Journal Of Data Science
Volume 2, Number 02, 2024, DOI 10.58471/Science.v2i02
ESSN 3025-2792 (Online)
https://ejournal.seaninstitute.or.id/index.php/visualization

Decision Making Techniques For Selecting Female Dormitory Supervisors Using The Technique Method For Others Reference By Similarity To Ideal Solution

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Article Info
Keywords:
Female student dormitory, Santo Thomas Catholic University Medan, surveillance, security, TOPSIS

ABSTRACT
The female student dormitory at Santo Thomas Catholic University Medan serves as a temporary residence for female students who come from outside Medan. Dormitory supervisors play an important role in the management and supervision of the dormitory, ensuring the safety and well-being of residents. However, the selection of new coaches faces obstacles, such as lack of qualifications and potential conflicts of interest. To address these issues, this research applies the Technique for Order Preference by Similarity to Ideal (TOPSIS) method as a decision-making tool. This method allows the comparison of alternatives to prospective coaches based on set criteria. The results show that the TOPSIS method is effective in determining suitable candidates for female dormitory coaches, thus supporting the establishment of a safe and supportive environment for female students. This research emphasises the importance of a transparent selection process and oversight mechanism to prevent conflicts and ensure the integrity of the candidate.

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INTRODUCTION

Based on the Big Indonesian Dictionary (KBBI), a dormitory is a residential building for homogeneous people. A female student dormitory is a place of residence for female students (girls only) of a college with a temporary period consisting of a number of rooms and led by a dormitory head. Saint Thomas Catholic University Medan is a private college that has a female dormitory as a source of accommodation for female students whose residence is outside Medan.

In this female dormitory there is a Supervisor where the Supervisor of the female dormitory is someone who is responsible for the management and supervision of the dormitory specifically for female students. Their duties include ensuring the safety, comfort, and well-being of the female students who live in the dormitory. The supervisor of the female dormitory usually has a fairly important role in guiding and providing support to the female students. They can be role models and support female students in various aspects of life, from academic to social and emotional.

The female dormitory supervisor changes his/her term of office every three years, but there are obstacles in selecting a new dormitory supervisor. The female dormitory supervisor

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is usually selected based on age, experience in managing the dormitory, counseling skills, sensitivity to dormitory residents, and managerial ability to work with diverse individuals. So the method chosen is the Technique for Order Preference by Similarity to Ideal (TOPSIS) method.

The Technique for Order Preference by Similarity to Ideal (TOPSIS) method is a multicriteria decision-making method used to determine the best alternative among several alternatives by comparing the distance of each alternative to the positive and negative ideal solutions. This study aims to establish an easy method with two solutions, to select a mentor who meets the criteria requested by the previous mentor chairman using the Topsis method.

Issues in selecting a dorm supervisor can include difficulty in finding someone suitable for the role, lack of required qualifications or experience, and potential conflicts of interest or relationships between supervisors and students. It is important to have a transparent and rigorous selection process to ensure that the supervisors selected have the integrity, competence, and ability to lead and maintain a safe and supportive dorm environment. In addition, clear policies and oversight mechanisms can help prevent or address potential conflicts of interest.

Problem solving to overcome problems in the selection of dormitory supervisors is that prospective supervisors must follow a clear and strict selection process based on qualifications, experience, and personality that are in accordance with the needs of the dormitory. In the selection or assessment process, prospective supervisors can be assisted by students, other management staff. Supervisors provide adequate training and support to help prospective supervisors face challenges and fulfill their duties properly and conduct regular supervision and evaluation of the performance of dormitory supervisors to ensure that they carry out their duties properly and in accordance with established policies, not forgetting to build a culture of open communication between supervisors, students, and management staff to facilitate handling problems quickly and effectively and prevent greater conflict.

METHOD

Understanding the Topsis method

The Technique for Order Preference by Similarity to Ideal (TOPSIS) method is a multicriteria decision-making method used to determine the best alternative among several alternatives by comparing the distance of each alternative to the positive and negative ideal solutions.

The purpose of Topsis:

1. Selection of the best alternative
2. Weighting of criteria
3. Assessing alternative performance
4. Addressing multi-criteria
5. Provide consistent alternatives.

Steps for working on the TOPSIS method

1. Collect data and form a decision matrix containing the values of each alternative against each criterion. For example, if there is$m$$m$alternative and$n$$n$criteria, then the decision matrix$X$$X$size$m \times n$$m$×n.

