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Application of EDAS Method with Entropy Weighting in Performance Assessment of the Best Student Activity Unit

Uswatun Hasanah[*], Mesran, Rian Syahputra

Teknik Informatika, Fakultas Ilmu Komputer dan Teknologi Informasi, Universitas Budi Darma, Kota Medan, Indonesia
Email: [1,*]uh15520@gmail.com, [2]mesran.skom.mkom@gmail.com, [3]ryansyah93@gmail.com
Correspondence Author Email: uh15520@gmail.com

Abstract–The Student Activity Unit (UKM) is an institution formed as a forum for all student activities in developing the interests, talents, creativity and expertise of its members. Performance appraisal is needed to evaluate every achievement and motivate SMEs. Based on the results of interviews conducted with the Vice Chancellor III for Student Affairs at Budi Darma University, he explained that the performance assessment of SMEs at Budi Darma University is still based on the activity of SMEs on campus and has not used other criteria that are clearer and more structured when assessing the performance of the best SMEs at Budi Darma University. . This is certainly less effective and prone to errors. Therefore, a Decision Support System (DSS) is needed as a solution to overcome these problems. In this study, the Entropy method and the EDAS method were applied to 5 criteria and 8 alternatives. Then the alternative chosen according to the criteria for evaluating the performance of the best UKM at Budi Darma University is in alternative A4 with a score of 0.9685, namely SSBD (Sanggar Seni Budi Darma).

Keywords: DSS; Performance Appraisal; UKM; Entropy; EDAS

1. INTRODUCTION

Higher Education is an educational institution that organises scientific teaching and education above the secondary level based on Indonesian nationality and culture [1]. Universities are responsible for equipping each student with hard skills and soft skills. These soft skills can be honed by students by joining the Student Activity Unit (UKM). UKM is an institution that was formed as a forum for all student activities in developing the interests, talents, and expertise of its members [2].

Budi Darma University is one of the universities that facilitates each student in developing interests and talents through UKM. Performance appraisal is carried out annually to produce the best SMEs on campus at Budi Darma University. Performance appraisal of the Student Activity Unit is a measurement of the quality of performance of each UKM in order to develop and improve the quality of work as taking action if something goes wrong or correcting deficiencies in an activity that takes place in the UKM[3].

Based on the results of interviews conducted with the Vice Rector III for Student Affairs at Budi Darma University, it is explained that the assessment of SME performance at Budi Darma University is still based on the activeness of SMEs on campus only and has not used other criteria that are clearer and more structured when assessing the performance of the best SMEs at Budi Darma University. This is certainly less effective and prone to error. Therefore, a Decision Support System (SPK) is needed as a solution to overcome these problems. Decision Support System (DSS) is a computer-based information system to support decision making in a company or organisation[4]. There are several methods in SPK such as ARAS, SWARA, OCRA, MAUT, ELECTRE, PROMETHEE, EDAS, Entropy[5].

The application of the Entropy Method and the EDAS Method has been widely used in previous studies, including research conducted by Dwi Marisa Midyanti, et al in 2019 regarding the selection of houses in Pontianak city using a comparison of the EDAS and ARAS methods which resulted in the best alternative to A9 with a value of 0.7372[6]. Research conducted by Ria Safitri, et al in 2020 discussed the selection of work recommendations using the EDAS method resulting in the best alternative being A4 with a value of 1.0180[7]. In 2020, research was conducted by Pristiwati Fitriani, et al regarding the determination of student thesis titles with a comparison of the WASPAS, COPRAS, EDAS methods resulting in the best alternative in A1 with a value of 0.1871[8]. Research conducted by Yendrizal in 2020 on the selection of the best students using the Entropy method and the MOORA method resulted in the best alternative being A3 with a value of 0.3779[9]. Radius Kharisman Ndruru, et al in 2020 conducted research in evaluating the performance of POLRI members using the MABAC and Entropy methods resulting in alternative A3 as the best alternative with a value of 0.05475[10].

From the problems described above, the author is interested in conducting research on the Application of the EDAS Method with Entropy Weighting in the Performance Assessment of the Best Student Activity Unit (Case Study: Budi Darma University). The application of these two methods is expected to produce an objective final preference value based on the alternatives and criteria that have been determined.

