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IMPLEMENTATION OF THE FUZZY LOGIC METHOD TO DETERMINE EMPLOYEE ASSESSMENT

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Abstract: Performance assessment is the process of measuring an organization in achieving predetermined goals. Performance assessment can also be interpreted as periodically determining the operational effectiveness of an organization and its personnel, based on the vision, mission and organizational standards that have been previously established. Performance appraisals are carried out between superiors and subordinates, looking at the employee's work results in the last year. Employee performance assessment at the North Padang Lawas Regency PUPR Service still uses a manual system so that the files are not arranged quickly and employee performance assessment still uses calculations with Microsoft Excel. With this problem, the fuzzy logic method is used. The fuzzy method is used to obtain the best employee performance assessment, with 3 criteria to produce the greatest value selected. This research aims to design an employee performance assessment application using the fuzzy method, to obtain recommendations for promotion. The test results of 8 people had sufficient value and 2 people had low value. For low-ranking employees, they will be given sanctions and reprimands by their superiors, while for employees with sufficient value, their performance must be improved to be even better.

Keywords: fuzzy logic; performance; assessment; employee;

Abstrak: Penilaian kinerja merupakan proses pengukuran organisasi dalam mencapai tujuan yang telah ditetapkan. Penilaian kinerja dapat juga diartikan sebagai penentuan secara periodik efektivitas operasional suatu organisasi, dan personilnya, berdasarkan visi, misi dan standar organisasi yang telah ditetapkan sebelumnya. Penilaian kinerja dilakukan antara atasan dengan bawahan, melihat hasil kerja pegawai dalam setahun terakhir. Penilaian kinerja pegawai pada Dinas PUPR Kabupaten Padang Lawas Utara masih menggunakan sistem manual sehingga berkas-berkas file tidak tersusun secara rapid dan penilaian kinerja pegawai masih menggunakanperhitungan dengan microsoft excel.Dengan permasalahah tersebut menggunakan metode fuzzy logic. Metode fuzzy digunakan dalam mendapatkan penilaian kinerja pegawai terbaik, dengan 3 kriteria untuk menghasilkan nilai terbesar yang terpilih. Penelitian ini bertujuan untuk merancang aplikasi penilaian kinerja karyawan dengan metode fuzzy, untuk mendapatkan rekomendasi kenaikan jabatan. Hasil tes dari 8 orang memiliki nilai cukup dan 2 orang memiliki nilai rendah. Bagi pegawai yang memiliki nilai rendah akan diberikan sanksi dan teguran oleh atasannya, sedangkan bagi pegawai yang memiliki nilai cukup, kinerjanya harus ditingkatkan agar lebih baik lagi.

Kata kunci: fuzzy logic; penilaian; kinerja; pegawai

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INTRODUCTION

Performance assessment is the process of measuring an organization in achieving predetermined goals [1]. Performance assessment can also be interpreted as periodically determining the operational effectiveness of an organization and its personnel, based on the vision, mission and organizational standards that have been previously established [2].

The research was conducted at the PUPR Office of North Padang Lawas Regency in terms of employee performance assessment at PUPR of North Padang Lawas Regency as many as 12 people. The purpose of this study is to facilitate the agency in assessing the performance of its employees. When observing the object, there was no assessment system for the employees, where there was no plus value for employees who had really good performance. With the absence of this performance assessment, employees who work according to the regulations made by the school do not get any reward value. Therefore, observations were made in employee performance assessments which could later be used as a basis for assessing employee performance targets later. Based on these problems, employee performance assessment is determined using a decision support system. Decision Support Systems are part of a computer-based information system that is used to support decisions in an organization or company. The method used in assessing employee performance is the Fuzzy Logic Method. This method is known as the weighted addition method. The concept of fuzzy logic is easy to understand because it is simple, not fixated on a decision, so it can tolerate uncertainty [3][4].

Previous fuzzy logic research was carried out by Junaidi Bakwa Uasi, from calculations using the Mamdani fuzzy logic method, the lecturer's performance level for the teaching variable value was 30 (low), the research variable value was 85 (good) and the community service variable value 50 (fair) was 16.4553 (sufficient) [5]. According to Munte and several other researchers, the results of this research show that the Sugeno fuzzy method produces higher scores than the Mamdani method [6][7]. Other research shows that the fuzzy logic method with the Mamdani method produces reports accurately and quickly, increasing accuracy in obtaining employee assessment results[8][9][10].

METHOD

The method used in this system is the fuzzy Mamdani method, where the Mamdani method explains how to draw the best conclusions or decisions dari permasalahan yang tidak pasti [11].The framework for the research carried out can be seen in Figure 1.

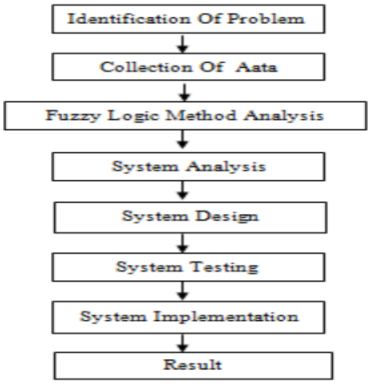

Figure 1. Research Framework

Identification of Problem

Identification of the problem is that there has been no assessment of the

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employee, which means there is no plus value for employees who have really good performance.

