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Decision Support System for Determining Exemplary Employees Using the Evaluation Method based on Distance from Average Solution (EDAS)

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Decision;
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Recommendations;
Solution;

Abstract

The selection of the best employees is a critical process in human resource management (HRM) that aims to get individuals who best fit the needs and goals of the organization. This study aims to determine the best employees using Evaluation based on Distance from Average Solution (EDAS) using criteria of Loyalty, Discipline, Liveliness, Responsibilities, Leadership, Organization, Knowledge so that the resulting solution can provide recommendations for decision makers in making a decision. Based on the process of completing steps from stage 1 to stage 7, the selection of the best employees using the Evaluation Method based on Distance from Average Solution (EDAS) resulted in the best employee recommendations obtained on behalf of Yuni with a value of 0.686 to rank 1. 2nd place was obtained by Yustian with a value of 0.566, 3rd place was obtained by Lisa with a value of 0.563, and 4th place was obtained by Andi with a value of 0.486

1.INTRODUCING

Information system is a series of elements that are interconnected and interact to collect, store, process, and disseminate information to support decision making, problem solving, operational management, and goal achievement in an organization. Information Systems consist of technology components, data, procedures, and the people involved in this process. Information Systems have an important role in the modern business and organizational world, helping them manage data, optimize operations, improve efficiency, and make better decisions[1]. In the era of information technology, Information Systems are the basis for innovation and digital transformation in various industries. Information systems, if managed and used properly, can be valuable assets that support an organization's success in various aspects of its business. In the digital age, an organization's ability to integrate information technology into operations is becoming a key factor in competing and adapting to rapid changes in the market and business environment[2].

The selection of the best employees is a critical process in human resource management (HRM) that aims to get individuals who best fit the needs and goals of the organization. This process involves a number of complex steps and attention to various factors, including abilities, experience, cultural values, and other aspects. Ensuring that the selection process is conducted meticulously and professionally is key to acquiring individuals who will contribute positively to the growth and goals of the organization. In addition, the selection process can also evolve and improve over time to match the changing needs of the organization.

A Decision Support System (DSS) is a system or software designed to aid decision making by providing information, analysis, and other tools that support a better and informed decision-making process[3]. DSS is used in a variety of contexts, whether in business, government, health, and other

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fields. The main purpose of DSS is to assist decision makers by providing relevant information, processing data, and offering various options or solutions that can be analyzed[4]. DSS can be used in a variety of cases, such as in employee selection, financial analysis, supply chain planning, medical diagnosis, project management, and more. Its main role is to assist humans in making better decisions and being better informed in a variety of contexts. The main goal of DSS is to increase the speed and quality of decisions. With better information and tools that aid analysis, decision makers can make more timely and informed decisions. Decision Support Systems are essential tools in complex business environments, allowing companies to take decisions based on powerful data and sound analytics. With proper use, DSS can help organizations improve operational efficiency, improve strategic decisions, and deal with the challenges that come with rapid changes in the business world.

The EDAS (Evaluation based on Distance from Average Solution) method is one of the methods in the Decision Support System used for ranking or ranking alternatives in the context of elections[5]. This method is often used in employee selection, project evaluation, product selection, and other decisions involving alternatives that must be sorted by specific preferences or criteria. The advantage of the EDAS method is its ability to handle many criteria in complex selection. However, like all methods, EDAS also has limitations and needs to be applied carefully. For example, it is necessary to pay attention to the selection of criteria weights and the selection of distance metrics used, as well as ensure that the data used is accurate and relevant.

This study aims to determine the best employees using Evaluation based on Distance from Average Solution (EDAS) using criteria of Loyalty, Discipline, Liveliness, Responsibilities, Leadership, Organization, Knowledge so that the resulting solution can provide recommendations for decision makers in making a decision.

2.RESEARCH METHOD

The research stage is a very important process in order to conduct a systematic and in-depth scientific study[6]. Research is a complex and continuous process that involves stages from problem formulation to dissemination of results. Perseverance, good scientific methods, research ethics, and the ability to collaborate are key factors in producing quality research and contributing to the advancement of knowledge in various fields of science[7]–[10]. This stage of research is an important foundation for generating new knowledge and advancing understanding in various fields of science. The stages of research carried out can be seen in figure 1 below.

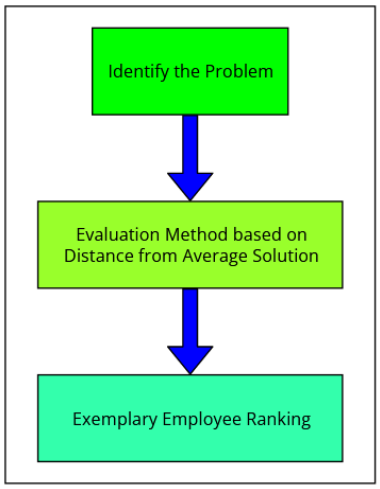

Figure 1. The Stages of Research

2.1. Identify the Problem

Problem identification is the process of identifying, analyzing, and defining problems or obstacles that need to be overcome. This step is a critical initial stage in problem solving and effective decision making. Problem identification involves a deep understanding of a particular situation or context, identifying the root cause of the problem, and clearly formulating the problem. In this stage, conduct

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interviews about the problem of determining the best employees, and provide a solution using a decision support system model.