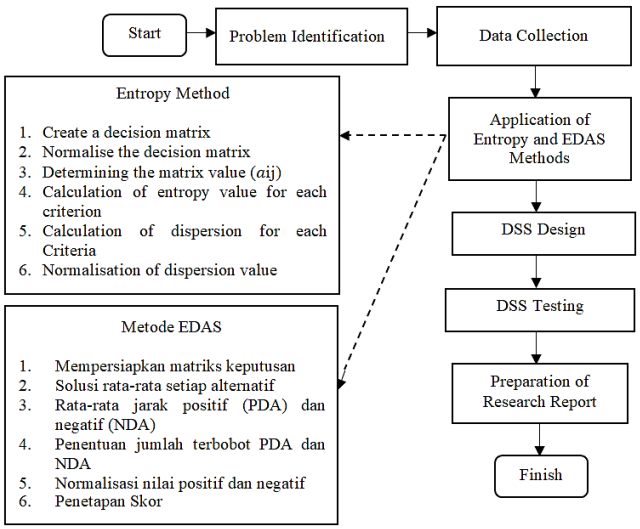
2. RESEARCH METHODOLOGY

2.1 Research Stages

This research methodology serves to facilitate the research process that will be made. The following is a brief explanation of the stages that the author did in making this research:

1. Problem Identification
   At this stage the author describes and examines what problems are being faced.
2. Data Collection
   Collecting data related to this research by means of observation, interviews, and literature studies.
3. Application of Entropy and EDAS Methods
   At this stage, an analysis of the source of the problem is carried out so that the author can determine alternative data and criteria to be applied using the Entropy method and the EDAS method.
4. Design
   This stage aims to provide an overview of the best student activity unit performance assessment system at Budi Darma University.
5. Testing
   Testing is done with the Entropy method to get the weight value and the EDAS method as an alternative value generator.
6. Preparation of Research Report

This stage is a documentation of the implementation of research made into the form of a final research report. The following is an overview of the Research Stages which can be seen in Figure 1 below



Gambar 1. Research Stages

2.2 Decision Support System (DSS)

DSS is part of computer-based information systems and includes knowledge management-based systems that are used as decision support in a company or organisation. The purpose of DSS is as a medium of information, predicting, guiding towards the use of information in order to make the best decisions[11]. There are several methods in SPK such as ARAS, SWARA, OCRA, MAUT, ELECTRE, PROMETHEE, EDAS, Entropy, MABAC[12]–[14].

2.3 Performance Assessment

Performance appraisal is a process in the organisation to evaluate, measure, and assess the performance of each member accurately. In this case the organisation needs proper job training, giving appropriate responsibilities and carrying out work properly is a policy determinant in terms of improving human resources in an organisation[15]–[17].

2.4 Student Activity Unit (UKM)

UKM is a student institution where students who have similar interests, creativity, passion, and orientation channel extracurricular activities on campus. The position of UKM is in the university area which actively develops an independent organisational management system. Joining UKM provides benefits for students, especially in terms of developing abilities and skills that are not obtained in the classroom learning process.[18], [19].

2.5 Entropy Method

Entropy method is a method that normalises the value of each criterion even though there are differences in units, quantitative, qualitative and differences in the range of values. In the Entropy method, the criteria with the highest score will get the highest weight value[20]. The following are the weighting steps of the Entropy method[21]:

1. Creating a decision matrix

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \quad (1)$$

2. Normalisation of the decision matrix

$$a_{ij} = \frac{k_j^i}{k_{j\,max}^i} \quad (2)$$

3. Determining the value of the matrix (a_{ij})

$$a_{ij} = \frac{k_{ij}}{\sum_{i=1}^{m}\sum_{i=1}^{n} k_{ij}} \quad (3)$$

4. Calculation of entropy values for each criterion

$$E_j = \left[\frac{-1}{\ln m}\right]\sum_{i=1}^{n}\left[a_{ij} ln\left(a_{ij}\right)\right] \quad (4)$$

5. Calculation of dispersion for each criterion

$$D_j = 1 - E_j \quad (5)$$

6. Normalisation of dispersion values

$$W_j = \frac{D_j}{\sum D_j} \quad (6)$$

2.6 EDAS Method

EDAS method is a method in decision making based on the highest final judgement to obtain the best choice from all alternatives. The application of the EDAS method is based on the use of distance measures, namely Positive Distance from Average (PDA) and Negative Distance from Average (NDA). Alternative testing is carried out according to the higher PDA value and the lower NDA value. The following are the steps in the EDAS method[22], [23]:

1. Preparing the decision matrix

$$\mathrm{X} = \begin{bmatrix} r_{11} & \cdots & r_{1j} & \cdots & r_{1n} \\ \vdots & \ddots & \vdots & \ddots & \vdots \\ r_{i1} & \cdots & r_{ij} & \cdots & r_{in} \\ \vdots & \ddots & \vdots & \ddots & \vdots \\ r_{m1} & \cdots & r_{mj} & \cdots & r_{mn} \end{bmatrix}_{m \times n} \quad (7)$$

2. Average solution of each alternative

$$AV_j = \frac{\sum_{i=1}^{m} r_{ij}}{m} \quad (8)$$

3. Average positive (PDA) and negative (NDA) distance
   For Benefit criteria:

$$PDA_{ij} = \frac{max\left(0,(r_{ij} - AV_j)\right)}{AV_j} \quad (9)$$

$$NDA_{ij} = \frac{max\left(0,(AV_j - r_{ij})\right)}{AV_j} \quad (10)$$

   For *Cost* criteria*:*

$$PDA_{ij} = \frac{max\left(0,(AV_j - r_{ij})\right)}{AV_j} \quad (11)$$

$$NDA_{ij} = \frac{max\left(0,(r_{ij} - AV_j)\right)}{AV_j} \quad (12)$$

4. Determination of the weighted sum of PDA and NDA

$$SP_i = \sum_{j=1}^{n} PDA_{ij} \,.\, w_j \quad (13)$$

$$SN_i = \sum_{j=1}^{n} NDA_{ij} \,.\, w_j \quad (14)$$

5. Normalisation of positive (SPi) and negative (NSi) values

$$NSP_i = \frac{SP_i}{\max_i(SP_i)} \quad (15)$$

$$NSN_i = 1 - \frac{SN_i}{\max_i(SN_i)} \quad (16)$$

6. Scoring

$$AS_i = \frac{1}{2}(NSP_i + NSN_i) \quad (17)$$

with $0 \leq AS_i \leq 1$

3. RESULTS AND DISCUSSION

3.1 Determination of Alternative Data and Criteria

This research data comes from the Student Affairs Division of Budi Darma University in 2021. There are 8 alternative data and 5 criteria used in this study as shown in the following table:

Table 1. Alternative Data and Criteria

No	Nama UKM	Number of Members (C_1)	Number of UKM Activities(C_2)	Number of Achievements (C_3)	Number of Work Programme Realisation (C_4)	Activity Time (C_5)
1	CIFOR (Community Informatic of The Road)	50 Persons	6 Activities	1 Achievement	1 Activities	12 Meetings
2	BDMC (Budi Darma Design Grafis dan Multimedia Club)	45 Persons	7 Activities	1 Achievement	4 Activities	12 Meetings
3	BPC (Budi Darma Programing Club)	60 Persons	8 Activities	5 Achievements	7 Activities	12 Meetings
4	SSBD (Sanggar Seni Budi Darma)	50 Persons	9 Activities	5 Achievements	9 Activities	13 Meetings
5	BEC (Budi Darma English Club)	45 Persons	6 Activities	3 Achievements	3 Activities	13 Meetings
6	KMK (Kumpulan Mahasiswa Kristen)	394 Persons	9 Activities	2 Achievements	9 Activities	14 Meetings
7	KMN (Kumpulan Mahasiswa Nias)	345 Persons	8 Activities	1 Achievement	5 Activities	12 Meetings
8	LDK (Lembaga Dakwah Kampus)	380 Persons	9 Activities	2 Achievements	5 Activities	14 Meetings

3.2 Determination of Criteria

The criteria used in assessing the performance of the best SMEs in accordance with the provisions made by Budi Darma University are:

Table 2. UKM Criteria Data

No	Criteria	Description	Type
1	C_1	Number of Members	*Benefit*
2	C_2	Number of SME Activities	*Benefit*
3	C_3	Number of Achievements	*Benefit*
4	C_4	Number of Work Programme Realisation	*Benefit*
5	C_5	Activity Time	*Benefit*

Description Table 2 has several criteria such as Number of Members which is the number of administrators and members who are active in UKM Budi Darma University, Number of UKM Activities is the number of activities that are often carried out in each UKM, Number of Achievements is the number of achievements that have been won by UKM, Number of Work Program Realisation is the number of work programs that are realised in each management period and Activity Time is the number of meetings and learning in UKM.

