THE USE OF THE WEIGHTED PRODUCT (WP) METHOD IN ASSESSING THE PERFORMANCE OF DOCTORS AT SETIO HUSODO HOSPITAL

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Abstract

In a hospital, the doctor's role is very important. A doctor is someone who because of his knowledge tries to heal the sick. Doctors must have professionalism and quality in providing quality health services. One of the efforts to spur the performance of doctors is to conduct performance evaluations in order to increase the spirit of performance and achievement. Currently the job evaluation system at Setio Husodo Hospital is still done conventionally and the results of the assessment are subjective. By using a computer as a tool in the decision-making process for assessing the performance of doctors supported by the weighted product (WP) method to obtain accurate results. This study aims to design a Decision Support System application for assessing the performance of doctors which later deserves to be rewarded by Setio Husodo Hospital by looking at the value of the criterion weights and then processing the ratings of the doctor's performance assessment. The results of the study are in the form of an application that can show the value and ranking of the credibility of a doctor at Rs. Setio Husodo.

Keywords: Decision Support System, PHP and MySQL, WP (Weighted Product), RS Setio Husodo

INTRODUCTION

The rapid development of technology has brought the world into a new era, especially in the field of information technology, where this technology can be applied in almost every aspect of the life of the world's people[1] Along with the rapid development of information technology that is happening today, information technology is not just a work tool, but also a part of the company's strategy to boost its performance and competitiveness. Not a few people use the application as a tool in decision making and the application is used as material to obtain search results from a subject matter[9]. Every agency always faces the future in its activities, in order to achieve its vision and mission. In achieving optimal decisions on the activities of an agency, an appropriate, systematic and accountable way is needed

A doctor is someone who because of his knowledge tries to heal people who are sick. To become a doctor usually requires special education and training and has a degree in medicine. Efforts are made to increase the spirit of better performance and achievement, an institution gives awards to doctors who are considered outstanding [2]. In the process of assessing the performance of doctors as the main professionals in hospitals, it must be carried out realistically, objectively and based on evidence .

Setia Husodo Hospital was established in 2011 which is located in the range of Jalan Sisingamaraja. Setia Husodo Hospital is one of the hospitals that is the center of health services in the city of Kisaran, the doctors on duty at this hospital consist of general practitioners, specialists, and polyclinics. In determining the performance appraisal, doctors and leaders still use conventional methods. Doctors' performance assessment is still done manually and the data processing process has not used an application program in making decisions. Therefore, it is necessary to design a Decision Support System (DSS) for assessing the performance of doctors at Setio Husodo Hospital [3].

One method that can be used to assess the performance of doctors is to use the Weighted Product (WP) method. This method is often used to assist in setting goals or decisions. The concept used is weighting with the rating of an appraiser variable, the Weighted Product (WP) method only produces the largest value which will be chosen as the best alternative [4]. Based on previous research in determining the performance appraisal, the author intends to create a system which can determine the performance appraisal which will later become a contract performance appraisal. The system that will be made is a decision support system with the Weighted Product (WP) method which is a method of determining the order (priority) in multi-criteria analysis. [5]

RESEARCH METHODS

The Weighted Product method is one method of solving the MADM problem. This method evaluates several alternatives to a set of attributes or criteria, where each attribute is independent of one another. The weighted product method uses multiplication to connect attribute ratings, where the rating of each attribute must be raised first with the weight of the attribute in question (Yoon, 1989). This process is the same as the normalization process [6]. The steps in completing the weighted product method are as follows:

1. Determine the criteria and weights for each criterion.
2. Perform the calculation of the relative value of the initial weight
(w_j). Dimana $\sum w_j = 1$

$$W_j = \frac{W_j}{\sum W_j}$$

3. Create a comparison matrix of alternatives and criteria.
4. Perform the calculation of the value of the vector S.

$$S_i = \prod_{j=i}^{n} X_{ij}^{w_j}$$

5. Perform the calculation of the relative preference value (Vector V).

$$V_i = \frac{S_i}{\prod_{j=1}^{n}\left(X_j^*\right)W_j}$$

6. Ranking alternatives.

RESULTS AND DISCUSSION

The WP method in the process requires criteria that will be used as material for calculations in the recommendation process for evaluating the performance of doctors at Setio Husodo Hospital [7].