Collection Of Data

The process of collecting research data using interview techniques, observation and literature studies such as from books, journals, and the internet related to the research.

Fuzzy logic Method Analysis

By conducting input analysis, calculation process, and output analysis.

System Analysis

Conducting system weakness analysis, system needs analysis and system feasibility analysis.

System Design

By designing UML, applications with PHP programming.

System Testing

In the trial stage of this system, it will be known whether the designed system can be used far from the word error so that it can be used at the PUPR Office of North Padang Lawas Regency.

System Implementation

At this implementation stage, programs/applications are made. The design of a decision support system for employee performance assessment at the PUPR Office of North Padang Lawas Regency using the Fuzzy Logic method is carried out using Php programming and a Mysql database.

Results

The system that has been implemented at the PUPR Office of North Padang Lawas Regency will later be used by the agency to be able to conduct employee performance assessments according to its criteria.

On Figure 1, the system that has been implemented at the PUPR Department of North Padang Lawas Regency, the results will later be used by the agency to assess employee performance according to the criteria. The research methods used in this research are qualitative methods and quantitative methods. The qualitative method is data in the form of characters that can be assessed by researchers, such as characteristics, traits and conditions or a description of the quality of the object being studied.

The following is alternative data for employee performance assessment which can be seen in the following table:

Table 1. Alternative Data

Code	Alternative data	Absenteisn	Discipline	Loyalty
A01	M.Nuh Pulungan,ST	87	80	80
A02	Ikhsan Harahap, ST	70	70	80
A03	Ridwan Saleh Harahap, ST	65	65	40
A04	Irpansyah Nasution, ST	89	85	80
A05	Ginta Ritonga,ST	90	78	78
A06	Saddam Husein,ST	80	82	82
A07	Mhd. Ali Harahap, ST	78	78	75
A08	Sunardi Siregar, ST	82	84	84
A09	Bosar Rambe, ST	82	82	83
A10	Sobrin Dalimunthe, ST	85	85	86

The Fuzzy Logic method in the process requires criteria that will be used as calculation material in the employee performance assessment process at the

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PUPR Service, North Padang Lawas Regency. The criteria for consideration are as follows:

Tabel 2 Data Kriteria

Kriteria	Kriteria
CK1	Absemteisn
CK2	Discipline
CK3	Loyalty
CK4	Performance

The following are the steps for the fuzzy logic method using the Mamdani method

Table 3. Variable

Function Name	Variable	Range
Input	Absemteisn	0-100
	Discipline	0-100
	Loyalty	0-100
Output	Performance	0-100

There are 3 fuzzy sets for employee performance assessment variables at the PUPR Department of North Padang Lawas Regency which can be seen in table 4

Table 4. Fuzzy Set

Skala	Mark
Low (RR)	0-65
Enought(CC)	65-75
Godd (BB)	75-100

From table 4 above, the graph shown in figure 2 was created.

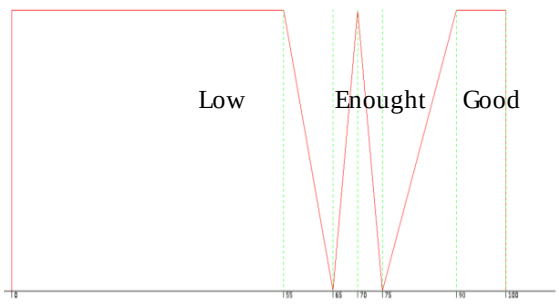

Figure 2. Fuzzification

For a low fuzzy set, it has a domain (0-65) with the highest degree of membership at the value 65. If the variable value is higher and exceeds the value 65, the closer it is to enough.

$$\mu OP\ (Low) = \begin{cases} 1\ ; x < 55 \\ \frac{55-x}{10}; 55 \leq x \leq 65 \\ 0; x > 0 \end{cases} \quad (1)$$

For a fuzzy set, it is enough to have a domain (65-75) with the highest degree of membership at the value 75. If the variable value is higher and exceeds the value 75, the closer it is to good.

$$\mu OP\ Enought = \begin{cases} 0\ ; < 65\ atau\ x > 75 \\ \frac{x-65}{10}; 65 \leq x \leq 70 \\ \frac{75-x}{5}; 70 \leq x \leq 75 \end{cases} \quad (2)$$

For a fuzzy set, it is enough to have a domain (75-100) with the highest degree of membership found at the value 100, if the variable value is less than 100 then the closer it is to enough

$$\mu OP\ (Good) = \begin{cases} 0\ ; x < 75 \\ \frac{x-75}{15}; 75 \leq x \leq 90 \\ 1; x \geq 90 \end{cases} \quad (3)$$

RESULTS AND DISCUSSION

The results and discussion of the Fuzzy Logic method with the Mamdani method in assessing employee performance at the PUPR Service in North Padang Lawas Regency include research results, data results and discussion.