In Table 2. Criteria Data there is no weight value, so weighting can be done using the Entropy method. The following are the weighting stages using the Entropy method:

1. Creating a Decision Matrix
   Make a decision matrix using equation 1 (Chapter 2)

$$X = \begin{bmatrix} 50 & 6 & 1 & 1 & 12 \\ 45 & 7 & 1 & 4 & 12 \\ 60 & 8 & 5 & 7 & 12 \\ 50 & 9 & 5 & 9 & 13 \\ 45 & 6 & 3 & 3 & 13 \\ 394 & 9 & 2 & 9 & 14 \\ 345 & 8 & 1 & 5 & 12 \\ 380 & 9 & 2 & 5 & 14 \end{bmatrix}$$

2. Normalisation of the Decision Matrix (Kij)
   Calculating matrix normalisation using equation 2 (Chapter 2)
   For C1

   $K_{11}=\left[\frac{50}{394}\right]=0.1269$

   $K_{21}=\left[\frac{45}{394}\right]=0.1142$

   Perform the calculation in the same way from K31 to K81
   For C2

   $K_{12}=\left[\frac{6}{9}\right]=0.6667$

   $K_{22}=\left[\frac{7}{9}\right]=0.7778$

   Perform the calculation in the same way from K32 to K82
   For C3

   $K_{13}=\left[\frac{1}{5}\right]=0.2$

   $K_{13}=\left[\frac{1}{5}\right]=0.2$

   Perform the calculation in the same way from K33 to K83
   For C4

   $K_{14}=\left[\frac{1}{9}\right]=0.1111$

   $K_{14}=\left[\frac{4}{9}\right]=0.4444$

   Perform the calculation in the same way from K34 to K84
   For C5

   $K_{15}=\left[\frac{12}{14}\right]=0.8571$

   $K_{25}=\left[\frac{12}{14}\right]=0.8571$

   Perform calculations in the same way from K35 to K85. Then the normalised matrix results can be seen as below.

$$\begin{bmatrix} 0.1269 & 0.6667 & 0.2 & 0.1111 & 0.8571 \\ 0.1142 & 0.7778 & 0.2 & 0.4444 & 0.8571 \\ 0.1523 & 0.8889 & 1 & 0.7778 & 0.8571 \\ 0.1269 & 1 & 1 & 1 & 0.9286 \\ 0.1142 & 0.6667 & 0.6 & 0.3333 & 0.9286 \\ 1 & 1 & 0.4 & 1 & 1 \\ 0.8756 & 0.8889 & 0.2 & 0.5556 & 0.8571 \\ 0.9645 & 1 & 0.4 & 0.5556 & 1 \\ - & - & - & - & - \\ 3.4746 & 6.8889 & 4 & 4.7778 & 7.2857 \end{bmatrix}$$

3. Determining the Matrix Value (aij)
   Calculating the Matrix Value (aij) using equation 3 (Chapter 2)
   For C1

   $a_{11}=\frac{[0.1269]}{[3.4746]}=0.0365$

$a_{21}=\frac{[0.1142]}{[3.4746]}=0.0329$

Perform the calculation in the same way from a_31 to a_81
For C2

$a_{12}=\frac{[0.6667]}{[6.8889]}=0.0968$

$a_{22}=\frac{[0.7778]}{[6.8889]}=0.1129$

Perform the calculation in the same way from a_{32} to a_{82}
For C3

$a_{13}=\frac{[0.2]}{[4]}=0.05$

$a_{23}=\frac{[0.2]}{[4]}=0.05$

Perform the calculation in the same way from a_{33} to a_{83}
For C4

$a_{14}=\frac{[0.111]}{[4.7778]}=0.0233$

$a_{24}=\frac{[0.4444]}{[4.7778]}=0.0930$

Perform the calculation in the same way from a_{34} to a_{84}
For C_5

$a_{15}=\frac{[0.8571]}{[7.2857]}=0.1176$

$a_{25}=\frac{[0.8571]}{[7.2857]}=0.1176$

Perform the calculation in the same way from a_{35} to a_{85}. So the probability matrix will look like below.