1. From each of these criteria, the weights will be determined as follows:

Definition	Weight Value
Very Less	1
Not Enough	2
Enough	3
Good	4
Very Good	5

Table 1. Weight Value

2. The criteria for consideration are as follows:

Criteria	Name Of Criteria	Weight Value
C1	Number of Polyclinic Patients	5
C2	Diclat	3
C3	Time of come polyclinic	3
C4	Time Visite	2

Table 2. Weighting Criteria

3. Determine the weight of each criterion

The criteria for the value of the number of polyclinic patients are data on the results of the value of the number of polyclinic patients based on the doctor's performance assessment [8].

Criteria	Sub Criteria	Weight Value
Number of Polyclinic Patients	>3.600	5
	2.880-3.599	4
	<2.400	3

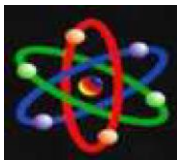**Table 3. Number of Polyclinic Patients**

The criteria for the results of the education and training scores are the data on the results of the training scores based on the doctor's performance assessment

Criteria	Sub Criteria	Weight Value
Diclat	>90 jam	4
	60 jam s/d 89 jam	3
	20 jam s/d 59 jam	2

Table 4. Diclat

The criteria for the results of the polyclinic time attendance values are the results of the polyclinic time attendance values based on the doctor's performance assessment.

Criteria	Sub Criteria	Weight Value
Time Of Come Polyclinic	13.00 WIB – 13.44 WIB	4
	13.45 WIB – 14.29 WIB	3
	>14.30 WIB	2

Tabel 5. Time Of Come Polyclinic

The criteria for the results of the time visit scores are the data on the results of the time visit values based on the doctor's performance assessment.

Criteria	Sub Criteria	Weight Value
Time Visite	16.30 WIB – 16.59 WIB	4
	17.00 – 17.59 WIB	3
	>18.00 WIB	2

Tabel 6. Time Visite

Alternatif	Name Of Doctor's
A1	Dr. Ansaruddin Nasution, Sp.A
A2	Dr. Ardyansyah Nasution, Sp.THT-KL
A3	Dr. Awaluddin Sibuea, Sp.B
A4	Dr. Binsar parulian Sitanggang, Sp.Og
A5	Dr. Darma liza efendi, M.ked (PD), Sp.PD
A6	Dr. Dina Mariana, M.Ked (PD), Sp.PD
A7	Dr. Intan Lismayani, M.Ked (Neu), Sp.s
A8	Dr. Janwar sahanda nasution, Sp.OG
A9	Dr. Julius Dariar, Sp.THT–KL
A10	Dr. Nini Deritana, Sp.P

Table 7. Alternatives used

In this criterion, 4 samples of doctor's performance assessment data will be used. The following is table 8 sample data for physician performance assessment.

Alternatif	Criteria			
	C1	C2	C3	C4
Dr. Ansaruddin Nasution, Sp.A	3.115	118 H	13.00 WIB	17.00 WIB

Alternatif	Criteria			
Dr. Ardyansyah Nasution, Sp.THT-KL	2.010	44 h	14.00 WIB	17.00 WIB
Dr. Awaluddin Sibuea, Sp.B	1.118	52 h	13.00 WIB	17.00 WIB
Dr. Binsar parulian Sitanggang, Sp.Og	3.050	116 h	13.50 WIB	17.00 WIB
Dr. Darma liza efendi, M.ked (PD), Sp.PD	2.769	125 h	13.45 WIB	17.00 WIB
Dr. Dina Mariana, M.Ked (PD), Sp.PD	2.364	72 h	13.00 WIB	17.00 WIB
Dr. Intan Lismayani, M.Ked (Neu), Sp.s	1.107	22 h	13.00 WIB	17.00 WIB
Dr. Janwar sahanda nasution, Sp.OG	2.329	48 h	14.05 WIB	17.00 WIB
Dr. Julius Dariar, Sp.THT–KL	2.279	48 h	13.55 WIB	17.00 WIB
Dr. Nini Deritana, Sp.P	3.665	118 h	14.30 WIB	19.00 WIB

Table 8. Alternative Value Data

After knowing the alternative data, then giving weight to the criteria for each alternative data. The following is Table 9 of the criteria weights for each alternative.

