. Based on the results of this research, shows that from the five orders of candidates for recruiting new employees, it can be seen that the scores obtained by each prospective new employee are not too far apart from first to fifth. In the first and fifth places, they have similarities in the final psychological and educational criteria. Whereas the first and fifth psychological test criteria have almost perfect scores.

Keywords: Weighted Product; selection; new employees;

INTRODUCTION

Employees are an important resource for every company. In running a business, the success of a company is largely determined by the quality of its employees. To obtain quality employees who meet the required qualifications, companies must carry out a selection process in recruiting qualified new employee candidates. The selection of prospective new employees is an important part of the entire Human Resources Management process where the quality of a company's human resources depends on the quality of its employees (Nurfadila and Lubs, 2023).

PT. Delta Sukses Sejahtera is a private company that operates in the field of recruitment services. This recruitment service serves companies by taking over the job of recruiting candidates. In this way, companies do not need to spend time and energy carrying out the entire recruitment process.

In the selection process for prospective new employees at PT. Delta Sukses Sejahtera is carried out with a series of tests consisting of four assessment stages, namely: written skills test, psychological test, health test, and interview test. Each assessment is taken into account and considered according to the company's needs (Efendi and Novita, 2019). So far, the selection process for prospective employees has experienced difficulties because they are still comparing the test results of prospective employees one by one to determine potential new employees. This process takes a long time. Apart from that, the old employee selection system created an element of subjective assessment. So it is necessary to build a decision support system using the Weighted Product (WP) method as an alternative solution so that it runs effectively and reduces the occurrence of subjective assessments (Alifia, 2021).

Weighted Product (WP) is a method in a decision-making system that connects attribute ratings using a multiplication technique, where the rating for each attribute needs to be raised to the power of the relevant attribute weight before calculation, this process is similar to the normalization stage.

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LITERATURE REVIEW

Decision Support Systems

Decision Support System (DSS) is a computer-based interactive system that utilizes data and models to support the decision-making process, especially in resolving situations that do not have a clear structure or are only semi-structured (Turban, Liang, and Aronson, 2005 in Limbong . et al., 2020). DSS was originally defined as a model-based system consisting of data processing processes and considerations that help managers make decisions. To achieve its goals, the system needs to be simple, easy to control, easy to adapt, and also comprehensive (Limbong, et al. 2020). A literature review is a critical, analytical summary and synthesis of the current knowledge of a topic. It should compare and relate different theories/research, findings, and so on, rather than just summarize them individually. It should also have a particular focus or theme to organize the review. In this section, the researcher can describe some of the related previous studies. Researchers can review the gaps in the research, then it can be used as a basis for research to be carried out.

Weighted Product Method

The Weighted Product (WP) method is a decision-making technique used to solve problems in Multi-Attribute Decision Making (MADM), which usually arise in the context of discrete space. The WP method is often used to evaluate several alternatives based on a set of attributes or criteria, where each attribute is considered independent (not dependent on each other). These criteria usually take the form of measures, regulations, or standards used in the decision-making process (Harahap and Sumijan, 2020).

According to Yoon (as explained in the book Kusumadewi, 2006), the WP method is an approach that combines attribute rankings using a multiplication technique, where each attribute ranking is squared with the appropriate attribute weight. This process is similar to the normalization process (Asmawati. et al, 2022).
The Weighted Product method allows evaluation and decision making because this approach is simple, allowing the use of many alternatives for various attributes or criteria, without any dependency between one attribute and another. The WP method can help in decision-making, such as in choosing a laptop. However, the calculation results using the Weighted Product Method only produce the maximum value which will be selected as the best alternative. If the alternative meets the specified criteria, then this approach can be used. The advantage of the WP method is its efficiency, because the calculations required take less time. The weight of favorable attributes is used as a positive power in the multiplication process, while the weight of unfavorable attributes is used as a negative power.