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$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{k=1}^{m} x_{kj}^2}} \qquad D_i^+ = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^+)^2}$$

$$D_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2}$$

2. Perform normalization to change various measurements into dimensionless values. Normalization is usually done with the formula
where Rij is the normalized value of the element Xij.
3. Multiplying the normalization matrix by the given criteria weights. These weights describe the relative importance of each criterion. Weighted decision matrix$V$ Vobtained by:

vij=wj·rij

Where Wj is the weight of the jth criterion.

4. Determine the positive ideal solution (A+A+) and negative ideal solutions (A−A−). The positive ideal solution consists of the maximum value for the profit criterion and the minimum value for the cost criterion, while the negative ideal solution is the opposite.

Positive ideal solution:

A+={v1+,v2+,...,vn+}A+={v1+,v2+,...,vn+}

Wherevj+=maxf_0(vij)vj+=max(vij) for the profit criteria andvj+=minf_0(vij)vj+=min(vij) for cost criteria.

Negative ideal solution:

A−={v1−,v2−,...,vn−}A−={v1−,v2−,...,vn−}

Wherevj−=minf_0(vij)vj−=min(vij) for the profit criteria andvj−=maxf_0(vij)vj−=max(vij) for cost criteria.

5. Calculate the distance of each alternative from the positive and negative ideal solutions using the distanceEuclidean:
6. Calculate the preference value for each alternative that indicates its proximity to the positive ideal solution. The preference value (Ci Ci) is calculated by ;

$$C_i = \frac{D_i^-}{D_i^+ + D_i^-}$$

MarkCiCi ranges between 0 and 1, the closer it is to 1, the better the alternative.

7. Sorting Alternative Values: Sorting alternatives based on preference valuesCiCi from highest to lowest.

RESULTS AND DISCUSSION

Decision making for selecting female dormitory supervisors using the Topsis method

Alternative Table

Code	Name of candidate name of mentor
A001	Sr. Mutiara

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Code	Name of candidate name of mentor
A002	Sr. Agustina
A003	Sr. Melati
A004	Sr. Vanessa
A005	Sr. Jessica

Criteria Table

code	criteria
C1	Age (cost)
C2	Experience in managing a dormitory (Benefit)
C3	Counseling skills (Benefit)
C4	Sensitivity to residents' needs (Benefit)
C5	Managerial Ability (Benefit)

Criteria weight table

criteria	Weight
Age (cost)	10
Experience in managing a dormitory (Benefit)	20
Counseling skills (Benefit)	25
Sensitivity to residents' needs (Benefit)	25
Managerial Ability (Benefit)	20

Candidate mentor value data

Name of candidate for mentor	Age	Experience in managing a dormitory	Counseling skills	Sensitivity towards female students	Managerial skills
Sr. Mutiara	25	3	76	75	70
Sr. Agustina	28	6	78	70	85
Sr. Melati	24	4	65	65	80
Sr. Vanessa	23	3	80	65	75
Sr. Meliana	30	8	85	80	65

Determination of Criteria Weight

Experience in managing a dormitory

Range	Variables	Mark
8-10	Very high	1
6-7	tall	0.75
4-5	Currently	0.50
3	Low	0.25
2-1	Very low	0

Age

Range	Variables	Mark
23	Very high	1
24-25	tall	0.75
26-28	Currently	0.50
29-30	Low	0.25
31	Very low	0

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Counseling skills

Range	Variables	Mark
80-100	Very high	1
75-79	tall	0.75
70-75	Currently	0.50
65-70	Low	0.25
<=60	Very low	0

Sensitivity towards female students

Range	Variables	Mark
80-100	Very high	1
75-79	tall	0.75
70-75	Currently	0.50
65-70	Low	0.25
<=60	Very low	0

Decision matrix

Name of candidate for mentor	Age	Experience in managing a dormitory	Counseling skills	Sensitivity towards female students
Sr. Mutiara	25 = 0.75	3 = 0.25	76 = 0.75	75 = 0.75
Sr. Agustina	28 = 0.50	6 = 0.75	78 = 0.75	70 = 0.50
Sr. Melati	24 = 0.75	4 = 0.50	65 = 0.25	65 = 0.25
Sr. Vanessa	23 = 1	3 = 0.25	80 = 1	65 = 0.25