2.2. Evaluation Method based on Distance from Average Solution (EDAS)

The stages of solving to overcome problems using the Evaluation method based on Distance from Average Solution are described as follows.

1. Creating a Decision Matrix

   The first step is to create a decision matrix (X) that describes the performance of each alternative against all the criteria used. In X rows will show the alternatives that exist and X columns indicate the criteria used. The form of the decision matrix equation (X) is as follows.

$$X = \begin{bmatrix} x_{i1} & \cdots & x_{in} \\ \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mn} \end{bmatrix} \quad (1)$$

   X_{ij} Shows the performance value of the I alternative on the J criterion, while m is the number of alternatives while N is the number of criteria.

2. Determining Average Solution (AV)

   The second step is to determine the average solution (AV) according to predetermined criteria. Determination of the average solution using the following equation.

$$AV = [AV_j]_{1\times m} \quad (2)$$

   The value of the AV_j will be calculated by the following equation:

$$AV_j = \frac{\sum_{i=1}^{n} x_{ij}}{n} \quad (3)$$

3. Determining the Positive and Negative Distance from the Average (PDA dan NDA)

   The third step is to calculate the positive distance (PDA) from the mean matrix (AV) and negative distance (NDA) from the mean matrix (AV) according to the type of criteria (benefit or cost) using the following equation.

$$PDA = [PDA_{ij}]_{n\times m} \quad (4)$$

$$NDA = [NDA_{ij}]_{n\times m} \quad (5)$$

   For the j criterion with the type of benefit, the equation applies.

$$PDA_{ij} = \frac{max(0,(X_{ij} - AV_j))}{AV_j} \quad (6)$$

$$NDA_{ij} = \frac{max(0,(AV_j - X_{ij}))}{AV_j} \quad (7)$$

   For the j criterion with the type of cost, the equation applies.

$$PDA_{ij} = \frac{max(0,(AV_j - X_{ij}))}{AV_j} \quad (8)$$

$$NDA_{ij} = \frac{max(0,(X_{ij} - AV_j))}{AV_j} \quad (9)$$

4. Determining the Weighted Sum of PDA and NDA (SP dan SN)

   The fourth step is to determine the weighted sum of PDAs and NDAs for all available alternatives. The form of the equation for calculating SP and SN values is as follows.

$$SP_i = \sum_{j=1}^{m} w_j \times PDA_{ij} \quad (10)$$

$$SN_i = \sum_{j=1}^{m} w_j \times NDA_{ij} \quad (11)$$

   The SP_i value is the weighted sum value of the PDA for each alternative, while the SNi value is the weighted sum value of the NDA for each alternative

5. Normalization of SP and SN Values

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The fifth step is to calculate the NSP and NSN values obtained from the normalized values of SP and SN for all existing alternatives. The form of the equation for calculating NSP and NSN values is as follows.

$$NSP_i = \frac{SP_i}{max(SP_i)} \quad (12)$$

$$NSN_i = \frac{SN_i}{max(SN_i)} \quad (13)$$

6. Calculating Assessment Score Values (AS)

The sixth step is to calculate the appraisal score (AS) value based on the normalized values of NSP and NSN, the form of the AS value calculation equation is as follows.

$$AS_i = \frac{1}{2}(NSP_i + NSN_i) \quad (14)$$

where $0 \leq AS_i \leq 1$

2.3. Exemplary Employee Ranking

Alternative tethering is one of the important applications of decision support systems (DSS). In this context, DSS assists decision-making by comparing and ranking a number of alternatives based on various predetermined criteria or factors. The ranking results are used as a guide for decision makers. However, keep in mind that DSS only provides recommendations, and the final decision making remains in the hands of the user.

3.RESULTS AND DISCUSSION

The results of the collection of needs based on interviews conducted obtained 7 criteria used in determining the best employees, criteria data along with the weight of each criterion can be seen in table 1.

Table 1. Criteria Data

Criteria	Criteria Weights
Loyalty (KT1)	0.6
Discipline (KT2)	0.5
Liveliness (KT3)	0.5
Responsibilities (KT4)	0.8
Leadership (KT5)	0.8
Organization (KT6)	0.4
Knowledge (KT7)	0.7

The next stage determines the assessment of employee data based on the results of the assessment from the leader in evaluating employee performance. The results of employee performance appraisal can be seen in table 2 below.

Tabel 2. Employee Performance Appraisal Data

Criteria	Employee Data			
	Andi (K1)	Lisa (K2)	Yuni (K3)	Yustian (K4)
Loyalty (KT1)	4	5	4	5
Discipline (KT2)	3	4	3	3
Liveliness (KT3)	4	4	5	4
Responsibilities (KT4)	5	3	5	3
Leadership (KT5)	4	3	5	4
Organization (KT6)	3	4	4	4
Knowledge (KT7)	3	3	4	4

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Next, use the resolution steps to solve the problem using the Evaluation Method based on Distance from Average Solution (EDAS) method for the selection of the best employees. The stages of completion using the EDAS method are as follows.

