



ROULETTE WHEEL SELECTION FOR FUZZY ANALYTICAL HIERARCHICAL PROCESS TO ASSESS EMPLOYEE PROMOTION

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ABSTRACT

The recruitment system Roulette Wheel is categorized by the Fuzzy AHP algorithm to promote employees in the Pidie Aceh District Government selection. The Roulette selection approach measures the initial stages of the selection (roulette wheel), based on the initial criteria value i.e. the completeness of administration, medical conditions, gender, working time and discipline, of each employee. The probability of selection is determined, namely by weighting and ranking for each worker using the fuzzy AHP algorithm. The experimental findings indicate that, out of a total of 50 employees, 40 percent earned a promotional contribution; of 100 employees, 34 percent obtained a promotional reward, of 150 employees a total of 44,66 percent obtained a promotion; of 200 workers 44,5 percent were eligible for promotion, for a total of 200 employee results of 150 employees

KEYWORDS: Roulette Wheel Selection method, ranking Fuzzy AHP algorithm .

1. INTRODUCTION

Administration, health age, work period, work discipline, job skill, commitment, training, condite and work performance are all criteria for the recruitment of Pidie Regency government employees. The assessment of promotion requirements is performed by each worker's manager and submitted as a basis for consideration for the promotion of the employee to the Regional Employee Agency (BKD) of Pidie Regency.

Dooki, et al(2017) research on an integral fuzzy AHP and Fuzzy TOPSIS Ranking and Bank Chief Inspector's Selection: A case study. Research by Dooki et al. In the current trial multiple attribute decision-making (MADM) was performed between

the Fuzzy Analytical Hierarchy Process (FAHP) algorithm. With recommendations for changes in this process, the results of this study have produced an average efficiency rate value of 77.82 percent to upgrade it to achieve a good ER quality.

Analytical Process Hierarchy (AHP) is a logical hierarchy with human perception as its key source. This method was developed in the early 1970s, to find the ranking or priority order of various alternatives to solve a problem by Prof. Thomas Lorie Saaty of the Wharton Business School. (Xiulin, SI, LI. 2014). Fuzzy AHP method is an AHP analysis tool. While AHP is often used for the analysis of qualitative and quantitative criteria, Fuzzy AHP is

best used to describe fuzzy decisions than AHP. (Igon et al, 2014).

Stochastic Sampling With Replacement selection method, or better known as the Roulette Wheel Selection, is one method that is often used in various multi-agent-based algorithms such as Genetic Algorithms, Bee Colony Optimization, and others. This method is used in the process of selection and decision making and ensures that individuals or nodes with better fitness and objective functions will have a greater chance of being chosen (Zhang et al, 2013).

Objective of the study

This study aims to attain the possible value of each employee in the first selection using the method of selection of roulette wheels that is used at the next stage, which is to evaluate the adequacy of the ranking system using the AHP Fuzzy algorithm so that the selection results meet the optimum and objective criteria.

2. METHODOLOGY

The following steps must be taken to evaluate the employee strengths in Pidie Regency by selecting the Roulette Wheel method in the Fuzzy Analytic Hierarchy (Fuzzy AHP) process:

- a. Initial selection (Roulette Wheel)
- b. Calculate that employee's fitness value based on initial criteria namely administrative completeness, education, gender, working time and discipline.
- c. Calculate the value for each worker of the probability of selection.
- d. Generate random values within the probability range
- e. Select employees with a random value on the Roulette Wheel.

1. Selection of the Advanced Stage (Fuzzy AHP)

- a. Establish a Hierarchical System

Figure 1 Illustrates the hierarchical structure of the selection problem for promotion.

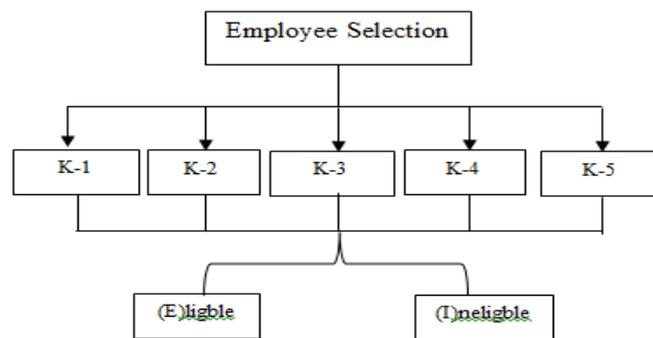


Figure 1. Hierarchical structure of the selection

The Advanced Synthesis Value (Si) parameters include K-1, K-2 K-3, K-4, K-5 K-5

$$S_i = \sum_{(j=i)}^m \left[M_{(g^i)}^j \times \left[\sum_{(i=1)}^n \sum_{(j=1)}^m M_{(g^i)}^j \right] \right]^{-1}$$