According to (Alifia, 2021) the WP method weight calculation must be carried out in order of importance. The level of importance of the WP method is:
1) Not Good
2) Not Good
3) Good Enough
4) OK
5) Very Good

Recruitment

Recruitment is generally understood as the search and acquisition of potential and qualified human resource applicants to select candidates who best suit the needs of the position. To fill open positions, a process known as recruitment is used to identify and place a large number of potential employees who are deemed to meet the company's requirements. The availability of the best human resources is just one of many factors that go into company growth. Implementing employee recruitment is the key to obtaining quality human resources. In public and commercial organizations, as well as in the educational sector, recruitment is the process of obtaining staff who meet the company's criteria. 2016 Riniwati The recruitment process involves attracting, inviting, and finding prospective employees who can fill certain jobs within the company. 2019 (Saihuddin)(Dewi, Givan, & Wiinarno, 2021).

METHOD

The variables used in this research are assessment indicators made by the founder in determining prospective new employees at PT Delta Sukses Sejahtera. The alternatives that are an option in determining potential new employees to be selected as permanent employees at PT Delta Sukses Sejahtera, include those in the table below:

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Table 1 . Alternative Table

Code	Alternative Name
C1	Height
C2	Weight
C3	Age
C4	Last education
C5	Traveling time
C6	Psychological test
C7	Interview

The criteria set by PT Delta Sukses Sejahtera include:

1. Height (C1)

Height is a priority that must be taken into account when selecting prospective employees. If employees do not have sufficient height, then prospective employees will have difficulty reaching their field of work. The required height is 150 - 180.

2. Body Weight (C2)

Body weight is something that must be prioritized in selecting prospective employees because body weight is very influential on health, the ideal body weight is 50 - 80.

3. Age (C3)

Age is very important in selecting prospective employees, this is because companies usually want to look for candidates who can be molded. This means that for those who still want to learn, those who can still be monitored, the accepted age is 18 - 25.

4. Recent Education (C4)

Recent education is very important in the selection of prospective employees, this is to reflect what the prospective employee has basic knowledge and understand certain scientific disciplines that are needed by the company, the final educational requirement is high school – master's degree.

5. Travel Time (C5)

Travel time is something that must be taken into account when selecting prospective employees because we can assess the distance a prospective employee travels to get to the company, the desired travel time is 15 – 45 minutes.

6. Psychological test (C6)

Psychological testing is a valid and reliable procedure for measuring the abilities and behavioral tendencies of your company's potential employees, both for screening prospective entry-level employees and prospective employees whose level is already at the mid/senior level. The psychological test score that meets the requirements is 60 - 80.

7. Interview (C7)

Interviews are an important method in the selection process for prospective employees. In job interviews, companies can better understand the potential or abilities of prospective employees. There are 3 criteria that are assessed in interviews, namely appearance, communication, and service.

The research stages required are as follows:

1. Determine the selection criteria and sub-criteria for prospective new employees
2. Collect alternative data regarding prospective new employees
3. After obtaining all the data, the researcher used the weighted product method to process the data, with the following steps:

a. The first step is to determine the initial weight for each criterion. The initial weight value (w) is used to describe the relative importance of each criterion. This initial weight value is determined by the decision maker, who assesses the level of importance of each criterion. There are several general methods for determining initial weights, such as assigning parameter values to each criterion or assigning weights on a scale of 0-100.

b. The second step is to normalize the initial weights by dividing each weight (wo) by the total value (wj) using the formula : $W_j = \frac{W_j}{\sum w_j}$ (1)

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This normalization is carried out to produce a normalization value, where is the number of alternatives, and is the total number of initial weights. With normalization, criteria that are benefits will have a positive value that is maximized, while criteria that are costs will have a negative value that is minimized.

c. The third step is to determine the vector value (S) using the formula :

$$S_i = \prod_{j=1}^{n} X_{ij}^{wj}, i = 1, 2, ..., m \quad (2)$$

The vector value (S) is obtained by multiplying the attribute value of each criterion by the normalized weight results, with weights having a positive rank for the benefit criterion and a negative rank for the cost criterion.

d. The fourth step is to determine the vector value (V) using the formula :

$$V_i = \frac{\prod_{j=1}^{n} X_{ij}^{wj}}{\prod_{j=1}^{n} (X_j^*)^{wj}}; i = 1, 2, ...m \quad (3)$$

Vector V is an alternative priority that will be used in the ranking process by dividing each number of vector S values by the total number of all vector S values.

e. The final step is to compile the vector V values and draw conclusions as the closing stage. In other words, after getting the resulting vector V, arrange them in order according to the highest V value. The alternative that has the highest V value is the optimal choice.