1. **Creating a Decision Matrix**
   Based on the assessment data of prospective candidates, the first stage is to make a decision matrix using equation (1). The rows in the matrix show the alternatives, and the columns in the matrix show the criteria. The results of the decision matrix can be seen below.

$$X = \begin{bmatrix} 4 & 3 & 4 & 5 & 4 & 3 & 3 \\ 5 & 4 & 4 & 3 & 3 & 4 & 3 \\ 4 & 3 & 5 & 5 & 5 & 4 & 4 \\ 5 & 3 & 4 & 3 & 4 & 4 & 4 \end{bmatrix}$$

2. **Determining Average Solution (AV)**
   Next determine the average solution of the criterion (AV_j) by using equations 3.

$$AV_1 = \frac{x_{11} + x_{12} + x_{13} + x_{14}}{4}$$
$$AV_1 = \frac{4+5+4+5}{4} = \frac{18}{4} = 4.5$$
$$AV_2 = \frac{x_{21} + x_{22} + x_{23} + x_{24}}{4}$$
$$AV_2 = \frac{3+4+3+3}{4} = \frac{13}{4} = 3.25$$
$$AV_3 = \frac{x_{31} + x_{32} + x_{33} + x_{34}}{4}$$
$$AV_3 = \frac{4+4+5+4}{4} = \frac{17}{4} = 4.25$$
$$AV_4 = \frac{x_{41} + x_{42} + x_{43} + x_{44}}{4}$$
$$AV_4 = \frac{5+3+5+3}{4} = \frac{16}{4} = 4$$
$$AV_5 = \frac{x_{51} + x_{52} + x_{53} + x_{54}}{4}$$
$$AV_5 = \frac{4+3+5+4}{4} = \frac{16}{4} = 4$$
$$AV_6 = \frac{x_{61} + x_{62} + x_{63} + x_{64}}{4}$$
$$AV_6 = \frac{3+4+4+4}{4} = \frac{15}{4} = 3.75$$
$$AV_7 = \frac{x_{71} + x_{72} + x_{73} + x_{74}}{4}$$
$$AV_7 = \frac{3+3+4+4}{4} = \frac{14}{4} = 3.5$$

   After obtaining the average solution for the criteria, then create an average solution (AV). The average solution (AV) for the whole uses the following equation (2).

$$AV = [AV_1\ AV_2\ AV_3\ AV_4\ AV_5\ AV_6\ AV_7]$$
$$AV = [4.5\ \ 3.25\ \ 4.,25\ \ 4\ \ 4\ \ 3.75\ \ 3.25]$$

3. **Determining the Positive and Negative Distance from the Average (PDA dan NDA)**
   The next step calculates the positive distance (PDA) and negative distance (NDA) from the average solution (AV). For benefit type criteria, PDA values use formula (6) and NDA use formula (7).

$$PDA_{11} = \frac{max(0, (X_{11} - AV_1))}{AV_1}$$
$$PDA_{11} = \frac{max(0, (4 - 4.5))}{4.5} = \frac{max(0, -0.5)}{4.5} = 0$$
$$NDA_{11} = \frac{max(0, (AV_1 - X_{11}))}{AV_1}$$

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$$NDA_{11} = \frac{max(0,(4.5-4))}{4.5} = \frac{max(0,0.5)}{4.5} = 0.11$$
$$PDA_{12} = \frac{max(0,(X_{12}-AV_2))}{AV_2}$$
$$PDA_{12} = \frac{max(0,(3-3.25))}{3.25} = \frac{max(0,-0.25)}{3.25} = 0$$
$$NDA_{12} = \frac{max(0,(AV_2-X_{12}))}{AV_2}$$
$$NDA_{12} = \frac{max(0,(3.25-3))}{3.25} = \frac{max(0,0.25)}{3.25} = 0.08$$
$$PDA_{13} = \frac{max(0,(X_{13}-AV_3))}{AV_3}$$
$$PDA_{13} = \frac{max(0,(4-4.25))}{4.25} = \frac{max(0,-0.25)}{4.25} = 0$$
$$NDA_{13} = \frac{max(0,(AV_3-X_{13}))}{AV_3}$$
$$NDA_{13} = \frac{max(0,(4.25-4))}{4.25} = \frac{max(0,0.25)}{4.25} = 0.06$$
$$PDA_{14} = \frac{max(0,(X_{14}-AV_4))}{AV_4}$$
$$PDA_{14} = \frac{max(0,(5-4))}{4} = \frac{max(0,1)}{4} = 0.03$$
$$NDA_{14} = \frac{max(0,(AV_4-X_{14}))}{AV_4}$$
$$NDA_{14} = \frac{max(0,(4-5))}{4} = \frac{max(0,-1)}{4} = 0$$
$$PDA_{15} = \frac{max(0,(X_{15}-AV_5))}{AV_5}$$
$$PDA_{15} = \frac{max(0,(4-4))}{4} = \frac{max(0,0)}{4} = 0$$
$$NDA_{15} = \frac{max(0,(AV_5-X_{15}))}{AV_5}$$
$$NDA_{15} = \frac{max(0,(4-4))}{4} = \frac{max(0,0)}{4} = 0$$
$$PDA_{21} = \frac{max(0,(X_{21}-AV_1))}{AV_1}$$
$$PDA_{21} = \frac{max(0,(5-4.5))}{4.5} = \frac{max(0,0.5)}{4.5} = 0.11$$
$$NDA_{21} = \frac{max(0,(AV_1-X_{21}))}{AV_1}$$
$$NDA_{21} = \frac{max(0,(4.5-5))}{4.5} = \frac{max(0,-0.5)}{4.5} = 0$$
$$PDA_{22} = \frac{max(0,(X_{22}-AV_2))}{AV_2}$$
$$PDA_{22} = \frac{max(0,(4-3.25))}{3.25} = \frac{max(0,0.75)}{3.25} = 0.23$$
$$NDA_{22} = \frac{max(0,(AV_2-X_{22}))}{AV_2}$$
$$NDA_{22} = \frac{max(0,(3.25-4))}{3.25} = \frac{max(0,-0.75)}{3.25} = 0$$
$$PDA_{23} = \frac{max(0,(X_{23}-AV_3))}{AV_3}$$

