Group Decision Support System Fuzzy Profile Matching Method With Organizational Citizenship Behaviour

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Abstrak

Dalam suatu organisasi perusahaan, sumber daya manusia merupakan unsur yang sangat penting untuk menunjang kemajuan dan kualitas dalam mencapai tujuan perusahaan. Hal terpenting yang dapat dilakukan oleh perusahaan yaitu proses seleksi karyawan, guna menjamin kandidat yang tepat pada posisi yang tepat serta dengan nilai-nilai berupa Organizational Citizenship Behavior. Dalam penelitian ini akan dibahas metode-metode yang dapat diterapkan dalam proses jenjang karir dalam suatu organisasi. Permasalahan yang sering terjadi, seperti sulitnya menentukan orang yang tepat untuk mengisi suatu posisi, salah sasaran dalam proses promosi, karena hanya dinilai dari beberapa kriteria, kemudian promosi yang kurang transparan dan tidak objektif. Dengan menerapkan sistem pendukung keputusan kelompok, di mana pendapat dari beberapa pengambil keputusan dapat ditampung, serta dalam pemecahan masalah dan komunikasi terjadi dalam kelompok. Penelitian ini menggunakan metode profile matching, karena dapat memberikan penilaian terhadap potensi masing-masing calon pegawai dengan membandingkan profil pribadi pegawai dengan profil jabatan yang bersangkutan, dipadukan dengan logika fuzzy sehingga nilai asli yang diperoleh alternatif tetap konsisten dari awal hingga proses pemeringkatan. Hasil yang diperoleh berupa laporan pemeringkatan dengan menggunakan metode borda, berdasarkan perhitungan dari metode fuzzy profile matching diharapkan dapat membantu organisasi perusahaan untuk mempermudah proses promosi.

Kata kunci—*DSS, profile matching, fuzzy, GDDS, BORDA, Organzational Citizenship Behavior*

Abstract

In a corporate organization, human resources are a very important element to support progress and quality in achieving the goals of the company. The most important thing that can be done by the company, namely the employee selection process, in order to guarantee the right candidate in the right position as well with value form Organzational Citizenship Behavior. In this study, we will discuss the methods that can be applied in the career path process in an organization. Problems that often occur, such as being difficult to determine the right person to fill a position, mistargeting in the promotion process, because it is only judged from several criteria, then promotions are less transparent and not objective. By implementing a group decision support system, where the opinions of several decision makers can be accommodated, as well as in problem solving and communication occurs in a group. This study uses the profile matching method, because it can provide an assessment of the potential of each employee candidate by comparing the employee's personal profile with the profile of the position in question, combined with fuzzy logic so that the original value obtained by the alternative

remains consistent from the beginning to the ranking process. The results obtained in the form of ranking reports using the borda method, based on calculations from the fuzzy profile matching method, are expected to help company organizations to facilitate the promotion process.

1. INTRODUCTION

In a corporate organization, human resources are a very important element to support progress and quality in achieving the goals of the company [1]. In order for employees to produce increased performance, placement for these employees is needed according to their knowledge, skills, and abilities [2]. A very important thing that can be done by corporate organizations, namely the employee selection process, in order to ensure that the right person or employee occupies the right position as well [3]. In this study, we will discuss the methods that can be applied in the process of career paths or promotions in an organization. With the system and method used, it is hoped that it can help human resource development (HRD) within the company to determine suitable employees to occupy a position. Usually, the problem is the difficulty of determining the right person to occupy a certain position in accordance with what is needed by the organization. With many candidates who have almost the same criteria. As well as other concerns, namely the wrong target in carrying out the promotion process, which usually occurs because the candidate is only judged based on several criteria, such as length of service, discipline and work performance. Other problems, such as the process of promotion is less transparent so that it will cause jealousy from other candidates so that it will cause distrust of employees towards the company. The determination of criteria in the placement of employee assignments cannot be separated from the goal so that the employees who will be transferred meet the predetermined criteria [4]. Job analysis is a form of developing a detailed description of the tasks that must be carried out in a position, determining the relationship from one position to another existing position, and determining the knowledge, skills, and other abilities needed by employees to do work efficiently and effectively. Effective [5].