Creating a Normalized Decision Matrix

Criteria 1

$$= \frac{0.75}{\sqrt{0.75^2 + 0.25^2 + 0.75^2 + 0.75^2}}$$

$$= \frac{0.75}{\sqrt{1.9375}}$$

$$= 0.538$$

$$= \frac{0.25}{\sqrt{0.75^2 + 0.25^2 + 0.75^2 + 0.75^2}}$$

$$= \frac{0.25}{\sqrt{1.9375}}$$

$$= 0.179$$

$$= \frac{0.75}{\sqrt{0.75^2 + 0.25^2 + 0.75^2 + 0.75^2}}$$

$$= \frac{0.75}{\sqrt{1.9375}}$$

$$= 0.538$$

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$$= \frac{0.75}{\sqrt{0.75^2 + 0.25^2 + 0.75^2 + 0.75^2}}$$

$$= \frac{0.75}{\sqrt{1.9375}}$$

$$= 0.538$$

Criteria 2

$$= \frac{0.50}{\sqrt{0.50^2 + 0.75^2 + 0.75^2 + 0.25^2}}$$

$$= \frac{0.50}{\sqrt{1.6875}}$$

$$= 0.384$$

$$= \frac{0.75}{\sqrt{0.50^2 + 0.75^2 + 0.75^2 + 0.25^2}}$$

$$= \frac{0.75}{\sqrt{1.6875}}$$

$$= 0.577$$

$$= \frac{0.75}{\sqrt{0.50^2 + 0.75^2 + 0.75^2 + 0.25^2}}$$

$$= \frac{0.75}{\sqrt{1.6875}}$$

$$= 0.577$$

$$= \frac{0.25}{\sqrt{0.50^2 + 0.75^2 + 0.75^2 + 0.25^2}}$$

$$= \frac{0.25}{\sqrt{1.6875}}$$

$$= 0.192$$

Criteria 3

$$= \frac{0.75}{\sqrt{0.75^2 + 0.50^2 + 0.25^2 + 0.25^2}}$$

$$= \frac{0.75}{\sqrt{1,125}}$$

$$= 0.707$$

$$= \frac{0.50}{\sqrt{0.75^2 + 0.50^2 + 0.25^2 + 0.25^2}}$$

$$= \frac{0.50}{\sqrt{1,125}}$$

$$= 0.471$$

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$$= \frac{0.25}{\sqrt{0.75^2 + 0.50^2 + 0.25^2 + 0.25^2}}$$
$$= \frac{0.25}{\sqrt{1{,}125}}$$
$$= 0.235$$

$$= \frac{0.25}{\sqrt{0.75^2 + 0.50^2 + 0.25^2 + 0.25^2}}$$
$$= \frac{0.25}{\sqrt{1{,}125}}$$
$$= 0.235$$

Criteria 4

$$= \frac{1}{\sqrt{1^2 + 0.25^2 + 1^2 + 0.25^2}}$$
$$= \frac{1}{\sqrt{2{,}125}}$$
$$= 0.685$$
$$= \frac{0.25}{\sqrt{1^2 + 0.25^2 + 1^2 + 0.25^2}}$$
$$= \frac{0.25}{\sqrt{2{,}125}}$$
$$= 0.171$$

$$= \frac{1}{\sqrt{1^2 + 0.25^2 + 1^2 + 0.25^2}}$$
$$= \frac{1}{\sqrt{2{,}125}}$$
$$= 0.685$$
$$= \frac{0.25}{\sqrt{1^2 + 0.25^2 + 1^2 + 0.25^2}}$$
$$= \frac{0.25}{\sqrt{2{,}125}}$$
$$= 0.171$$

Decision matrix for 4 criteria

Name of candidate for mentor	Age	Experience in managing a dormitory	Counseling skills	Sensitivity towards students
Sr. Mutiara	0.538815906080	0.179605302026	0.538815906080	0.538815906080
Sr. Agustina	0.384900179459	0.577350269189	0.577350269189	0.192450089729
Sr. Melati	0.707106781186	0.471404520791	0.235702260395	0.235702260395
Sr. Vanessa	0.685994340570	0.171498585142	0.685994340570	0.171498585142

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Determining the positive ideal solution matrix and negative ideal solution matrix

Positive ideal solution	Negative ideal solution
$Y1^+ = \max\{usia\} = 0{,}707$	$Y1^- = \max\{usia\} = 0{,}384$
$Y2^+ = \max\{mengelola\ asrama\} = 0{,}577$	$Y2^- = \max\{mengelola\ asrama\} = 0{,}171$
$Y3^+ = \max\{ket\ konseling\} = 0{,}685$	$Y3^- = \max\{ket\ konseling\} = 0{,}235$
$Y4^+ = \max\{kep\ mahasiswa\} = 0{,}538$	$Y4^- = \max\{kep\ mahasiswa\} = 0{,}171$
$A^+ = \{0{,}707; 0{,}577; 0{,}685; 0{,}538\}$	$A^- = \{0{,}384; 0{,}171; 0{,}235; 0{,}171\}$

