Decision Support System with Simple Additive Weighting Method for Selection of Organizational Leaders

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Abstract

This study aims to determine a leader from 4 existing candidates (Aan, Andi, Fianri, Wendi) so that it can be decided which candidate is the right to lead an organization. Decision Support System as a computer-based system that assists in the decision making process. DSS as an adaptive, interactive, flexible, computer-based information system specifically developed to support solutions from unstructured management issues to improve the quality of decision making. The Simple Additive Weigthing method is often also known as the weighted summing method. The basic concept of the Simple Additive Weigthing method is to find the weighted sum of performance ratings on each alternative on all attributes. The Simple Additive Weigthing method requires the decision matrix normalization process (X) to a scale that can be compared with all available alternative ratings. As for the data collection methods used in this study are literature studies, observations and interviews. The results of this study are based on the four candidates above using the Wendi Simple Additive Weigthing method chosen as the leade

Keywords: Decision Support System, Simple Additive Weighting, Organizational leader

Introduction

Decisión Support System, is generally defined as a system that is able to provide both the ability of problem solving abilities and communication capabilities for semi-structured problems. Specifically, DSS is defined as a system that supports the work of a manager or group of managers in solving semi-structured problems by providing information or proposals towards certain decisions.

Another opinion states that DSS is an interactive computer-based system, which helps decision makers use data and models to solve unstructured problems. Decision support systems utilize the intellectual resources of individuals with the ability of computers to improve the quality of decisions. So this is a computer-based support system for decision-making management that deals with semi-structured problems.

Decision Support System (DSS) is a system that is able to provide problem solving capabilities and communication skills for problems with semi-structured and unstructured conditions. This system is used to assist decision making in semi-structured situations and unstructured situations, where no one knows for certain how decisions should be made (Turban, 2001).

Literature Review

Definition of System

The system is a collection of elements that interact to achieve certain goals. "According to Jogiyanto (2005: 2).

Definition of Decision Support System

According to Marakas in Sari (2006) A DSS has four major sub systems that define the DSS technical capabilities, namely the data management sub system, the model management sub system, the knowledge engine sub system, and the interface sub system. Explanations for each component are presented as follows:

a. Data management subsystem

   This component takes, stores and organizes relevant data for a decision-making problem.

b. Management model subsystem

The role of this subsystem is to take, store, and organize activities related to quantitative models that provide analytical capabilities for SPK.

c. Machine knowledge subsystem

The knowledge engine is the "brain" of SPK. Data and models are jointly used to produce applications that help users make decisions.

d. Interface subsystem

The interface is a communication tool between the user and the system. Data, models and processing components will be easily accessed and manipulated if there is an interface that is easily understood by users.

Simple Additive Weigthing is often known as the weighted addition method. The basic concept of the Simple Additive Weigthing method is to find the weighted sum of the performance ratings on each alternative of all attributes.

The Simple Additive Weigthing method requires the decision matrix normalization process (X) to a scale that can be compared with all available alternative ratings. Given the following equation:

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{\underset{i}{Max}\, x_{ij}} & jika\ j\ atribut\ keuntungan\ (benefit) \\[2ex] \dfrac{\underset{i}{Min}\, x_{ij}}{x_{ij}} & jika\ j\ atribut\ biaya\ (cost) \end{cases}$$

Where rij is the normal performance rating of the Ai alternative to the Cj attribute; i = 1,2, ..., m and j = 1,2, ..., n. The preference value for each alternative (Vi) is given the following formula:

$$Vi = \sum_{J=1}^{n} Wjrij$$

A larger V value indicates that Ai's alternatives are preferred.

Research methods and data collection

1. Library Studies

That is data collection by conducting studies, or studying books related to the issues to be discussed.

2. Interview

That is to do question and answer with the organization to obtain information needed to determine the prospective leader.

3. Observation

Direct observation of the system used in the activities undertaken in the work process.