The decision-making process for promotions can be completed with a decision support system used by managers as one of the information support in solving problems to fill positions, where the performance function can calculate the consideration of each competency possessed by each HR [6]. Decision support systems (DSS) can provide alternative solutions when a person or group of people is difficult to make the right and appropriate decisions [7]. In this study, using a group decision support system, where the opinions of several decision-makers can be accommodated, as well as in problem-solving and communication occurs in a group [8]. The method used in this study, one of which is the profile matching method, in the profile matching process in outline is the process of comparing individual competencies into job competencies, the smaller the gap generated, the greater the value weight, which means it has a greater opportunity for employees to occupy the position [9]. According to [10], the profile matching method was chosen because it is able to select the best candidates from a number of existing employees. In this case, the intended candidates are employees who are entitled to occupy the available positions based on the specified criteria. Then according to [11], this method is used in evaluating employee selection, which can provide an assessment of the potential of each employee candidate by comparing the employee's personal profile with the profile of the position in question. Then the profile matching method is combined with fuzzy logic, which is called fuzzy profile matching. Fuzzy logic uses a membership function by using a curve that shows the mapping of data input points into their membership values which have an interval between 0 to 1. The stages in the profile matching method combined with Fuzzy logic

use a membership function that is used to calculate the interval value conversion, calculation GAP, and GAP weighting [12]. The criteria used for determining promotion in this study are aspects of intelligence, aspects of work attitudes, and aspects of behavior, then divided into sub-criteria. This competency system contains a description of the achievements and potential of human resources in accordance with the needs of the work unit [3]. To get the final ranking of each decision-maker, this study added the BORDA method; this method is a voting method that can complete group decision making, wherein its application each decision-maker (DM) gives a rating based on the available alternative choices [13]. Similar studies that have discussed profile matching and fuzzy methods, such as research from [14], entitled Decision Support System for Promotion Using Profile Matching Method. The purpose of this study is to assist managers in making decisions based on criteria that have been determined by the company, so that the promotions given are right on target to employees who have good performance at PT. Aromaduta Rasaprima. Furthermore, research with the addition of the fuzzy method to the profile matching method, such as research from [15], with the title Comparison of Results between Model Profile Matching and Model Profile Matching Using Fuzzification, as an Overview, the purpose of this study is to determine or select the best paper, based on several The paper is assessed based on the comparison of the profile matching method with the fuzzy profile matching method. Then another similar study, from research [12], entitled Comparison of Profile Matching Methods with Fuzzy Profile Matching in the Selection of Deputy Principals, this study aims to conduct the selection of vice principals, with various alternatives, by testing and assessing by committee to vice principal candidates. The test results will then be calculated using the weighting of the importance of each criterion method. The calculation results from this weight multiplication method will be compared with calculations using the Profile Matching and Fuzzy Profile Matching methods.

2. METHODS

2.1 Decision Support System (DSS)

The definition of a decision support system is a system that has been designed and can be implemented to support decisions that have been agreed upon in the selection of an object [16]. Then according to [17] a decision support system or decision support system is an information system at the management level of an organization that combines data and sophisticated analytical models or data analysis tools to support semi-structured and unstructured decisions, DSS is planned to assist organizational decision making.

Then according to [18], the Group Decision Support System aims to improve the group decision-making process by removing barriers from common communication, providing techniques for developing decision analysis, and systematically directing the pattern, timing, or content of discussion. Meanwhile, according to [19], the Group Decision Support System (GDSS) is a computer-based system that supports groups of people who are involved in a common task (goal).

2.2 Profile Matching

The Profile matching is a vital process in HR management where the competition (ability) required by a position is first determined [20]. Then according to [21], profile matching is a simple method in a decision support system by comparing the GAP between the Alternative and Criteria values. Meanwhile, according to some experts, the notion of profile matching is a decision-making mechanism by assuming that there is an ideal level of predictor variables that applicants must possess, not a minimum level that must be met or passed [1], [22]. The Profile Matching process compares individual competencies into job competencies to see differences in

competencies (also called gaps). [1], [23], [24]. The steps in calculating the profile matching method are as follows.