A comparison matrix pairwise is used to evaluate the synthesis value

Determine the vector value (V) and the Defuzzification Ordinary value (d').

$$d'(A_1) = \min V (S_1 \geq S_k), \text{ untuk } k = 1, 2, \dots, n; k \neq i$$

Fuzzy vector weight calculation (W')

$$W' = (d'(A_1), d'(A_2), \dots, d'(A_n))T$$

Normalization of the weight value of fuzzy vectors (W)

The normalized weight values of the vector are:

$$W = (d(A_1), d(A_2), \dots, d(A_n))T, \text{ dimana } W \text{ adalah bilangan non fuzzy.}$$

Ranking of employees and results of decision

The results of the ranking are provided with the information of eligible or not.

Flowchart Penelitian

The fuzzy AHP algorithm for the determination of employee promotions in Pidice can be seen from Figure 2 as a method for Roulette Wheel selection.

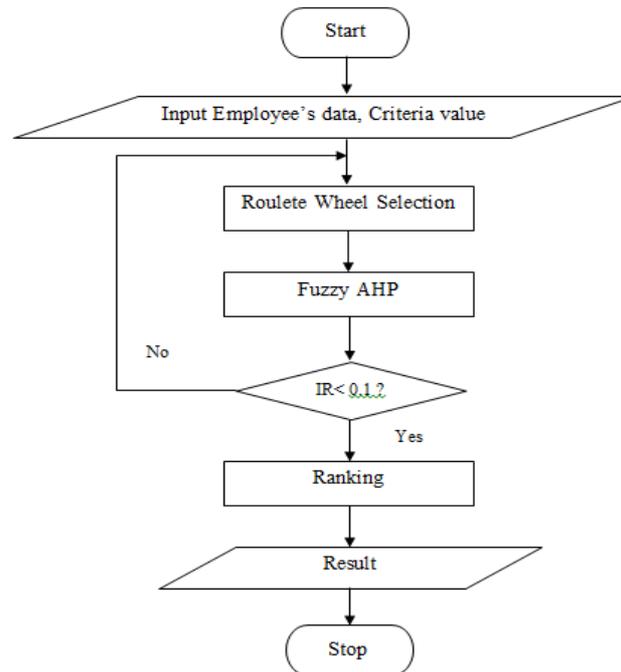


Figure 2
Diagram of analysis

Details of employees and initial requirements value information are given in the diagram above. The first step is to select employees to identify in the Fuzzy AHP process using the Roulette Wheel algorithm. The results of the Fuzzy AHP ranking with an assessment of advanced criteria (such as achievement, conditee, education, ability, and loyalty) as well as the calculation of the accuracy are compared with data processing results in the regional staffing agency. Employees are calculated on the index of the Random Consistency (IR) value, in which the IR is < 01.

3. LITERATURE REVIEW

Basic Concepts of Decision Support Systems

The basic concepts of support systems were first formulated in the early 1970s by Scott Morton. He defines "interactive computer-based systems" to support decision making, which helps decision-makers use data and different models to deal with unstructured problems. Another classic definition is "decision support systems combine human intellectual resources with software capabilities to enhance decision performance (Novian, 2010).

Through the definition of three key components for the DBMS, MBMS and user interface must be included in a decision support system. Knowledge-based subsystem management is optional but can offer some advantages as the intelligence of these three key components. Users

can be considered a component in a decision support system like all management information systems. Such components form a network of decision support that can be connected to an intranet, extranet or Internet service.

Promotion of Employees

Every organization has a way to define its employees ' career paths. Position, rank, and class are commonly used. The position is the role of each individual's work, while ranks depend on the organizational structure of someone and classes are instruments that relate to one's experience. Corporate hierarchy positions can be divided into categories widely used, including employees, supervisors, managers, executives, directors, and commissioners.

An outstanding staff member could be promoted over his position, such as supervisor, within a certain period. The level of executors (staff) is differentiated by a relatively large organization in different classes and groups, such as junior personnel, personnel or senior personnel. All positions and classes will be adapted to the company's organizational criteria and career paths.

Roulette Wheel Selection Method

Selection is the method by which the person who will be selected to be crossed to get better candidates in the next generation is assessed. Every individual's fitness value is first evaluated before the recruitment process takes place (Sri Kusumadewi,

2005). The fitness value is used to define the individual's ability/quality, which is then used during the following selection phases.