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$$PDA_{23} = \frac{max(0,(4-4.25))}{4.25} = \frac{max(0,-0.25)}{4.25} = 0$$
$$NDA_{23} = \frac{max(0,(AV_3 - X_{23}))}{AV_3}$$
$$NDA_{23} = \frac{max(0,(4.25-4))}{4.25} = \frac{max(0,0.25)}{4.25} = 0.06$$
$$PDA_{24} = \frac{max(0,(X_{24} - AV_4))}{AV_4}$$
$$PDA_{24} = \frac{max(0,(3-4))}{4} = \frac{max(0,-1)}{4} = 0$$
$$NDA_{24} = \frac{max(0,(AV_4 - X_{24}))}{AV_4}$$
$$NDA_{24} = \frac{max(0,(4-3))}{4} = \frac{max(0,1)}{4} = 0.03$$
$$PDA_{25} = \frac{max(0,(X_{25} - AV_5))}{AV_5}$$
$$PDA_{25} = \frac{max(0,(4-4))}{4} = \frac{max(0,0)}{4} = 0$$
$$NDA_{25} = \frac{max(0,(AV_5 - X_{25}))}{AV_5}$$
$$NDA_{25} = \frac{max(0,(4-4))}{4} = \frac{max(0,0)}{3.75} = 0$$
$$PDA_{31} = \frac{max(0,(X_{31} - AV_1))}{AV_1}$$
$$PDA_{31} = \frac{max(0,(4-4.5))}{4.5} = \frac{max(0,-0.5)}{4.5} = 0$$
$$NDA_{31} = \frac{max(0,(AV_1 - X_{31}))}{AV_1}$$
$$NDA_{31} = \frac{max(0,(4.5-4))}{4.5} = \frac{max(0,0.5)}{4.5} = 0.11$$
$$PDA_{32} = \frac{max(0,(X_{32} - AV_2))}{AV_2}$$
$$PDA_{32} = \frac{max(0,(3-3.25))}{3.25} = \frac{max(0,-0.25)}{3.25} = 0$$
$$NDA_{32} = \frac{max(0,(AV_2 - X_{32}))}{AV_2}$$
$$NDA_{32} = \frac{max(0,(3.25-3))}{3.25} = \frac{max(0,0.25)}{3.25} = 0.08$$
$$PDA_{33} = \frac{max(0,(X_{33} - AV_3))}{AV_3}$$
$$PDA_{33} = \frac{max(0,(5-4.25))}{4.25} = \frac{max(0,0.75)}{4.25} = 0.18$$
$$NDA_{33} = \frac{max(0,(AV_3 - X_{33}))}{AV_3}$$
$$NDA_{33} = \frac{max(0,(4.25-5))}{4.25} = \frac{max(0,-0.75)}{4.25} = 0$$
$$PDA_{34} = \frac{max(0,(X_{34} - AV_4))}{AV_4}$$
$$PDA_{34} = \frac{max(0,(5-4))}{4} = \frac{max(0,1)}{4} = 0.03$$
$$NDA_{34} = \frac{max(0,(AV_4 - X_{34}))}{AV_4}$$