Calculating the distance of alternatives from the positive ideal solution and the distance of alternatives from the negative ideal solution

$$Di^+ = \sqrt{\sum_{j=1}^{n} (y_1^+ - yij)^2}$$

$$D1^+ = \sqrt{(0{,}707 - 0{,}538)^2} + (0{,}577 - 0{,}179)^2 + (0{,}685 - 0{,}538)^2 + (0{,}538 - 0{,}538)^2$$

$=\sqrt{0{,}349013}$

$= 0.590$

$$Di^- = \sqrt{\sum_{j=1}^{n} (\text{yij} - yi^-)^2}$$

$$D1^- = \sqrt{(0{,}538 - 0{,}384)^2} + (0{,}179 - 0{,}577)^2 + (0{,}538 - 0{,}235)^2 + (0{,}538 - 0{,}171)^2$$

$=\sqrt{0{,}538902}$

$= 0{,}734$

$$Di^+ = \sqrt{\sum_{j=1}^{n} (y_1^+ - yij)^2}$$

$$D2^+ = \sqrt{(0{,}707 - 0{,}384)^2} + (0{,}577 - 0{,}577)^2 + (0{,}685 - 0{,}577)^2 + (0{,}538 - 0{,}192)^2$$

$=\sqrt{0{,}454380}$

$=0.674$

$$Di^- = \sqrt{\sum_{j=1}^{n} (\text{yij} - yi^-)^2}$$

$$D2^- = \sqrt{(0{,}384 - 0{,}384)^2} + (0{,}577 - 0{,}577)^2 + (0{,}577 - 0{,}235)^2 + (0{,}192 - 0{,}171)^2$$

$=\sqrt{0{,}117405}$

$= 0{,}342$

$$Di^+ = \sqrt{\sum_{j=1}^{n} (y_1^+ - yij)^2}$$

$$D3^+ = \sqrt{(0{,}707 - 0{,}707)^2} + (0{,}577 - 0{,}471)^2 + (0{,}685 - 0{,}235)^2 + (0{,}538 - 0{,}235)^2$$

$=\sqrt{0{,}305545}$

$= 0{,}552$

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$$Di^{-} = \sqrt{\sum_{j=1}^{n} (\text{yij} - yi^{-})^2}$$

$D3^{-} = \sqrt{(0{,}707 - 0{,}384)^2} + (0{,}471 - 0{,}577)^2 + (0{,}235 - 0{,}235)^2 + (0{,}235 - 0{,}171)^2$
$=\sqrt{0{,}338332}$
$= 0{,}581$

$$Di^{+} = \sqrt{\sum_{j=1}^{n} (\text{y}_1^{+} - yij)^2}$$

$D4^{+} = \sqrt{(0{,}707 - 0{,}685)^2} + (0{,}577 - 0{,}171)^2 + (0{,}685 - 0{,}685)^2 + (0{,}538 - 0{,}171)^2$
$=\sqrt{0{,}321525}$
$= 0{,}567$

$$Di^{-} = \sqrt{\sum_{j=1}^{n} (\text{yij} - yi^{-})^2}$$

$D4^{-} = \sqrt{(0{,}685 - 0{,}384)^2} + (0{,}171 - 0{,}577)^2 + (0{,}685 - 0{,}235)^2 + (0{,}171 - 0{,}171)^2$
$=\sqrt{0}, 668336$
$=0.817$

Calculating the relative closeness to the positive ideal solution

$$Vi = \frac{0.734}{0.734 + 0.590}$$
$$= \frac{0.734}{1{,}324}$$
$$= 0.5543806646525$$

$$Vi = \frac{0.342}{0.342 + 0.674}$$
$$= \frac{0.342}{1{,}016}$$
$$= 0.3366141732283$$

$$V1 = \frac{0.581}{0.581 + 0.552}$$
$$= \frac{0.581}{1{,}133}$$
$$= 0.5127978817299$$

$$V1 = \frac{0.817}{0.817 + 0.567}$$

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$$= \frac{0.817}{1,384}$$

= 0.5903179190751

Alternative	V+	Ranking
Sr. Mutiara	0.5543806646525	2
Sr. Agustina	0.3366141732283	4
Sr. Melati	0.5127978817299	3
Sr. Vanessa	0.5903179190751	1

CONCLUSION

Based on the results of the research and discussion that has been conducted on "Decision Making Techniques for Selecting Female Dormitory Supervisors Using the Topsis Method", it can be concluded that the results of the implementation of this Decision Support System show that the Topsis Method can be applied properly and correctly in accordance with what is applied so as to obtain the best Female Dormitory Supervisor.

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