1. The first step in the profile matching method is to determine the variables that will later be used as points for evaluating employees' positions.
2. Calculating the results of mapping the competency gap. Gap is the difference between job profiles and standards for career planning and employee profiles shown in the formula 1.

$$Gap = Profil\ employe - Job\ Profil$$

3. The next step is to determine the weight of the gap calculation that has been carried out, shown in the Table 1.

Table 1 Weight Profile Matching

Gap difference	Value Weight	Description
4	5	Individual competence excess 4 levels / level
3	4,5	Individual competence excess 3 levels / level
2	4	Individual competence excess 2 levels / level
1	3,5	Individual competence excess 1 levels / level
0	3	Competence as required
-1	2,5	Individual competence is less than 1 level/level
-2	2	Individual competence is less than 2 level/level
-3	1,5	Individual competence is less than 3 level/level
-4	1	Individual competence is less than 4 level/level

4. The following process is to calculate the value of the core factor and secondary factor. The core factor is the aspect (competence) that is most prominent or most needed by a position expected to produce optimal performance. Calculation of the core factor can be shown in the formula 2.

$$NCF = \frac{\Sigma NC}{\Sigma IC} \qquad (2)$$

NCF is the average core factor value, NC is the total number of core factor values. IC is Number of items core factor.

5. Secondary factors are items other than aspects that exist in the core factor (supporting factor). The secondary factor calculation can be shown in the formula 3.

$$NSF = \frac{\Sigma NS}{\Sigma IS} \qquad (3)$$

NSF, Average secondary factor score, NS, Total secondary factor score, IS, Number of secondary factor items.

6. The next stage is to calculate the total value of each aspect based on the percentage of core and secondary factors that are estimated to affect the performance of each profile. The calculation can be seen in the formula 4. NCF is Average value of core factor, NSF is Average value of secondary factor

$$Value = 60\%\ NCF + 40\%\ NSF \qquad (4)$$

7. The last step is to calculate the ranking of each candidate who is proposed to occupy the position, using the formula 5.

$$Ranking = \mathcal{X}\%NT\ 1 + \mathcal{X}\ \%NT\ 2 + \mathcal{X}\ \%\ 3 \qquad (5)$$

NT(1) : The total value of the first aspect variable,
NT(2) : The total value of the second aspect variable,
NT(3) : The total value of the third aspect variable,
$(\mathcal{X})\%$: The percentage value of each variable.

2.3 Fuzzy Logic

Fuzzy set theory can be used to represent the problem of uncertainty. An ordinary fuzzy number has a fuzzy set which is indicated by giving an interval from 0-1. One way that can be used to get the membership value is through a function approach. There are several functions that can be used.

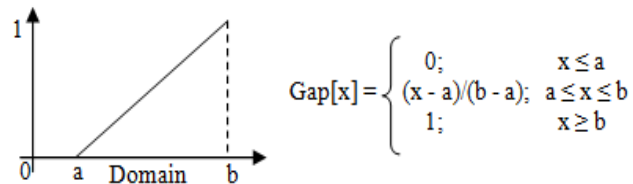$$Gap[x] = \begin{cases} 0; & x \le a \\ (x - a)/(b - a); & a \le x \le b \\ 1; & x \ge b \end{cases}$$

Figure 1 Membership Function Curves and Formulas

Fuzzy logic uses membership functions by using a curve that shows the mapping of data input points into their membership values which have an interval between 0 to 1. Triangle Curve is a combination of 2 lines (linear) [12]. The Triangle Curve is in the image 1.