RESULT

The criteria used to determine prospective new employees are as follows: Height (C1), Weight (C2), Age (C3), Last Education (C4), Travel Time (C5), Psychological Test (C6), Interview (C7). In this research, 23 alternatives were used, namely the names of the people in the Mabar sub-district, including Zulkifli, Reynaldi, Maulana Tamma, Darwis, Wahid, Surya Darma, Dolly, Irfan, Raffi, M. Tanjung, Budiman, Fadli, Nanang, Yoga, Herlis, Zidan, Yusuf, Hendri, Andi Surahman, Andreas, Legimin, Anton and Ikhsan.

The results obtained from this research come from the highest total score in the list of prospective new employee recruits compared to the scores of other prospective recruits. The final achievement produced is the final calculation result of the evaluation using the Weighted Product method.

4.1 Manual Analysis and Calculations for the Weighted Product Method

The preparation of the Weighted Product model in this research was carried out as follows:

1. Obtain the criteria that will be used in the process of determining potential new employees for PT. Delta Success Prosperous. These criteria include;

a. Height,
b. Weight,
c. Age,
d. Last education,
e. Traveling time,
f. psychological test,
g. Interviews,

2. Give importance weight to each criterion that will be used later. In this research, the following is the determination of the weight values used to determine recipients of housing assistance.

Table 2 Criteria Table

No	Criteria Name	Weight
1	Height	5
2	Weight	5
3	Age	5
4	Last education	4
5	Traveling time	2
6	Psychological test	4
7	Interview	5
	Total	30

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Data regarding the criteria values and criteria weights for candidates who meet the requirements to become prospective new employees was obtained through interview interactions with HRD at PT DELTA SUKSES SEJAHTERA.

3. Determination of values for each sub-criteria as follows:
Each criterion has sun criteria which will be assessed by following the WP mode rules, using certain scale intervals listed in Table 2.

Table 3. Description of Values

Weight	Value
Not good	1
Not good	2
Pretty good	3
Good	4
Very Good	5

4. Determine the value of each alternative

If there were data from 23 candidates for new employee recruitment as in Table 3. below, then the WP calculation would be as follows:

Table 4. Values of Prospective New Employees

Name of Prospective New Employee	C1	C2	C3	C4	C5	C6	C7
Zulkifli	4	3	3	4	1	3	1
M.Reynaldi	4	4	3	3	1	3	1
Maulana Tamma	3	4	3	3	1	3	1
Darwis	3	3	3	3	1	3	1
Abdul Nur Wahid	3	4	3	4	3	1	1
Surya Darma	4	5	5	4	1	3	1
Dolly Hananda	3	5	4	4	3	3	1
Irfan Maulana	3	5	5	4	1	3	1
M.Raffi	2	5	5	4	1	3	1
M.Tanjung	4	5	3	4	5	1	1
Budiman	3	5	3	4	1	5	5
M.Fadli	2	5	3	4	3	5	5
Nanang Prasetya	2	5	3	3	3	5	3
Yoga Prabowo	3	5	3	3	3	1	1
Herlis Syaputra	4	3	3	4	3	5	1
Zidan	4	3	3	4	5	5	5
Yusuf Mahardika	4	4	3	4	1	5	1
Hendri Rambe	3	4	4	4	1	3	1
Andi Surahman	3	5	4	4	3	3	3
Andreas	3	4	4	4	5	3	1
Legimin	3	5	4	4	5	3	5
Anton	2	5	3	4	1	3	1
M.ikhsan lubis	4	5	3	3	1	3	1

Table 3 is an example of data on prospective new employee recruitment that will be calculated and ranked to determine the priority of prospective new employee recruitment candidates. Each of these data will be used to calculate the vector S and Vector V values according to the formula previously explained. Before calculating the vector S value, weight normalization is first carried out.