Alternatif	Criteria			
	C1	C2	C3	C4
Dr. Ansaruddin Nasution, Sp.A	4	3	4	3
Dr. Ardyansyah Nasution, Sp.THT-KL	3	2	3	3
Dr. Awaluddin Sibuea, Sp.B	3	2	4	3
Dr. Binsar parulian Sitanggang, Sp.Og	4	2	3	3
Dr. Darma liza efendi, M.ked (PD), Sp.PD	4	3	3	3
Dr. Dina Mariana, M.Ked (PD), Sp.PD	3	3	4	3
Dr. Intan Lismayani, M.Ked (Neu), Sp.s	3	2	4	3
Dr. Janwar sahanda nasution, Sp.OG	3	3	3	3
Dr. Julius Dariar, Sp.THT–KL	3	2	3	3
Dr. Nini Deritana, Sp.P	5	3	2	2

Table 9. Alternative Weight Values

After determining the value of the match branch of each criterion. Then the next step is to correct the weight first, where the initial weight W = (5, 3, 3, 2) will be corrected to

$$W_j = \frac{W_j}{\sum W_j}$$

W = (5 + 3 + 3 + 2) = 13

$$W1 = \frac{5}{5 + 3 + 3 + 2} = 0{,}38$$

$$W2 = \frac{3}{5 + 3 + 3 + 2} = 0{,}23$$

$$W3 = \frac{3}{5 + 3 + 3 + 2} = 0{,}23$$

$$W4 = \frac{2}{5 + 3 + 3 + 2} = 0{,}15$$

W$\sum$W = 0,385 + 0,231 + 0,231 + 0,153 = 1

After correcting the weights, the next step is to calculate the value of the S vector by using multiplication to connect the attribute ratings. Where the attribute rating must be raised first with the weight of the attribute in question.

$$S_i = \prod_{j=i}^{n} X_{ij}^{w_j}$$

$S_1 = (4^{0,38}) + (3^{0,23}) + (4^{0,23}) + (3^{0,15}) = 3{,}54$

$S_2 = (3^{0,38}) + (2^{0,23}) + (3^{0,23}) + (3^{0,15}) = 2{,}7$

$S_3 = (3^{0,38}) + (2^{0,23}) + (4^{0,23}) + (3^{0,15}) = 2{,}89$

$S_4 = (4^{0,38}) + (2^{0,23}) + (3^{0,23}) + (3^{0,15}) = 3{,}02$

$S_5 = (4^{0,38}) + (3^{0,23}) + (3^{0,23}) + (3^{0,15}) = 3{,}31$

$S_6 = (3^{0,38}) + (3^{0,23}) + (4^{0,23}) + (3^{0,15}) = 3{,}17$

$S_7 = (3^{0,38}) + (2^{0,23}) + (4^{0,23}) + (3^{0,15}) = 2{,}89$

$S_8 = (3^{0,38}) + (3^{0,23}) + (3^{0,23}) + (3^{0,15}) = 2{,}97$

$S_9 = (3^{0,38}) + (2^{0,23}) + (3^{0,23}) + (3^{0,15}) = 2{,}7$

$S_{10} = (5^{0,38}) + (3^{0,23}) + (2^{0,23}) + (2^{0,15}) = 3{,}09$

Vektor S	Si
$S_1(A_1)$	3,54
$S_2(A_2)$	2,7
$S_3(A_3)$	2,89
$S_4(A_4)$	3,02
$S_5(A_5)$	3,31
$S_6(A_6)$	3,17
$S_7(A_7)$	2,89
$S_8(A_8)$	2,97
$S_9(A_9)$	2,7
$S_{10}(A_{10})$	3,09
$\sum S_i =$	**30,27**