2. 3.1 Fuzzy Profile Matching

Fuzzy Profile Matching is a combination of Fuzzy Logic with Profile Matching method. The stages used are the stages in the Profile Matching method combined with Fuzzy Logic using a membership function that is used to calculate interval value conversions, GAP calculations and GAP weighting. The formula for finding the weights in the fuzzy profile matching method, as shown in equation 6.

$$\text{weight sub-criteria}_{ij} = \text{weight gap}_{ij} + (\text{weight gap}_{ij} * \text{membership degree}_{ij}) \tag{6}$$

2. 3.2 BORDA method

The BORDA method according to [13], in the Borda method, voting and counting is done by giving a number of points to each candidate (candidate), for example, there are five candidates in an election, each candidate receives 5 points for ranking candidates. first, 4 points for the second ranked candidate and so on, the last candidate receives 1 point, in other words where n candidates will receive n points for the first choice, n-1 for the second choice, n-2 for the 3rd choice, n-4 for the choice 5. Borda's calculation according to [25-28] is as follows,

1. Giving points by decision makers can be done by assigning a value of - 1 for the first alternative choice, - 2 for the second alternative choice, and a value of 0 is for the last alternative choice.
2. The alternative that has the highest score is the winner.

2.4 Index Organizational Citizenship Behaviour (OCB)

Organizational Citizenship Behaviour (OCB) is a character of Loyalty to the Organization [29]. According to [30], defines OCB as individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system and that in the aggregate promotes the effective functioning of the organization. From the theory offered by Organ, OCB is an action of choice that is carried out spontaneously by employees outside the job description, behavior that describes the employee having met the minimum requirements of his position and positive behavior that supports organizational effectiveness. Indicators of Organizational citizenship behavior [30], consist of several components, including ;

a. Altruism, the behavior of helping other employees without any coercion on tasks that are closely related to organizational activities.
b. Courtesy, Behavior that shows respect for the rights of others which aims to prevent the emergence of work problems related to other employees
c. Sportsmanship, Behavior that indicates a desire to tolerate less than ideal situations by not making damaging issues even though they feel irritated.
d. Civic Virtue, Behavior that shows voluntary participation and support for organizational functions both professionally and socially.
e. Conscientousness, Contains the performance of the role prerequisites that exceed the minimum standards expected by the organization

3. RESULTS AND DISCUSSION

Job Promotion Calculation Process with Fuzzy Profile Matching In Figure 2 is the process flow of the fuzzy profile matching method to carry out the promotion process. Database is a collection of connected data that is stored together on a medium, which is organized based on a certain schema or structure, and with software to manipulate it for a particular use. The database can also be interpreted as a collection of data that is arranged in the form of several tables that have relationships with each other or stand alone [31-32]. In the process of calculating the fuzzy profile matching method for use in promotions, previously it must have aspects and sub-criteria that have been determined with the factors and values of the position profile. In this study, the sample is show in Table 2.
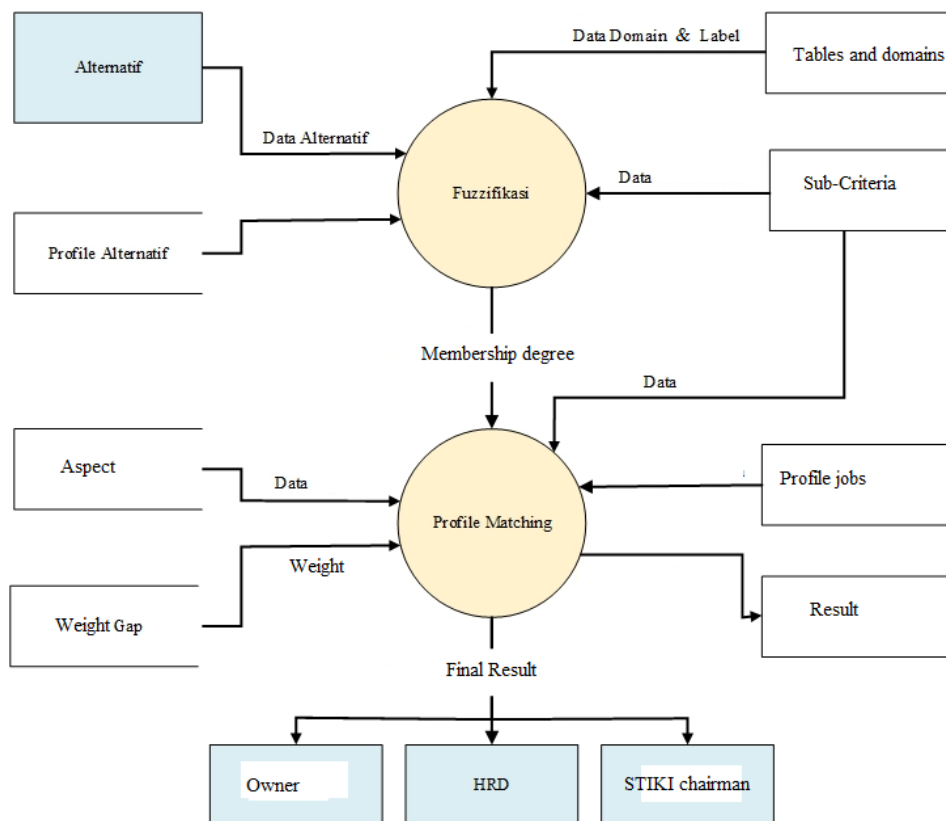