Fuzzy Method

In 1965, Professor L. A. Zadeh of Berkeley implemented the fuzzy model for the first time. Fuzzy models are organized, complex numerical predictors. In an unpredictable setting, the system may develop intelligence systems. This system assumes a dynamic logical feature. The fuzzy logic contains several processes: fuzzy sets, application of IF-THEN and fuzzy inference (Marimin, 2005). The following are considered in the context of fuzzy logic.

Several methods, namely the Tsukamoto, Sugeno, and Mamdani methods, represent the results of the fuzzy logic. That result is representing a fuzzy set with a single member function in the Tsukamoto method. The outcome of every rule's deduction is z as a standard set (crisp) calculated based on the calculation. The result is z. A weighted average (Sri Kusumadewi, 2002) is the final result

Fuzzy AHP Algorithm

AHP is a functional hierarchy with the main input representing human perception. The method was developed in the early 1970s to identify the ranking or priority order of various alternatives in the resolution of a problem by Dr. Thomas Lorie Saaty from the Wharton Business School. (Xiulin, SI & Dawei, LI. 2014)

4. ANALYSIS AND RESULTS

In this section the researcher selects employees using the roulette-wheel method to obtain a list of employees who are included in the next process, ranking the Aceh Pidie Government staff promotion method by the Fuzzy Analytic Hierarchy Process (Fuzzy AHP). The only once the selection process is now completed twice, which includes the initial selection and additional selection with different criteria. The studies conducted by the researchers with the number of employees from 50 to 300.

Data for preliminary criteria

Initial Data functions with the Roulette Wheel method for workers participating in the ranking for the initial selection process. Data can be seen in Table 1 as the preliminary criteria are.

Table 1
Data for preliminary criteria

Code	Criteria
K-1	Administrative requirements
K-2	Health
K-3	Age
K-4	Length of working
K-5	Discipline

As shown in Table 2, the advanced criteria for the Fuzzy AHP ranking are.

Tabel 2
Advanced Criteria

No	Criteria
K-1	Achievement
K-2	Condite
K-3	Education
K-4	Ability
K-5	Loyalty

Source: The Regional Personnel Agency Pidie Regency

Selection results with the Roulette Wheel method

The initial test is performed with initial parameters by the scores of the selection using the roulette

wheel method and the results are ranked by a Fuzzy AHP algorithm.

Table 3 shows the results of the selection of employees using the roulette wheel method.

Table 3
Selection results for Roulette Wheel Method

No	Random Number	Selected Employees
1	0.948790578	Jayauddin
2	0.66837182	Zulkarnaen
3	0.563285359	Supriyanto
4	0.529426598	Jhon Saragi
5	0.601395417	Aulia Arnas
6	0.833320348	Ismantoro
7	0.176469105	Yohanna
8	0.349626931	Istiansyah Pane
9	0.464496713	Laiya Sunny
10	0.009707842	Ichsan
11	0.452766459	Laiya Sunny
12	0.733852744	Sipaholon Girsang
13	0.746958359	Sri Puspa
14	0.696879694	Zulkarnaen
15	0.279366058	Satur Dende
16	0.661396206	Zulkarnaen
17	0.045494363	Husni
18	0.951214232	Hediyadi
19	0.091255866	Ichsan
20	0.390237102	Riantono
21	0.175684168	Yohanna
22	0.166046408	Abdullah
23	0.724354967	Sipaholon Girsang
24	0.078194397	Ichsan
25	0.671566777	Zulkarnaen
26	0.193803717	Yohanna
27	0.924606582	Wawan Hartono
28	0.920858525	Wawan Hartono
29	0.429791595	Jenny Anum
30	0.570361802	Idris Ginting

Fuzzy AHP Algorithm Ranking

When evaluating employee promotion, the results of the Fuzzy AHP Algorithm function should be

weighted and ranked. Table 5 shows the results of the Fuzzy AHP algorithm.

Table 5
AHP Fuzzy Algorithm Ranking Results

No	Final score	Selected employees	Description
1	0.965857	Zulkarnaen	Eligible
2	0.917496	Jayauddin	Eligible
3	0.870991	Ismantoro	Eligible
4	0.85515	Abdullah	Eligible
5		Istiansyah Pane	Eligible
6	0.820121	Sipaholon Girsang	Eligible
7	0.813256	Aulia Arnas	Eligible
8	0.812911	Hediyadi	Eligible
9	0.732161	Laiya Sunny	fairly eligible
10	0.731505	Ichsan	fairly eligible
11	0.579442	Yohanna	fairly eligible
12	0.564271	Husni	fairly eligible
13	0.54257	Jhon Saragi	fairly eligible
14	0.468217	Supriyanto	fairly eligible
15	0.396254	Idris Ginting	fairly eligible
16	0.261344	Satur Dende	Kurang
17	0.246026	Wawan Hartono	Kurang
18	0.205014	Riantono	Kurang
19	0.06747	Sri Puspa	Kurang
20	0.009402	Jenny Anum	Kurang

Ranking results of 20 employees who are eligible for consideration in the promotion.