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$$NDA_{34} = \frac{max(0,(4-5))}{4} = \frac{max(0,-1)}{4} = 0$$
$$PDA_{35} = \frac{max(0,(X_{35}-AV_5))}{AV_5}$$
$$PDA_{35} = \frac{max(0,(4-5))}{4} = \frac{max(0,-1)}{4} = 0$$
$$NDA_{35} = \frac{max(0,(AV_5-X_{35}))}{AV_5}$$
$$NDA_{35} = \frac{max(0,(5-4))}{4} = \frac{max(0,1)}{4} = 0.25$$
$$PDA_{41} = \frac{max(0,(X_{41}-AV_1))}{AV_1}$$
$$PDA_{41} = \frac{max(0,(5-4.5))}{4.5} = \frac{max(0,0.5)}{4.5} = 0.11$$
$$NDA_{41} = \frac{max(0,(AV_1-X_{41}))}{AV_1}$$
$$NDA_{41} = \frac{max(0,(4.5-5))}{4.5} = \frac{max(0,-0.5)}{4.5} = 0$$
$$PDA_{42} = \frac{max(0,(X_{42}-AV_2))}{AV_2}$$
$$PDA_{42} = \frac{max(0,(3-3.25))}{3.25} = \frac{max(0,-0.25)}{3.25} = 0$$
$$NDA_{42} = \frac{max(0,(AV_2-X_{42}))}{AV_2}$$
$$NDA_{42} = \frac{max(0,(3.25-3))}{3.25} = \frac{max(0,0.25)}{3.25} = 0.08$$
$$PDA_{43} = \frac{max(0,(X_{43}-AV_3))}{AV_3}$$
$$PDA_{43} = \frac{max(0,(4-4.25))}{4.25} = \frac{max(0,-0.25)}{4.25} = 0$$
$$NDA_{43} = \frac{max(0,(AV_3-X_{43}))}{AV_3}$$
$$NDA_{43} = \frac{max(0,(4.25-4))}{4.25} = \frac{max(0,0.25)}{4.25} = 0.06$$
$$PDA_{44} = \frac{max(0,(X_{44}-AV_4))}{AV_4}$$
$$PDA_{44} = \frac{max(0,(3-4))}{4} = \frac{max(0,-1)}{4} = 0$$
$$NDA_{44} = \frac{max(0,(AV_4-X_{44}))}{AV_4}$$
$$NDA_{44} = \frac{max(0,(4-3))}{4} = \frac{max(0,1)}{4} = 0.25$$
$$PDA_{45} = \frac{max(0,(X_{45}-AV_5))}{AV_5}$$
$$PDA_{45} = \frac{max(0,(4-4))}{4} = \frac{max(0,0)}{4} = 0$$
$$NDA_{45} = \frac{max(0,(AV_5-X_{45}))}{AV_5}$$
$$NDA_{45} = \frac{max(0,(4-4))}{4} = \frac{max(0,0)}{4} = 0$$

For cost-type criteria, PDA uses formula (8) and NDA uses formula (9).

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$$PDA_{16} = \frac{max(0, (AV_6 - X_{16}))}{AV_6}$$
$$PDA_{16} = \frac{max(0, (3.75 - 3))}{3.75} = \frac{max(0, 0{,}75)}{3.75} = 0.2$$
$$NDA_{16} = \frac{max(0, (X_{16} - AV_6))}{AV_6}$$
$$NDA_{16} = \frac{max(0, (3 - 3.75))}{3.75} = \frac{max(0, -0{,}75)}{3.75} = 0$$
$$PDA_{17} = \frac{max(0, (AV_7 - X_{17}))}{AV_7}$$
$$PDA_{17} = \frac{max(0, (3.5 - 3))}{3.5} = \frac{max(0, 0{,}5)}{3.5} = 0.14$$
$$NDA_{17} = \frac{max(0, (X_{17} - AV_7))}{AV_7}$$
$$NDA_{17} = \frac{max(0, (3 - 3.5))}{3.5} = \frac{max(0, -0{,}5)}{3.5} = 0$$
$$PDA_{26} = \frac{max(0, (AV_6 - X_{26}))}{AV_6}$$
$$PDA_{26} = \frac{max(0, (3.75 - 4))}{3.75} = \frac{max(0, 0{,}25)}{3.75} = 0.2$$
$$NDA_{26} = \frac{max\left(0, \left(X_{26} - AV_{j6}\right)\right)}{AV_6}$$
$$NDA_{26} = \frac{max(0, (4 - 3.75))}{3.75} = \frac{max(0, -0{,}25)}{3.75} = 0$$
$$PDA_{27} = \frac{max(0, (AV_7 - X_{27}))}{AV_7}$$
$$PDA_{27} = \frac{max(0, (3.5 - 3))}{3.5} = \frac{max(0, 0{,}5)}{3.5} = 0.14$$
$$NDA_{27} = \frac{max(0, (X_{27} - AV_7))}{AV_7}$$
$$NDA_{27} = \frac{max(0, (3 - 3.5))}{3.5} = \frac{max(0, -0{,}5)}{3.5} = 0$$
$$PDA_{36} = \frac{max(0, (AV_6 - X_{36}))}{AV_6}$$
$$PDA_{36} = \frac{max(0, (3.75 - 4))}{3.75} = \frac{max(0, -0{,}25)}{3.75} = 0$$
$$NDA_{36} = \frac{max(0, (X_{36} - AV_6))}{AV_6}$$
$$NDA_{36} = \frac{max(0, (4 - 3.75))}{3.75} = \frac{max(0, 0{,}25)}{3.75} = 0$$
$$PDA_{37} = \frac{max(0, (AV_7 - X_{27}))}{AV_7}$$
$$PDA_{37} = \frac{max(0, (3.5 - 4))}{3.5} = \frac{max(0, -0{,}5)}{3.5} = 0$$
$$NDA_{37} = \frac{max(0, (X_{27} - AV_7))}{AV_7}$$
$$NDA_{37} = \frac{max(0, (4 - 3.5))}{3.5} = \frac{max(0, 0{,}5)}{3.5} = 0.14$$
$$PDA_{46} = \frac{max(0, (AV_6 - X_{46}))}{AV_6}$$