Table 10. Finding Si Results

After obtaining the value of the vector S for each alternative, the next step is to rank it to determine who deserves the prize. This ranking uses the value of V where the formula for V is:

$$V_i = \frac{S_i}{\prod_{j=1}^{n}\left(X_j^*\right)W_j}$$

$$V1 = \frac{3,54}{30,27} = 0.12$$

$$V2 = \frac{2,7}{30,27} = 0.09$$

$$V3 = \frac{2,89}{30,27} = 0.1$$

$$V4 = \frac{3,02}{30,27} = 0.1$$

$$V5 = \frac{3,31}{30,27} = 0.11$$

$$V6 = \frac{3,17}{30,27} = 0.1$$

$$V7 = \frac{2,89}{30,27} = 0.1$$

$$V8 = \frac{2,97}{30,27} = 0.1$$

$$V9 = \frac{2,7}{30,27} = 0.09$$

$$V10 = \frac{3,09}{30,27} = 0.1$$

After calculating the value of the vector V, the largest value is obtained which is the best alternative [10]. The following is Table 11 of the alternative ranking results.

Alternatif	Name Of Doctor's	Value V	Rank
A1	Dr. Ansaruddin Nasution, Sp.A	0,12	1
A2	Dr. Darma liza efendi, M.ked (PD), Sp.PD	0,11	2
A3	Dr. Dina Mariana, M.Ked (PD), Sp.PD	0,1	3
A4	Dr. Nini Deritana, Sp.P	0,1	4
A5	Dr. Binsar parulian Sitanggang, Sp.Og	0,1	5
A6	Dr. Janwar sahanda nasution, Sp.OG	0,1	6
A7	Dr. Awaluddin Sibuea, Sp.B	0,1	7
A8	Dr. Intan Lismayani, M.Ked (Neu), Sp.s	0,1	8
A9	Dr. Ardiansyah Nasution, Sp.THT-KL	0,09	9
A10	Dr. Julius Dariar, Sp.THT–KL	0,09	10

Table 11. Assessment Results

5. Calculation Data Page
After displaying the results of the assessment, the results of the assessment will be obtained from the WP process. The following is a display of the assessment results page.
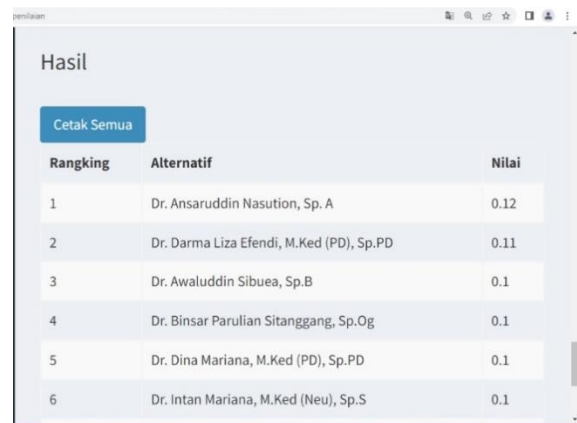

Figure 1. Display of Doctor's Performance Assessment Results Output.

CONCLUSION

Based on the research that has been done while making this system, the following conclusions can be drawn:
1. Thus the Doctor Performance Assessment Decision Support System at Setio Husodo Hospital was created by the author to facilitate HRD staff in assessing the performance of doctors which was previously manual.
2. So the application design of a Decision Support System for Doctor Performance Assessment at Setio Husodo Hospital was made to get more objective results.
3. Therefore, the Decision Support System on the Doctor's Performance Assessment uses the WP method, so that the results of

the assessment that have been carried out go through many calculation processes, starting from the weighting of values from all criteria and determining the value to getting the results of the Doctor's Performance Assessment at Setio Husodo Hospital.

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