$$X=\begin{bmatrix}0.0365 & 0.0968 & 0.05 & 0.0233 & 0.1176\\ 0.0329 & 0.1129 & 0.05 & 0.0930 & 0.1176\\ 0.0438 & 0.1290 & 0.25 & 0.1628 & 0.1176\\ 0.0365 & 0.1452 & 0.25 & 0.2093 & 0.1275\\ 0.0329 & 0.0968 & 0.15 & 0.0698 & 0.1275\\ 0.2878 & 0.1452 & 0.1 & 0.2093 & 0.1373\\ 0.2520 & 0.1290 & 0.05 & 0.1163 & 0.1176\\ 0.2776 & 0.1452 & 0.1 & 0.1163 & 0.1373\end{bmatrix}$$

4. Calculation of Entropy Value for Each Criterion (E_j)
Calculating the Entropy Value for Each Criterion (E_j) using equation 4 (Chapter 2)
For C_1

$a_{11} = 0.0365(\ln 0.0365) =$-0.1209

$a_{21} = 0.0329(\ln 0.0329) =$-0.1123

Perform the calculation in the same way from a_{31} toa_{81}

$\sum_{i=1}^{m}[a_{ij}\ \ln(a_{ij})]=$ -1.6649

$E_1 = \frac{-1}{\ln(5)}$-1.6649

$= \frac{-1}{1.6094}$-1.6649

$E_1 =$ 1.0345

For C_2

$a_{12} = 0.0968(\ln 0.0968) = -0.2260$

$a_{22} = 0.1129(\ln 0.1129) = -0.2463$

Perform the calculation in the same way from a_{32} to a_{82}

$\sum_{i=1}^{m}[a_{ij}\ln(a_{ij})]$= -2.1260

E_2 = $\frac{-1}{\ln(5)}$-2.1260

= $\frac{-1}{1.6094}$-2.1260

E_2 = 1.3210

For C3

$a_{13} = 0.05(\ln 0.05)$ =-0.1498

$a_{23} = 0.05(\ln 0.05)$ =-0.1498

Perform the calculation in the same way from a_{33} to a_{83}

$\sum_{i=1}^{m}[a_{ij}\ln(a_{ij})]$= -1.8876

E_3 = $\frac{-1}{\ln(5)}$-1.8876

= $\frac{-1}{1.6094}$-1.8876

E_3 = 1.1729

For C4

$a_{14} = 0.0233(\ln 0.0233)$ =-0.0875

$a_{24} = 0.0930(\ln 0.0930)$ =-0.2209

Perform the calculation in the same way from a_{34} to a_{84}

$\sum_{i=1}^{m}[a_{ij}\ln(a_{ij})]$= -1.9448

E_4 = $\frac{-1}{\ln(5)}$-1.9448

= $\frac{-1}{1.6094}$-1.9448

E_4 = 1.2084

For C5

$a_{15} = 0.1176(\ln\ 0.1176)$ =-0.2518

$a_{25} = 0.1176(\ln 0.1176\ )$ =-0.2518

Perform the calculation in the same way from a_{35} to a_{85}

$\sum_{i=1}^{m}[a_{ij}\ln(a_{ij})]$= -2.0773

E_5 = $\frac{-1}{\ln(5)}$-2.0773

= $\frac{-1}{1.6094}$-2.0773

E_5 = 1.2907

5. Calculation of Dispersion for Each Criterion (Dj)
   Calculating the Dispersion for Each Criterion (Dj) using equation 5 (Chapter 2)

   $D_1 = 1 - 1.0345$ =-0.0345

   $D_2 = 1 - 1.3210$ =-0.3210

   Perform the calculation in the same way from D_3 to D_5

   $\sum D_j$ =(-0.0345)+ (-0.3210)+ (-0.1729)+ (-0.2084)+ (-0.2907)= -1.0275

6. Normalisation of Dispersion Value (Wj)
   Calculating Normalised Dispersion Value (Wj) using equation 6 (Chapter 2)

   W_1=$\frac{[-0.0345]}{[-1.0275]}$=0.0336

$W_2=\frac{[-0.3210]}{[-1.0275]}=0.3124$

$W_3=\frac{[-0.1729]}{[-1.0275]}=0.1683$

$W_4=\frac{[-0.2084]}{[-1.0275]}=0.2028$

$W_5=\frac{[-0.2907]}{[-1.0275]}=0.2829$

After calculating with the Entropy method, the weight value is obtained as in the table below.