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$$PDA_{46} = \frac{max(0,(3.75-4))}{3.75} = \frac{max(0,-0{,}25)}{3.75} = 0$$

$$NDA_{46} = \frac{max(0,(X_{46}-AV_6))}{AV_6}$$

$$NDA_{46} = \frac{max(0,(4-3.75))}{3.75} = \frac{max(0,0{,}25)}{3.75} = 0.07$$

$$PDA_{47} = \frac{max(0,(AV_7-X_{47}))}{AV_7}$$

$$PDA_{47} = \frac{max(0,(3.5-4))}{3.5} = \frac{max(0,-0{,}5)}{3.5} = 0$$

$$NDA_{47} = \frac{max(0,(X_{47}-AV_7))}{AV_7}$$

$$NDA_{47} = \frac{max(0,(4-3.5))}{3.5} = \frac{max(0,0{,}5)}{3.5} = 0.14$$

The calculation results obtained positive distance data from the average solution (PDA) as in Table 3 below.

Tabel 3. Positive Distance Average Solution (PDA)

	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	PDA_{11}	PDA_{12}	PDA_{13}	PDA_{14}	PDA_{15}	PDA_{16}	PDA_{17}
A_2	PDA_{21}	PDA_{22}	PDA_{23}	PDA_{24}	PDA_{25}	PDA_{26}	PDA_{27}
A_3	PDA_{31}	PDA_{32}	PDA_{33}	PDA_{34}	PDA_{35}	PDA_{36}	PDA_{37}
A_4	PDA_{41}	PDA_{42}	PDA_{43}	PDA_{44}	PDA_{45}	PDA_{46}	PDA_{47}

	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	0	0	0	0.03	0	0.2	0.14
A_2	0.11	0.23	0	0	0	0.07	0.14
A_3	0	0	0.18	0.03	0	0	0
A_4	0.11	0	0	0	0	0	0

The calculation results obtained positive distance data from the average solution (PDA) as in Table 4 below.

Tabel 4. Negative Range Average Solution (NDA)

	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	NDA_{11}	NDA_{12}	NDA_{13}	NDA_{14}	NDA_{15}	NDA_{16}	NDA_{17}
A_2	NDA_{21}	NDA_{22}	NDA_{23}	NDA_{24}	NDA_{25}	NDA_{26}	NDA_{27}
A_3	NDA_{31}	NDA_{32}	NDA_{33}	NDA_{34}	NDA_{35}	NDA_{36}	NDA_{37}
A_4	NDA_{41}	NDA_{42}	NDA_{43}	NDA_{44}	NDA_{45}	NDA_{46}	NDA_{47}

	C_1	C_2	C_3	C_4	C_5	C_6	C_7
A_1	0.11	0.08	0.06	0	0	0	0
A_2	0	0	0.06	0.03	0	0	0
A_3	0.11	0.08	0	0	0.25	0.07	0.14
A_4	0	0.08	0.06	0.25	0	0.07	0.14

4. Determining the Weighted Sum of PDA and NDA (SP dan SN)

The process then determines the weighted sum of PDAs and NDAs for all available alternatives. For the weight of each criterion, namely: $W_1 = 0.6$ $W_2 = 0.5$ $W_3 = 0.5$ $W_4 = 0.8$ $W_5 = 0.8$ $W_6 = 0.4$ $W_7 = 0.7$, The SP value is the result of calculating the weighted amount of the PDA using the following equation (10).

$SP_1 = \sum_{j=1}^{m} w_j \times PDA_{1j}$

$SP_1 = (w_1 \times PDA_{11}) + (w_2 \times PDA_{12}) + (w_3 \times PDA_{13}) + (w_4 \times PDA_{14}) + (w_5 \times PDA_{15}) + (w_6 \times PDA_{16}) + (w_7 \times PDA_{17})$

$SP_1 = (0.6 \times 0) + (0.5 \times 0) + (0.5 \times 0) + (0.8 \times 0.03) + (0.8 \times 0) + (0.4 \times 0.2) + (0.7 \times 0.14)$