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5. Weight normalization is carried out for each criterion weight

To normalize or adjust the weights for each criterion, the formula used is as stated in equation (1) so that the weight normalization results are obtained in Table 5.

Table 5. Value of Prospective Acceptance of New Employees

No	Criteria Name	Weight	Weight Improvement
1	Height	5	5/30 = 0,166
2	Weight	5	5/30 = 0,166
3	Age	5	5/30 = 0,166
4	Last education	4	4/30 = 0,133
5	Traveling time	2	2/30 = 0,07
6	Psychological test	4	4/30 = 0,133
7	Interview	5	5/30 = 0,166
	Total	30	1

6. Calculation of Vector S values

Vector S is used to evaluate preferences for alternatives, and the estimated value of vector S is calculated using the formula contained in equation (2). So in this research, each alternative has a value, namely:
Vector S is used to evaluate preferences for alternatives, and the estimated value of vector S is calculated using the formula contained in equation (2). So in this research, each alternative has value, namely:

$$S_1 = (4^{0,166})(3^{0,166})(3^{0,166})(4^{0,133})(1^{(-0,07)})(3^{0,133})(1^{0,166})$$
$$= (1{,}258757174)(1{,}200057701)(1.200057701)(1.202469249)$$
$$(1)(1.157329776)(1)$$
$$= 2.522768042$$

$$S_2 = (4^{0,166})(4^{0,166})(3^{0,166})(3^{0,133})(1^{(-0,07(})(3^{0,133})(1^{0,166})$$
$$= (1.258757174)(1.258757174)(1.200057701)(1.157329776)$$
$$(1)(1.157329776)(1)$$
$$= 2.546832007$$

$$S_3 = (3^{0,166})(4^{0,166})(3^{0,166})(3^{0,133})(1^{(-0,07)})(3^{0,133})(1^{0,166})$$
$$= (1.200057701)(1.258757174)(1.200057701)(1.157329776)$$
$$(1)(1.157329776)(1)$$
$$= 2.428065895$$

$$S_4 = (3^{0,166})(3^{0,166})(3^{0,166})(3^{0,133})(1^{(-0,07)})(3^{0,133})(1^{0,166})$$

$$= (1.200057701)(1.200057701)(1.200057701)(1.157329776)$$
$$(1)(1.157329776)(1)$$
$$= 2.314838189$$

until S_{23}. After obtaining the values for each alternative, the next step is to calculate the total value, so that;

$$S_{total} = S_1 + S_2 + S_3 + S_4 + S_5 + S_6 + S_7 + S_8 + S_9 + S_{10} + S_{11} + S_{12} +$$
$$S_{13} + S_{14} + S_{15} + S_{16} + S_{17} + S_{18} + S_{19} + S_{20} + S_{21} + S_{22} + S_{23}$$
$$= 2.522768042 + 2.546832007 + 2.428065895 + 2.314838189 + 1.010265019$$
$$+ 2.989035725 + 1.272680339 + 2.84964838 + 2.664158914 + 0.769073918$$
$$+ 3.6601534 + 1.585927245 + 1.132078403 + 1.249880627 + 1.251406269$$
$$+ 1.068137933 + 2.646166403 + 2.646166403 + 1.527289842 + 0.857705407$$
$$+ 1.162664015 + 2.447559363 + 2.642940349$$
$$= 45.245442089.$$

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7. Calculation of vector V values

The V value vector is the result of calculations that will be used in the ranking process, and the estimated value of the V vector is calculated using the formula stated in equation (3). So, the relative preference value of each alternative in this research has a value.

Determining the ranking and prospective new employees as the best alternative is done by looking at the largest V value.

