Decision Support System in Determining Scholarship Recipient Lecturers Using the Simple Additive Weighting (SAW) Method

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ABSTRACT
The role of lecturers in higher education is one of the most influential parts of the quality of students produced. The educational qualification of lecturers is an important aspect of academic and institutional quality. So that many universities or educational institutions provide doctoral scholarship programs for potential lecturers. One of them is the Catholic University of Santo Thomas, Medan, which provides scholarships, namely doctoral scholarships for 5 outstanding lecturers. This research is a decision support system for doctoral scholarship recipients at the Catholic University of Santo Thomas Medan using the Simple Additive Weigting (SAW) method. The SAW method is used to determine the recipient of the S3 scholarship which is determined based on the criteria. This decision support system is built with a web-based application system as a tool in determining the decisions of lecturers who receive doctoral scholarships at the Catholic University of Santo Thomas Medan and uses MYSQL as a database.

1. INTRODUCTION

The development of information technology is currently growing rapidly so that the need for information is becoming increasingly important and increasingly needed in connection with the purpose of information, namely to produce something more meaningful and useful in order to make a quick and accurate decision (Beniger, 2009). With the rapid development of technology, it has an impact on all sectors of life (Cervellati & Sunde, 2005).

In the education sector, especially higher education, computerization is very important in the decision-making system. Because universities are obliged to provide education, research and community service (Directorate General of Higher Education, 2014). One of the elements in the implementation of higher education is the lecturer. Because lecturers are very important teaching staff in every university (Williams, 2002). And lecturers with higher degrees can automatically encourage the advancement of a campus in particular for the nation in general (Wright et al., 2003)(Sandler & Hall, 1986). In the Law of the Republic of Indonesia Number 14 of 2005 concerning teachers and lecturers, article 51 paragraph (1) point b, that lecturers are entitled to promotions and awards in accordance with their academic performance (Directorate General of Higher Education, 2004).

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The award system given by the government or every university is in the form of scholarships for educational foundations for doctoral programs (Glassick, 2000) (Sandmann et al., 2016). Scholarships are financial assistance provided by the government, universities and educational institutions (Nora et al., 2006).

One of them is the Catholic University of Santo Thomas, Medan, which is one of the universities that provides scholarship assistance for lecturers, namely doctoral scholarships as a form of appreciation for the performance of their lecturers. Every year the Santo Thomas Catholic University Foundation provides a quota of 5 lecturers for S3 scholarships. Scholarships are given to improve the quality of lecturers in expanding their knowledge according to the lecturer’s field of study and trying to improve the quality of education (Chanock, 2007) (Fabrice, 2010). In order to gain knowledge, it is necessary to study further to a higher level (Erickson et al., 2008). Based on the results of observations that have been made at the Catholic University of Santo Thomas, Medan, that in the awarding of S3 scholarships, the criteria assessed include age, years of service, rank, research, dedication, DP3 and Supporters. And scholarships are given to lecturers who are permanent lecturers. The scholarships granted are limited by the amount of funds provided by the foundation, whereas every year the number of lecturers who apply for doctoral scholarships increases (Calleson et al., 2005) (Austin, 2002) (Smesny et al., 2007). So to make it easier for the foundation to determine the lecturers who deserve to receive the doctoral scholarship, a decision support system is needed with a method that can manage and select the lecturers who are entitled to receive the doctoral scholarship in order to get accurate, fast and precise decisions.

2. RESEARCH METHOD

The Simple Additive Weighting (SAW) method is a weighted addition method (Afshari et al., 2010) (Irawan, 2020). The basic concept of the SAW method is to find the weighted sum of the performance ratings on each alternative on all criteria (Irawan, 2020) (Hadi et al., 2019). This method requires the process of normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings. The SAW method recognizes 2 (two) attributes, namely the benefit criteria and the cost criteria (Purba & Sihotang, 2019). The difference between these two criteria is in the selection of criteria when making decisions. This method requires the decision maker to determine the weight for each attribute. The total score for the alternatives is obtained by adding up all the assessment results between the rating and the weight of each attribute. The attribute rating must be dimension-free in the sense that it has passed the previous matrix normalization process.