$SP_1 = 0 + 0 + 0 + 0.024 + 0 + 0.08 + 0.098 = 0.202$

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$SP_2 = \sum_{j=1}^{m} w_j \times PDA_{2j}$
$SP_2 = (w_1 \times PDA_{21}) + (w_2 \times PDA_{22}) + (w_3 \times PDA_{23}) + (w_4 \times PDA_{24}) + (w_5 \times PDA_{25}) + (w_6 \times PDA_{26}) + (w_7 \times PDA_{27})$
$SP_2 = (0.6 \times 0.11) + (0.5 \times 0.23) + (0.5 \times 0) + (0.8 \times 0) + (0.8 \times 0) + (0.4 \times 0.07) + (0.7 \times 0.14)$
$SP_2 = 0.066 + 0.115 + 0 + 0 + 0 + 0.028 + 0.098 = 0.307$
$SP_3 = \sum_{j=1}^{m} w_j \times PDA_{3j}$
$SP_3 = (w_1 \times PDA_{31}) + (w_2 \times PDA_{32}) + (w_3 \times PDA_{33}) + (w_4 \times PDA_{34}) + (w_5 \times PDA_{35}) + (w_6 \times PDA_{36}) + (w_7 \times PDA_{37})$
$SP_3 = (0.6 \times 0) + (0.5 \times 0) + (0.5 \times 0.18) + (0.8 \times 0.03) + (0.8 \times 0) + (0.4 \times 0) + (0.7 \times 0)$
$SP_3 = 0 + 0 + 0.09 + 0.024 + 0 + 0 + 0 = 0.114$
$SP_4 = \sum_{j=1}^{m} w_j \times PDA_{4j}$
$SP_4 = (w_1 \times PDA_{41}) + (w_2 \times PDA_{42}) + (w_3 \times PDA_{43}) + (w_4 \times PDA_{44}) + (w_5 \times PDA_{45}) + (w_6 \times PDA_{46}) + (w_7 \times PDA_{47})$
$SP_4 = (0.6 \times 0.11) + (0.5 \times 0) + (0.5 \times 0) + (0.8 \times 0) + (0.8 \times 0) + (0.4 \times 0) + (0.7 \times 0)$
$SP_4 = 0.066 + 0 + 0 + 0 + 0 + 0 + 0 = 0.066$

The SN value is the result of calculating the weighted sum of the NDA using the following equation (11).

$SN_1 = \sum_{j=1}^{m} w_j \times NDA_{1j}$
$SN_1 = (w_1 \times NDA_{11}) + (w_2 \times NDA_{12}) + (w_3 \times NDA_{13}) + (w_4 \times NDA_{14}) + (w_5 \times NDA_{15}) + (w_6 \times NDA_{16}) + (w_7 \times NDA_{17})$
$SN_1 = (0.6 \times 0.11) + (0.5 \times 0.08) + (0.5 \times 0.06) + (0.8 \times 0) + (0.8 \times 0) + (0.4 \times 0) + (0.7 \times 0)$
$SN_1 = 0.066 + 0.04 + 0.03 + 0 + 0 + 0 + 0 = 0.136$
$SN_2 = \sum_{j=1}^{m} w_j \times NDA_{2j}$
$SN_2 = (w_1 \times NDA_{21}) + (w_2 \times NDA_{22}) + (w_3 \times NDA_{23}) + (w_4 \times NDA_{24}) + (w_5 \times NDA_{25}) + (w_6 \times NDA_{26}) + (w_7 \times NDA_{27})$
$SN_2 = (0.6 \times 0) + (0.5 \times 0) + (0.5 \times 0.06) + (0.8 \times 0.03) + (0.8 \times 0) + (0.4 \times 0) + (0.7 \times 0)$
$SN_2 = 0 + 0 + 0.03 + 0.024 + 0 + 0 + 0 = 0.054$
$SN_3 = \sum_{j=1}^{m} w_j \times NDA_{1j}$
$SN_3 = (w_1 \times NDA_{31}) + (w_2 \times NDA_{32}) + (w_3 \times NDA_{33}) + (w_4 \times NDA_{34}) + (w_5 \times NDA_{35}) + (w_6 \times NDA_{36}) + (w_7 \times NDA_{37})$
$SN_3 = (0.6 \times 0.11) + (0.5 \times 0.08) + (0.5 \times 0) + (0.8 \times 0) + (0.8 \times 0.25) + (0.4 \times 0.07) + (0.7 \times 0.14)$
$SN_3 = 0.066 + 0.04 + 0 + 0 + 0.2 + 0.028 + 0.098 = 0.432$
$SN_4 = \sum_{j=1}^{m} w_j \times NDA_{4j}$
$SN_4 = (w_1 \times NDA_{41}) + (w_2 \times NDA_{42}) + (w_3 \times NDA_{43}) + (w_4 \times NDA_{44}) + (w_5 \times NDA_{45}) + (w_6 \times NDA_{46}) + (w_7 \times NDA_{47})$
$SN_4 = (0.6 \times 0) + (0.5 \times 0.08) + (0.5 \times 0.06) + (0.8 \times 0.25) + (0.8 \times 0) + (0.4 \times 0.07) + (0.7 \times 0.14)$
$SN_4 = 0 + 0.04 + 0.03 + 0.2 + 0 + 0.028 + 0.098 = 0.396$

The results of the calculation of SP and SN values as in Table 3 below.