Discussion

This research is conducted on Organization xyz, where there are 4 candidates to be chosen as the leader, with the names Aan, Andi, Fianri, and Wendi, where the values of each candidate are: Knowledge Tests / Leadership Insights, Leadership Practice Tests, Personality tests , Innovation Tests, Discipline and Collaboration Tests are summarized in the table as follows:

Table 1. Recapitulation of Value Acquisition Each candidate

Alternative	Criteria				
	Knowledge /Leadership Insights	Leadership Practice	Personality	Innovation	Discipline and Collaboration
Aan	70	50	80	60	70
Andi	50	60	82	70	75
Fianri	85	55	80	75	80

Wendi	82	75	65	85	74

The weighted points for assessment are weighted for each of these ts results with the following details: 0.25 for Knowledge /insight test, 0.25 for leadership practice test, 0.25 for personality test, 0.15 for innovation test and 0.10 for discipline test and cooperation

So the Organization will choose an employee to be promoted as a leader. There are five criteria used to perform the assessment, namely:

1. C1 = knowledge test (insight)
2. C2 = leadership practice
3. C3 = personality test
4. C4 = innovation test
5. C5 = Discipline and cooperation test

The decision maker gives weights for each of the following criteria: C1 = 0.25; C2 = 0.25; C3 = 0.25; and C4 = 0.15; C5 = 0.10. There are four employees who are candidates (alternative) to be promoted as leaders, namely:

A1 = Aan
A2 = Andi,
A3 = Fianri, and
A4 = Wendi.

Table 2. Alternate values in each criteria:

Alternative	Criteria				
	C1	C2	C3	C4	C5
Aan	70	50	80	60	70
Andi	50	60	82	70	75
Fianri	85	55	80	75	80
Wendi	82	75	65	85	74

$$R11 = \frac{70}{Max\ (70;50;85;82)} = \frac{70}{85} = 0,82 \qquad R12 = \frac{50}{Max(50;60;55;75)} = \frac{50}{75} = 0,67$$

$$R21 = \frac{50}{Max\ (70;50;85;82)} = \frac{50}{85} = 0,59 \qquad R22 = \frac{60}{Max(50;60;55;75)} = \frac{60}{75} = 0,80$$

$$R31 = \frac{85}{Max\ (70;50;85;82)} = \frac{85}{85} = 1,00 \qquad R32 = \frac{55}{Max(50;60;55;75)} = \frac{55}{75} = 0,73$$

$$R41 = \frac{82}{Max\ (70;50;85;82)} = \frac{82}{85} = 0,96 \qquad R42 = \frac{75}{Max(50;60;55;75)} = \frac{75}{75} = 1,00$$

$$R13 = \frac{80}{Max\ (80;82;80;65)} = \frac{80}{82} = 0,98 \qquad R14 = \frac{60}{Max\ (60;70;75;85)} = \frac{60}{85} = 0,71$$

$$R23 = \frac{82}{Max\ (80;82;80;65)} = \frac{82}{82} = 1,00 \qquad R24 = \frac{70}{Max\ (60;70;75;85)} = \frac{70}{85} = 0,82$$

$$R33 = \frac{80}{Max\ (80;82;80;65)} = \frac{80}{82} = 0,98 \qquad R34 = \frac{75}{Max\ (60;70;75;85)} = \frac{75}{85} = 0,88$$

$$R43 = \frac{65}{Max\ (80;82;80;65)} = \frac{65}{82} = 0,79 \qquad R44 = \frac{85}{Max\ (60;70;75;85)} = \frac{85}{85} = 1,00$$

$$R15 = \frac{70}{Max\ (70;75;80;74)} = \frac{70}{80} = 0,88$$

$$R25 = \frac{75}{Max\ (70;75;80;74)} = \frac{75}{80} = 0,94$$

R35 = $\frac{80}{Max\ (70;75;80;74)}$ = $\frac{80}{80}$ = **1,00**

R45 = $\frac{74}{Max\ (70;75;80;74)}$ = $\frac{74}{80}$ = **0,93**

Table 3. Recapitulation of Results Matrix calculations

Alternative	Criteria				
	C1	C2	C3	C4	C5
Andi	0,82	0,67	0,98	0,71	0,88
Aan	0,59	0,80	1,00	0,82	0,94
Fianri	1,00	0,73	0,98	0,88	1,00
Wendi	0,96	1,00	0,79	1,00	0,93

Ranking process by using the weight that has been given by the decision maker: w = [0.25 0.25 0.25 0.15 0.10], the results obtained are as follows:

V1 = (0,25) (0,82) + (0,25) (0,67) + (0,25) (0,97) + (0,15) (0,71) + (0,10) (0,88)
   = 0,21 + 0,17 + 0,24 + 0,11 + 0,09
   = 0,82
V2 = (0,25) (0,59) + (0,25) (0,80) + (0,25) (1,00) + (0,15) (0,82) + (0,10) (0,94)
   = 0,15 + 0,20 + 0,25 +0,12 + 0,09
   = 0,81
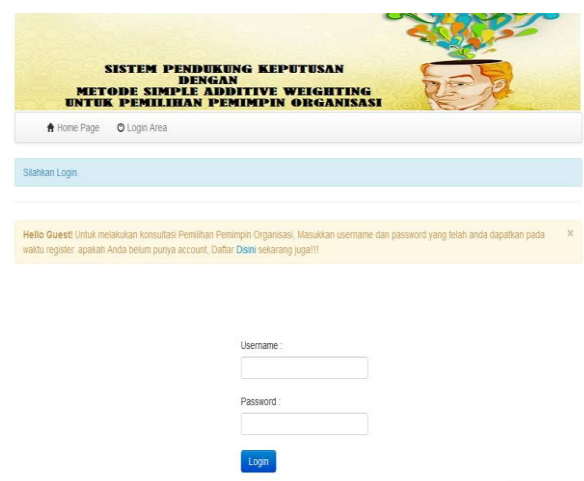V3 = (0,25) (1,00) + (0,25) (0,73) + (0,25) (0,97) + (0,15) (0,88) + (0,10) (1,00)
   = 0,25 + 0,18 + 0,25 + 0,13 + 0,10
   = 0,91
V4 = (0,25) (0,96) + (0,25) (1,00) + (0,25) (0,79) + (0,15) (1,00) + (0,10) (0,93)
   = 0,24 + 0,25 + 0,20 + 0,15 + 0,09
   = 0,93

The greatest value is on V4 so alternate A4 is the chosen alternative as the best alternative. In other words, Wendi will be elected as Chairman.
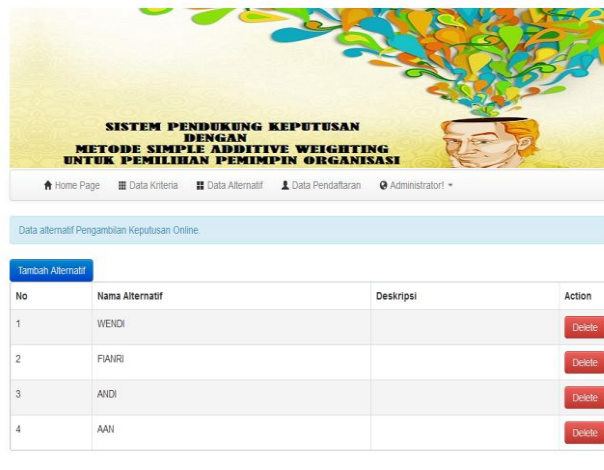
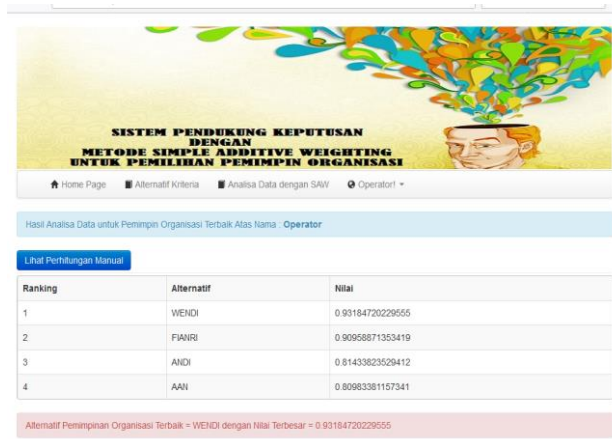Desain User Interface :
1. Login

2. Criteria Point

3. Prospective leaders

4. Final assessment results

From the view of the user interface it appears that Wendi is the selected leader based on Decision Support System with Simple Additive Weigthing method.

Conclusion

Making Support Systems Decisions to do calculations as data selectors with results of cracking. The system has been made refers to the formulation of existing problems that the system can select data in accordance with the provisions by performing calculations based on the method of Simple Additive Weighting.

Suggestions

With the existence of Decision Support System is the leadership of the organization can be determined efficiently and effectively without any interpensi both subjectively and in other ways, hopefully there is continuation of this research for the making of the application selection program leader with Decision Support System.

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