Alternative A01

CK1 =87

$$\mu OP(87) = \frac{87-75}{15} = 0{,}8$$

CK2 =80

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$$\mu OP(80) = \frac{80-75}{15} = 0{,}333$$

CK3=80

$$\mu OP(80) = \frac{80-75}{15} = 0{,}333$$

Alternative A02

CK1=70

$$\mu OP(70) = \frac{75-70}{5} = 1$$

CK2=70

$$\mu OP(70) = \frac{75-70}{5} = 1$$

Ck3=80

$$\mu OP(80) = \frac{80-75}{15} = 0{,}333$$

Alternative A03

CK1 = 65 :

$$\mu OP(65) = 0$$

CK2=65

$$\mu OP(65) = 0$$

CK3=40

$$\mu OP(40) = 1$$

Alternative A04

CK1 =89

$$\mu OP(89) = \frac{89-75}{15} = 0{,}933$$

CK2 =85

$$\mu OP(85) = \frac{85-75}{15} = 0{,}667$$

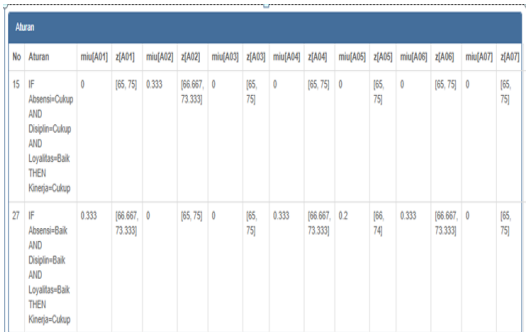
CK3=80

$$\mu OP(80) = \frac{80-75}{15} = 0{,}333$$

Forming a count using if then, there are 28 rules formed but only 2 rules are selected as below:

Rule 15 : IF Attendance=Adequate AND Discipline=Adequate AND Loyalty=Good THEN Performance=Low

Rule 27 : IF Attendance=Good AND Discipline=Good AND Loyalty=Good THEN Performance=Adequate

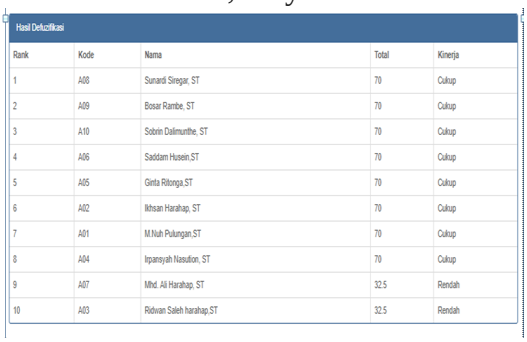


Aturan

No	Aturan	miu[A01]	z[A01]	miu[A02]	z[A02]	miu[A03]	z[A03]	miu[A04]	z[A04]	miu[A05]	z[A05]	miu[A06]	z[A06]	miu[A07]	z[A07]
15	IF Absensi=Cukup AND Disiplin=Cukup AND Loyalitas=Baik THEN Kinerja=Cukup	0	[65, 75]	0.333	[66.667, 73.333]	0	[65, 75]	0	[65, 75]	0	[65, 75]	0	[65, 75]	0	[65, 75]
27	IF Absensi=Baik AND Disiplin=Baik AND Loyalitas=Baik THEN Kinerja=Cukup	0.333	[66.667, 73.333]	0	[65, 75]	0	[65, 75]	0.333	[66.667, 73.333]	0.2	[66, 74]	0.333	[66.667, 73.333]	0	[65, 75]

Figure 3. Rule

Based on the fuzzyfication results based on the rules, they are as follows:



Hasil Defuzifikasi

Rank	Kode	Nama	Total	Kinerja
1	A08	Sunardi Siregar, ST	70	Cukup
2	A09	Bosar Rambe, ST	70	Cukup
3	A10	Sobrin Dalimunthe, ST	70	Cukup
4	A06	Saddam Husein,ST	70	Cukup
5	A05	Ginta Ritonga,ST	70	Cukup
6	A02	Ikhsan Harahap, ST	70	Cukup
7	A01	M.Nuh Pulungan,ST	70	Cukup
8	A04	Irpansyah Nasution, ST	70	Cukup
9	A07	Mhd. Ali Harahap, ST	32.5	Rendah
10	A03	Ridwan Saleh harahap,ST	32.5	Rendah

Figure 4. Defuzzyfication Result

CONCLUSION

The fuzzy logic method in the network training process uses several 3 criteria. The test results of 8 people had sufficient value and 2 people had low value. For low-ranking employees, they will be given sanctions and reprimands by their superiors, while for employees with sufficient value, their performance must be improved to be even better. From the implementation and testing results, it can be explained that the system designed to apply the Fuzzy Logic method in assessing employee performance is a system that makes it easier to evaluate employee performance later. This system, which makes it easy for admins, will also carry out assessments quickly, precisely and effectively without taking a long time.

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