Table 6. Vector S and Vector V Value

NAME	Vektor S	Vektor V
Zulkifli	2.522768042	0.055757396
M.Reynaldi	2.546832007	0.05628925
Maulana Tamma	2.428065895	0.053664320
Darwis	2.314838189	0.051161798
Abdul Nur Wahid	1.010265019	0.022328548
Surya Darma	2.989035725	0.066062692
Dolly Hananda	1.272680339	0.028128366
Irfan Maulana	2.84964838	0.062981999
M.Raffi	2.664158914	0.058882371
M.Tanjung	0.769073918	0.016997821
Budiman	3.6601534	0.080895516
M.Fadli	1.585927245	0.035051647
Nanang Prasetya	1.132078403	0.025020828
Yoga Prabowo	1.249880627	0.027624454
Herlis Syaputra	1.251406269	0.027658173
Zidan	1.068137933	0.023607636
Yusuf Mahardika	2.646166403	0.058484707
Hendri Rambe	2.646166403	0.058484707
Andi Surahman	1.527289842	0.033755662
Andreas	0.857705407	0.018956725
Legimin	1.162664015	0.025696821
Anton	2.447559363	0.054095159
M.ikhsan lubis	2.642940349	0.058413405

From the calculation results, it can be seen that the prospective new employee recipient with the name Budiman got the highest score on vector V. The following is a table of the results of the calculations carried out above:

After knowing all the vector S and vector V values for each alternative, ranking is then carried out, so that the ranking results for prospective new employee recruitment from the data above are:

Table 7. Results of Ranking of Prospective Aid Recipients

Name	Vektor S	Vektor V	Ranking
Zulkifli	2.522768042	0.055757396	9
M.Reynaldi	2.546832007	0.05628925	8
Maulana Tamma	2.428065895	0.053664320	11

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Darwis	2.314838189	0.051161798	12
Abdul Nur Wahid	1.010265019	0.022328548	21
Surya Darma	2.989035725	0.066062692	2
Dolly Hananda	1.272680339	0.028128366	15
Irfan Maulana	2.84964838	0.062981999	3
M.Raffi	2.664158914	0.058882371	4
M.Tanjung	0.769073918	0.016997821	23
Budiman	3.6601534	0.080895516	1
M.Fadli	1.585927245	0.035051647	13
Nanang Prasetya	1.132078403	0.025020828	19
Yoga Prabowo	1.249880627	0.027624454	17
Herlis Syaputra	1.251406269	0.027658173	16
Zidan	1.068137933	0.023607636	20
Yusuf Mahardika	2.646166403	0.058484707	5
Hendri Rambe	2.646166403	0.058484707	6
Andi Surahman	1.527289842	0.033755662	14
Andreas	0.857705407	0.018956725	22
Legimin	1.162664015	0.025696821	18
Anton	2.447559363	0.054095159	10
M.ikhsan lubis	2.642940349	0.058413405	7

DISCUSSIONS

Based on Table 6, it can be seen that the highest score was obtained by BUDIMAN. Where the weight criteria (C2) psychological tests (C6) and interviews (C7) are very influential criteria for determining prospective new employees because the most important requirements for accepting prospective new employees are psychological tests and interviews.

Then in second place is a new employee candidate named SURYA DARMA. The value obtained by SURYA DARMA on vector S is 2.989035725 and on vector V is 0.066062692. This is because the criteria that have been determined are that height and weight have a perfect score. After all, they have a body that is ideal for prospective new employees. Then in third place is a person named IRFAN MAULANA. The value obtained by IRFAN MAULANA for vector S is 2.84964838 and for vector V is 0.062981999. This is due to the criteria that have been determined, that for age it is still relatively easy and still common to develop again. Furthermore, in fourth place is a community called M.RAFFI. The value obtained by M.RAFFI for vector S is 2.664158914 and for vector V is 0.058882371. This is because according to the criteria that have been determined, Raffi's height is relatively low, but he is also still young and has a good education. Then in fifth place, there is a community named YUSUF MAHARDIKA. The value obtained by YUSUF MAHARDIKA on vector S is 2.646166403 and on vector V is 0.058484707. This is because the criteria that have been determined are that the height and the psychological test have very good scores.

CONCLUSION

From the five rankings of candidates for recruiting new employees, it can be seen that the scores obtained by each prospective new employee are not too far apart from first to fifth. In the first and fifth places, they have similarities in the final psychological and educational criteria. Whereas the first and fifth psychological test criteria have almost perfect scores.

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