Table 3. Criteria Weight Value

No	Criteria	Description	Types	Weight
1	C_1	Number of Members	*Benefit*	0.0336
2	C_2	Number of SME Activities	*Benefit*	0.3124
3	C_3	Number of Achievements	*Benefit*	0.1683
4	C_4	Number of Work Programme Realisation	*Benefit*	0.2028
5	C_5	Activity Time	*Benefit*	0.2829

Table 3 above shows the results of the application of the Entropy method to several criteria and produces a weight value that will be used in the application of the EDAS method in assessing the performance of the best SMEs at Budi Darma University.

3.3 Implementation of the EDAS Method

The EDAS method is used to rank several alternatives and criteria that have been determined to produce the best alternative. The steps for completing the EDAS method can be seen in the explanation below.

1. Preparing the Decision Matrix
   Make a decision matrix using the 7th equation (Chapter 2)

$$X = \begin{bmatrix} 50 & 6 & 1 & 1 & 12 \\ 45 & 7 & 1 & 4 & 12 \\ 60 & 8 & 5 & 7 & 12 \\ 50 & 9 & 5 & 9 & 13 \\ 45 & 6 & 3 & 3 & 13 \\ 394 & 9 & 2 & 9 & 14 \\ 345 & 8 & 1 & 5 & 12 \\ 380 & 9 & 2 & 5 & 14 \end{bmatrix}$$

2. Calculating the Average Solution of Each Alternative
   Calculating the Average Solution of Each Alternative using equation 8 (Chapter 2)

   $AV_1=\left(\frac{50+45+60+50+45+394+345+380}{8}\right) = 171.13$

   $AV_2=\left(\frac{6+7+8+9+6+9+8+9}{8}\right) = 7.75$

3. Calculate in the same way from AV_3 to AV_5.

Table 4. Alternative Average Solution Results

Alternative	C_1	C_2	C_3	C_4	C_5
A_1	50	6	1	1	12
A_2	45	7	1	4	12
A_3	60	8	5	7	12
A_4	50	9	5	9	13
A_5	45	6	3	3	13
A_6	394	9	2	9	14
A_7	345	8	1	5	12
A_8	380	9	2	5	14
AV	171.13	7.75	2.50	5.38	12.75

4. Positive Average Distance (PDAij)
   Calculating the Positive Average Distance (PDAij) for Benefit criteria using equation 9 (Chapter 2)
   For C1

   $PDA_{11}=\frac{\max(0,(50-171.13)}{171.13}=0$

$PDA_{21}=\frac{\max(0,(45-171.13)}{171.13}=0$

Perform the calculation in the same way from PDA_{31} to PDA_{81}
For C_2

$PDA_{12}=\frac{\max(0,(6-7.75)}{7.75}=0$

$PDA_{22}=\frac{\max(0,(7-7.75)}{7.75}=0$

Perform the calculation in the same way from PDA_{32} to PDA_{82}
For C_3

$PDA_{13}=\frac{\max(0,(1-2.50)}{2.50}=0$

$PDA_{23}=\frac{\max(0,(1-2.50)}{2.50}=0$

Perform the calculation in the same way from PDA_{33} to PDA_{83}
For C_4

$PDA_{14}=\frac{\max(0,(1-5.38)}{5.38}=0$

$PDA_{24}=\frac{\max(0,(4-5.38)}{5.38}=0$

Perform the calculation in the same way from PDA_{34} to PDA_{84}
For C_5

$PDA_{15}=\frac{\max(0,(12-12.75)}{12.75}=0$

$PDA_{25}=\frac{\max(0,(12-12.75)}{12.75}=0$

Perform the calculation in the same way from PDA_{35} to PDA_{85}

Table 5. Positive Average Distance (PDA_{ij})

Alternative	C_1	C_2	C_3	C_4	C_5
A_1	0	0	0	0	0
A_2	0	0	0	0	0
A_3	0	0.0323	1	0.3023	0
A_4	0	0.1613	1	0.6744	0.0196
A_5	0	0	0.2	0	0.0196
A_6	1.3024	0.1613	0	0.6744	0.0980
A_7	1.0161	0.0323	0	0	0
A_8	1.2206	0.1613	0.0000	0.0000	0.0980