5. DISCUSSIONS

The built-in software is used to compare the Fuzzy AHP algorithm at this phase. the initial criteria for the Roulette Wheel Selection Method and the advanced

criteria for the AHP Fuzzy algorithm include the evaluation of between 50 and 300 employees with ten criteria. The experimental results for all data on employees in the Government of Pidie Aceh Regency are as shown in Table 6.

Table 6
Total results of the test

Test	Total Data	Total of Roulet Wheel Selection results	Total of Fuzzy AHP	Distinction (C-D)	% (D/B)*100
A	B	C	D	E	F
1	50	30	20	10	40
2	100	55	34	21	34
3	150	86	67	19	44.66
4	200	124	89	35	44.5
5	300	235	215	20	71.66
Means				21	46.96 %

The average result from the data in Table 6 above is 46.96% and is shown in the bar chart, as shown in Figure 3.

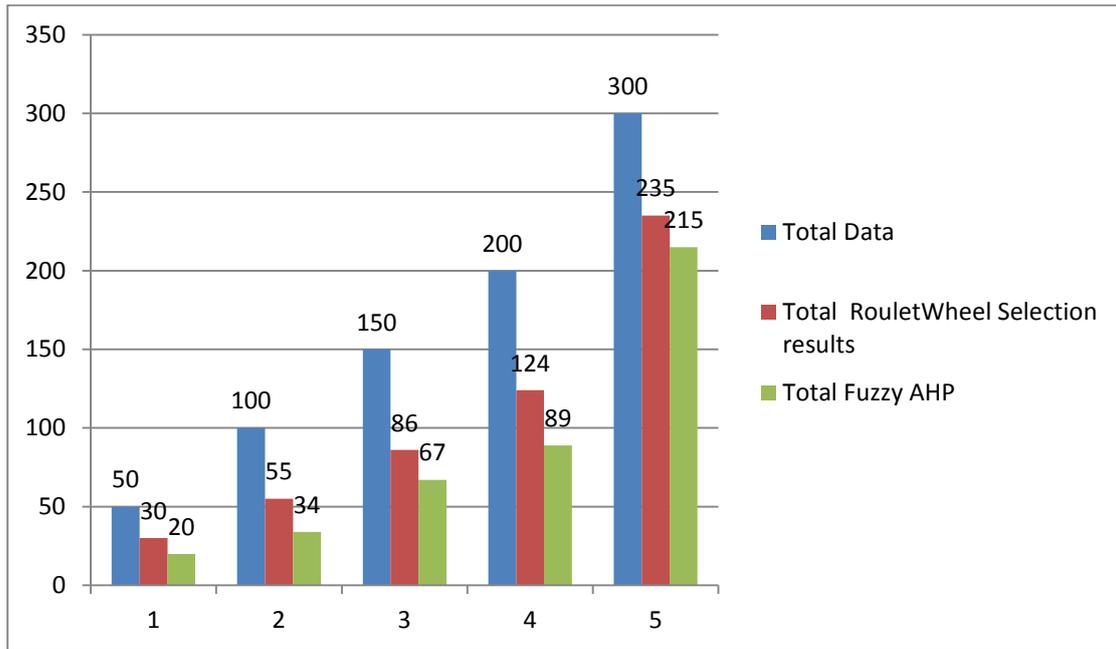


Figure 3
Roulette Wheel and Fuzzy AHP Ranking Results Chart

The figure 3 indicates that for the total data of 50 employees, 20 employees (40%) are managed to obtain and that there are a maximum of 34 employees (34%), of whom a promotion has been received, for the total of 100 employees, there are a total of 150 for 67 (44.66%) employees, for the total of 200 employees, there were a calculated 89. Through the results, more workers deserve to be promoted, and more percentages.

Process). Jurnal Ilmiah Media Elektrik, Vol 5, No.2, Desember 2010

6. CONCLUSION

The study's suggestions for this research are to compare the results of employee promotions and the ranking with various Fuzzy Multi-Attribute Decision Makings (FMADM) algorithms such as TOPSIS and ELECTRE.

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