Figure 2 Fuzzy Profile Matching Process Flow

Table 2 Job Profile Sample Value

Aspect and weight	Sub-criteria	Factor	Position Value
(KA1) intelligence (25%)	Systematic Thinking	*Core Factor*	85
	Real Reasoning and Solutions	*Core Factor*	75
	Concentration	*Secondary Factor*	88
	Anticipation	*Secondary Factor*	90
(KA2) work attitude (35%)	Accuracy and Responsibility	*Core Factor*	76
	Vitality and Planning	*Core Factor*	77
	Caution	*Secondary Factor*	89
	Achievement Drive	*Secondary Factor*	72
(KA3) behavior (40%)	Honesty	*Core Factor*	88
	Influence	*Core Factor*	76
	Fulfillment	*Secondary Factor*	77
	Discipline	*Secondary Factor*	92

A sample of the values obtained by each candidate or alternative. In this study, using a sample, namely with five candidates or alternatives, the value can be seen in Table 3.

Table 3 Sample Value of Each Alternative

Id_A	KA1				KA2			
	K1	K2	K3	K4	SK1	SK2	SK3	SK4
Employee 1	88	70	65	92	76	81	64	70
Employee 2	92	85	77	70	72	83	85	88
Employee 3	70	66	70	60	65	75	65	81
Employee 4	93	75	77	70	87	83	80	88
Employee 5	65	75	70	75	67	80	70	91

	KA4			
	P1	P2	P3	P4
Employee 1	76	65	88	77
Employee 2	88	85	95	84
Employee 3	70	77	86	76
Employee 4	86	82	93	76
Employee 5	77	75	68	88

Before calculating the gap in the profile matching method, first, the analog values in the sample Table 3, are changed to a value range of 1 to 5. For the range of values based on the analog values obtained, it can be seen in Table 4. The upper range of the sample values, and how much the sample values weigh [31]. After getting a range of values from 1 to 5 from Table 4, based on the analog sample values in table 3, a process is carried out to calculate the gap value for each candidate or alternative minus the job profile value. The results of the calculation of the gap. Fuzzy value can be seen in Figure 3.

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Table 4 Value Conversion Domain Label

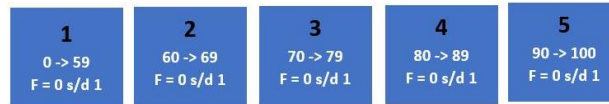| Lower limit	Upper limit	Weight	Category
90	100	5	Very good
80	89	4	Well
70	79	3	Enough
60	69	2	Not enough
0	59	1	Very less

Figure 3 Define Membership Function

After getting the results of the membership function, then the calculation process is carried out to find the value of the fuzzy profile matching weight. The results of the fuzzy profile matching weights for each candidate can be seen in Table 5.