5. Negative Average Distance (NDAij)
Calculating the Negative Average Distance (NDAij) for Benefit criteria using equation 10 (Chapter 2)
For C_1

$NDA_{11}=\frac{\max(0,(171.13-50)}{171.13}=0.7078$

$NDA_{21}=\frac{\max(0,(171.13-45)}{171.13}=0.7370$

Perform the calculation in the same way from NDA_{31} to NDA_{81}
For C_2

$NDA_{12}=\frac{\max(0,(7.75-6)}{7.75}=0.2258$

$NDA_{22}=\frac{\max(0,(7.75-7)}{7.75}=0.0968$

Perform the calculation in the same way from NDA_{32} to NDA_{82}
For C_3

$NDA_{13}=\frac{\max(0,(2.50-1)}{2.50}=0.60$

$NDA_{23}=\frac{\max(0,(2.50-1)}{2.50}=0.60$

Perform the calculation in the same way from NDA_{33} to NDA_{83}
For C_4

$NDA_{14}=\frac{\max(0,(5.38-1)}{5.38}=0.8140$

$NDA_{24}=\frac{\max(0,(5.38-4)}{5.38}=0.2558$

Perform the calculation in the same way from NDA_{34} to NDA_{84}
For C_5

$NDA_{15}=\frac{\max(0,(12.75-12)}{12.75}=0.0588$

$NDA_{25}=\frac{\max(0,(12.75-12)}{12.75}=0.0588$

Perform the calculation in the same way from NDA_{35} to NDA_{85}

Table 6. Negative Average Distance (NDA_{ij})

Alternative	C_1	C_2	C_3	C_4	C_5
A_1	0.7078	0.2258	0.60	0.8140	0.0588
A_2	0.7370	0.0968	0.60	0.2558	0.0588
A_3	0.6494	0	0	0	0.0588
A_4	0.7078	0	0	0	0
A_5	0.7370	0.2258	0	0.4419	0
A_6	0	0	0.20	0	0
A_7	0	0	0.60	0.0698	0.0588
A_8	0	0	0.20	0.0698	0

6. Determination of the Weighted Sum of PDA and NDA
Calculating the Weighted Sum of PDA using equation 13 (Chapter 2)
Weighted Sum of PDA
For C_1

PDA_{11}=0*0.0336=0

PDA_{21}=0*0.0336=0

Perform the calculation in the same way from PDA_{31} to PDA_{81}
For C_2

PDA_{12}=0*0.3124=0

PDA_{22}=0*0.3124=0

Perform the calculation in the same way from PDA_{32} to PDA_{82}
For C_3

PDA_{13}=0*0.1683=0

PDA_{23}=0*0.1683=0

Perform the calculation in the same way from PDA_{33} to PDA_{83}
For C_4

PDA_{14}=0*0.2028=0

PDA_{24}=0*0.2028=0

Perform the calculation in the same way from PDA_{34} to PDA_{84}
For C_5

PDA_{15}=0*0.2829=0

PDA_{25}=0*0.2829=0

Perform the calculation in the same way from PDA_{35} to PDA_{85}

Table 7. Weighted sum of PDA

Alternative	C_1	C_2	C_3	C_4	C_5	SPi
A_1	0	0	0	0	0	0

Alternative	C_1	C_2	C_3	C_4	C_5	SPi
A_2	0	0	0	0	0	0
A_3	0	0.0101	0.1683	0.0613	0	0.2397
A_4	0	0.0504	0.1683	0.1368	0.0055	0.3610
A_5	0	0	0.0337	0	0.0055	0.0392
A_6	0.0437	0.0504	0	0.1368	0.0277	0.2586
A_7	0.0341	0.0101	0	0	0	0.0442
A_8	0.0410	0.0504	0	0	0.0277	0.1191