Table 3. SP and SN Value

Alternative	SP Value	SN Value
Andi (K1)	SP_1	SN_1
Lisa (K2)	SP_2	SN_2
Yuni (K3)	SP_3	SN_3
Yustian (K4)	SP_4	SN_4
Andi (K1)	0.202	0.136
Lisa (K2)	0.307	0.054
Yuni (K3)	0.114	0.432
Yustian (K4)	0.066	0.396
Max Value	**0.307**	**0.432**

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5. Normalization of SP and SN Values

The next process normalizes the SP and SN values, the results of normalizing SP values using the following equation (12).

$$NSP_1 = \frac{SP_1}{max(SP)} = \frac{0.202}{0.307} = 0.658$$
$$NSP_2 = \frac{SP_2}{max(SP)} = \frac{0.307}{0.307} = 1$$
$$NSP_3 = \frac{SP_3}{max(SP)} = \frac{0.114}{0.307} = 0.3713$$
$$NSP_4 = \frac{SP_4}{max(SP)} = \frac{0.066}{0.307} = 0.215$$

the result of normalizing the SN value using the following equation (13).

$$NSN_1 = \frac{SN_1}{max(SN)} = \frac{0.136}{0.432} = 0.3148$$
$$NSN_2 = \frac{SN_2}{max(SN)} = \frac{0.054}{0.432} = 0.125$$
$$NSN_3 = \frac{SN_3}{max(SN)} = \frac{0.432}{0.432} = 1$$
$$NSN_4 = \frac{SN_4}{max(SN)} = \frac{0.396}{0.432} = 0.9167$$

the results of the calculation of NSP and NSN values as in Table 4 below.

Table 4. NSP and NSN Value

Alternative	NSP Value	NSN Value
Andi (K1)	NSP_1	NSN_1
Lisa (K2)	NSP_2	NSN_2
Yuni (K3)	NSP_3	NSN_3
Yustian (K4)	NSP_4	NSN_4
Andi (K1)	0.658	0.3148
Lisa (K2)	1	0.125
Yuni (K3)	0.3713	1
Yustian (K4)	0.215	0.9167

6. Calculating Assessment Score Values (AS)

The next process calculates the scoring score (AS) using the following equation (14).

$$AS_1 = \frac{1}{2}(NSP_1 + NSN_1)$$
$$AS_1 = \frac{1}{2}(0.658 + 0.3148)$$
$$AS_1 = \frac{1}{2}(0.9728)$$
$$AS_1 = 0.486$$
$$AS_2 = \frac{1}{2}(NSP_2 + NSN_2)$$
$$AS_2 = \frac{1}{2}(1 + 0.125)$$
$$AS_2 = \frac{1}{2}(1.125)$$
$$AS_2 = 0.563$$
$$AS_3 = \frac{1}{2}(NSP_3 + NSN_3)$$
$$AS_3 = \frac{1}{2}(0.3713 + 1)$$
$$AS_3 = \frac{1}{2}(1.3713)$$
$$AS_3 = 0.686$$
$$AS_4 = \frac{1}{2}(NSP_4 + NSN_4)$$
$$AS_4 = \frac{1}{2}(0.215 + 0.9167)$$
$$AS_4 = \frac{1}{2}(1.1317)$$
$$AS_4 = 0.566$$

The results of the calculation of the US value as in Table 5 below.

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Table 5. AS Value

Alternative	AS Value
Andi (K1)	AS_1
Lisa (K2)	AS_2
Yuni (K3)	AS_3
Yustian (K4)	AS_4
Andi (K1)	0.486
Lisa (K2)	0.563
Yuni (K3)	0.686
Yustian (K4)	0.566

7. Rangking

The final step is to rank based on existing AS values. AS values are sorted from highest to lowest. The results of the ranking of the selection of the best employees can be seen in the following table 6

Table 6. EDAS Ranking Results

Alternative	Employee Name	AS Value	Rangking
K3	Yuni	0.686	1
K4	Yustian	0.566	2
K2	Lisa	0.563	3
K1	Andi	0.486	4

Based on the process of completing steps from stage 1 to stage 7, the selection of the best employees using the Evaluation Method based on Distance from Average Solution (EDAS) resulted in the best employee recommendations obtained on behalf of Yuni with a value of 0.686 to rank 1. 2nd place was obtained by Yustian with a value of 0.566, 3rd place was obtained by Lisa with a value of 0.563, and 4th place was obtained by Andi with a value of 0.486.

4.CONCLUSION

This study aims to determine the best employees using Evaluation based on Distance from Average Solution (EDAS) using criteria of Loyalty, Discipline, Liveliness, Responsibilities, Leadership, Organization, Knowledge so that the resulting solution can provide recommendations for decision makers in making a decision. Based on the process of completing steps from stage 1 to stage 7, the selection of the best employees using the Evaluation Method based on Distance from Average Solution (EDAS) resulted in the best employee recommendations obtained on behalf of Yuni with a value of 0.686 to rank 1. 2nd place was obtained by Yustian with a value of 0.566, 3rd place was obtained by Lisa with a value of 0.563, and 4th place was obtained by Andi with a value of 0.486.

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