Table 5 Weight of Fuzzy Profile Matching

Id_A	KA01				KA2			
	K1	K2	K3	K4	SK1	SK2	SK3	SK4
Employee 1	5,667	3,000	3,111	3,6	5,000	3,889	2,889	5,667
Employee 2	4,200	5,444	4,444	2	3,667	4,667	4,667	4,200
Employee 3	2,500	4,167	2,500	1,5	3,889	4,667	3,111	2,500
Employee 4	4,550	4,667	4,444	2	6,222	4,667	3,000	4,550
Employee 5	3,111	4,667	2,500	3	4,444	3,500	2,500	3,111
KA3								
	P1	P2	P3	P4				
Employee 1	4,167	3,889	6,611	3,556				
Employee 2	5,667	5,444	6,000	3,611				
Employee 3	2,500	5,333	5,833	3,333				
Employee 4	5,000	4,278	5,200	3,333				
Employee 5	4,444	4,667	4,722	4,722				

The calculation process to find the value of the core factor and secondary factor of each candidate based on the aspects determined in this study. The results of the factors are shown in Table 6.

Table 6 Factor result

Id_A	KA1		KA2		KA2	
	CF	SF	CF	SF	CF	SF
Employee 1	4,333	3,356	3,111	3,600	4,028	5,083
Employee 2	4,822	3,222	4,444	2,000	5,556	4,806
Employee 3	3,333	2,000	2,500	1,500	3,917	4,583
Employee 4	4,608	3,222	4,444	2,000	4,639	4,267
Employee 5	3,889	2,806	2,500	3,111	4,556	4,722

The last stage in the fuzzy profile matching method is the process of calculating the ranking obtained from each candidate, based on the percentage of each aspect. The results of this ranking are only based on the assessment of one decision maker only, for the final result will be determined by a voting system with borda. The ranking results from one of the decision makers can be seen in Table 7.

Table 7 The Ranking Results of One of the Assessors

Id_A	KA1	KA1	KA1	Result	Decision
Employee 1	0,986	1,346	1,780	4,111	3
Employee 2	1,046	1,664	2,102	4,812	1
Employee 3	0,700	1,388	1,673	3,762	5
Employee 4	1,013	1,816	1,796	4,626	2
Employee 5	0,864	1,317	1,849	4,030	4

Implementation of a group decision support system, namely accumulating the final results obtained from each decision maker, later all the final results will be sorted based on points from the ranking obtained by each candidate. If you get rank 1, then the points you get will be maximal, and vice versa, if you get the lowest rank, automatically the points will also be small. From the points earned by each candidate, an addition will be made later, from the results of the addition of the candidate with the highest score, the candidate will automatically get a rank 1 and have the opportunity to be promoted to the required position. The results of the borda calculations in this study are shown in Table 8.

Table 8 Ranking Results With Borda

Alternative	Stakeholder		Total	*Result*
	Decision	HRD		
Employee 1	3	5	8	2
Employee 2	5	4	9	1
Employee 3	1	1	2	5
Employee 4	4	2	6	3
Employee 5	2	3	5	4

4. CONCLUSION

Research with this group decision support system, can provide a solution so that the selection of suitable candidates for certain positions is not carried out unilaterally, but by voting. The use of combined fuzzy and profile matching methods aims to obtain ranking results with the lowest possible error rate. The advantage of the combined fuzzy profile matching method compared to only the profile matching method is that the difference in values in one group of values is not ignored, meaning that this method can distinguish whether the value is closer to the upper limit or closer to the lower limit, so that the consistency of the values does not change. until the end. The criteria in this study are only as a sample, later they can be added or subtracted according to the needs of the relevant organization. In this study, there are several shortcomings that can be further developed. As for the shortcomings referred to, namely in determining the period of completion of a person in occupying a certain position, it cannot be done in this system. Then on the results of voting using BORDA, it is possible that there are those who get the same ranking or multiple winners. Then for the use of the fuzzy profile matching method, later it can be developed or added again with other methods, which are more efficient and more accurate.

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