7. Weighted Sum of NDA
   Calculating the Weighted Sum of NDA using equation 14 (Chapter 2)
   For C_1

   NDA_{11}=0.7078*0.0336=0.0238

   NDA_{21}=0.7370*0.0336=0.0247

   Perform the calculation in the same way from NDA_{31} to NDA_{81}
   For C_2

   NDA_{12}=0.2258*0.3124=0.0705

   NDA_{22}=0.0968*0.3124=0.0302

   Perform the calculation in the same way from NDA_{32} to NDA_{82}
   For C_3

   NDA_{13}=0.60*0.1683=0.1010

   NDA_{23}=0.60*0.1683=0.1010

   Perform the calculation in the same way from NDA_{33} to NDA_{83}
   For C_4

   NDA_{14}=0.8140*0.2028=0.1651

   NDA_{24}=0.2558*0.2028=0.0519

   Perform the calculation in the same way from NDA_{34} to NDA_{84}
   For C_5

   NDA_{15}=0.0588*0.2829=0.0166

   NDA_{25}=0.0588*0.2829=0.0166

   Perform the calculation in the same way from NDA_{35} to NDA_{85}

Table 8. Weighted Sum of NDA

Alternative	C_1	C_2	C_3	C_4	C_5	SNi
A_1	0.0238	0.0705	0.1010	0.1651	0.0166	**0.3770**
A_2	0.0247	0.0302	0.1010	0.0519	0.0166	0.2245
A_3	0.0218	0	0	0	0.0166	0.0384
A_4	0.0238	0	0	0	0	0.0238
A_5	0.0247	0.0705	0	0.0896	0	0.1849
A_6	0	0	0	0	0	0.0337
A_7	0	0	0.1010	0.0142	0.0166	0.1318
A_8	0	0	0.0337	0.0142	0	0.0478

8. Normalisation of Positive (SPi) and Negative (NSi) Values
   a. Positive Value Normalisation (SPi)
      Calculating Positive Value Normalisation (SPi) using equation 15 (Chapter 2)

      $NSP_1 = \frac{0}{0.3610} = 0$

      $NSP_2 = \frac{0}{0.3610} = 0$

      Perform the calculation in the same way from NSP_3 to NSP_8
   b. Negative Value Normalisation (NSi)
      Calculate the Negative Value Normalisation (NSi) using equation 16 (Chapter 2).

$NSN_1 = 1 - \frac{0.3770}{0.3770} = 0$

$NSN_2 = 1 - \frac{0.2245}{0.3770} = 0.4046$

Perform the calculation in the same way from NSN_3 to NSN_8

Table 9. Normalisation of Positive (SPi) and Negative (NS_i) Values

NSP_i/NSN_i	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8
NSP_i	0	0	0.6639	1	0.1086	0.7165	0.1224	0.3299
NSN_i	0	0.4046	0.8980	0.9370	0.5095	0.9107	0.6505	0.8732

9. Scoring

$AS_1 = 0.5 * (0 + 0) = 0$

$AS_2 = 0.5 * (0 + 0.4046) = 0.2023$

$AS_3 = 0.5 * (0.6639 + 0.8980) = 0.7810$

$AS_4 = 0.5 * (1 + 0.9370) = 0.9685$

$AS_5 = 0.5 * (0.1086 + 0.5095) = 0.3091$

$AS_6 = 0.5 * (0.7165 + 0.9107) = 0.8136$

$AS_7 = 0.5 * (0.1224 + 0.6505) = 0.3865$

$AS_8 = 0.5 * (0.3299 + 0.8732) = 0.6016$

Table 10. Scoring values

No	Alternative	UKM Name	Score Value	Rank
1	A_4	SSBD (Sanggar Seni Budi Darma)	0.9685	1
2	A_6	KMK (Kumpulan Mahasiswa Kristen)	0.8136	2
3	A_3	BPC (Budi Darma Programing Club)	0.7810	3
4	A_8	LDK (Lembaga Dakwah Kampus)	0.6016	4
5	A_7	KMN (Kumpulan Mahasiswa Nias)	0.3865	5
6	A_5	BEC (Budi Darma English Club)	0.3091	6
7	A_2	BDMC (Budi Darma Design Grafis dan Multimedia Club)	0.2023	7
8	A_1	CIFOR (Community Informatic of The Road)	0	8

According to the results of the application of the EDAS method with the Entropy method, the best alternative selected according to the best SME performance assessment criteria at Budi Darma University is in alternative A4 with the best score value of 0.9685, namely SSBD (Sanggar Seni Budi Darma).

4. CONCLUSIONS

The application of EDAS Method and Entropy method can be used accurately and efficiently in assessing the performance of the best SMEs at Budi Darma University. The application of Entropy Method is used in weighting and EDAS method is used in producing the best alternative. The best alternative selected according to the best SME performance assessment criteria at Budi Darma University is in alternative A4 with the best score value of 0.9685, namely SSBD (Sanggar Seni Budi Darma).

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