The concept of calculating the simple additive weighting (SAW) method is as follows:

a) Determining the Alternative that is Ai

b) Determine the criteria that will be used as a reference in making decisions, namely Cj

c) Determine the weight of preference or level of importance (W) on each criterion.

\[ W = [W_1, W_2, W_3, ..., W_j] \]

d) Create a match rating table for each alternative across all criteria.

e) Make a decision matrix (X) which is formed from the results of the suitability rating table for each alternative on each criterion. The X value of each alternative (Ai) on each predetermined criterion (Cj) where, \( i = 1,2, ..., m \) and \( j = 1,2, ..., n \).

f) Normalize the decision matrix by calculating the normalized performance rating value (rij) and alternative Ai with Cj criteria.

\[ r_{ij} = \frac{x_{ij} - \min x_{ij}}{\max x_{ij} - \min x_{ij}} \]

g) The results of the normalized performance rating (rij) form a normalized matrix (R)

h) The final result of preference (Vi) is obtained from the addition and multiplication of the row elements of the normalized matrix (R) with the preference weights (W) corresponding to the column elements of the matrix.
3. RESULTS AND DISCUSSIONS

The results of the research are in the form of the 5 best alternatives that will get the doctoral scholarship. And the following is the calculation process using the Simple Additive Weighting (SAW) method.

a) Determining Alternative Ai

| No | Lecturer Name                     | NIDN       | Age | Working Period (Years) | Functional       |
|----|-----------------------------------|------------|-----|------------------------|------------------|
| 1  | Rebekah Kariani Sembiring         | 0105128302 | 38  | 5                      | Lecturer         |
| 2  | Novalina Sembiring                | 010118507  | 36  | 7                      | Expert Assistant |
| 3  | Asnita Hasibuan                   | 0101018405 | 37  | 6                      | Lecturer         |
| 4  | Patri Janson Silaban              | 0128038802 | 33  | 6                      | Lecturer         |
| 5  | DR Naibaho Polin                  | 01021077401| 47  | 5                      | Expert Assistant |
| 6  | Jontra Justus Pangaribuan         | 0128088901 | 32  | 5                      | Expert Assistant |
| 7  | Arisan Candra                     | 0007018403 | 32  | 7                      | Expert Assistant |
| 8  | Emy Ria Aritonang                 | 0120087101 | 50  | 6                      | Lecturer         |
| 9  | Eddy R. Sembiring                 | 0113067101 | 50  | 8                      | Head Lecturer    |
| 10 | Happy Marbun                      | 018087302  | 48  | 8                      | Expert Assistant |
| 11 | Joana L. Saragih                  | 013087201  | 49  | 7                      | Lecturer         |
| 12 | A Pakpahan                        | 0122107901 | 42  | 7                      | Lecturer         |
| 13 | Frida Marta Argareta              | 019028601  | 35  | 7                      | Expert Assistant |
| 14 | Sinta Dameria                     | 01828505   | 36  | 6                      | Lecturer         |
| 15 | Rumiris Lumbangaol                | 0120028001 | 41  | 6                      | Lecturer         |
| 16 | Norbeth Sinaga                    | 006087502  | 46  | 8                      | Expert Assistant |
| 17 | Ancient Desire                    | 011087801  | 43  | 7                      | Lecturer         |

**Table 2. Lecturer Research Assessment Data**

| No | Lecturer Name                     | C1 | C2 | C3 | C4 | C5 | Average |
|----|-----------------------------------|----|----|----|----|----|---------|
| 1  | Rebekah Kariani Sembiring         | 60 | 120| 75 | 120| 50 | 85      |
| 2  | Novalina Sembiring                | 60 | 150| 75 | 120| 50 | 91      |
| 3  | Asnita Hasibuan                   | 60 | 120| 60 | 120| 40 | 80      |
| 4  | Patri Janson Silaban              | 60 | 120| 60 | 120| 40 | 80      |
| 5  | DR Naibaho Polin                  | 60 | 120| 75 | 120| 50 | 85      |
| 6  | Jontra Justus Pangaribuan         | 75 | 150| 75 | 120| 50 | 94      |
| 7  | Arisan Candra                     | 60 | 120| 60 | 120| 40 | 80      |
| 8  | Emy Ria Aritonang                 | 60 | 150| 60 | 90 | 50 | 82      |
| 9  | Eddy R. Sembiring                 | 60 | 150| 60 | 120| 50 | 88      |
| 10 | Happy Marbun                      | 75 | 120| 60 | 90 | 40 | 77      |
| 11 | Joana L. Saragih                  | 75 | 120| 60 | 90 | 40 | 77      |
| 12 | Sorang Pakpahan                   | 60 | 150| 60 | 120| 40 | 86      |
| 13 | Frida Marta Argareta              | 60 | 90 | 60 | 120| 50 | 76      |
| 14 | Sinta Dameria Simanjuntak        | 60 | 90 | 75 | 120| 50 | 79      |
| 15 | Rumiris Lumbangaol                | 75 | 150| 75 | 90 | 50 | 88      |
| 16 | Norbeth Sinaga                    | 60 | 120| 75 | 120| 40 | 83      |
| 17 | Ancient Desire                    | 60 | 120| 60 | 90 | 50 | 76      |
Table 3. Lecturer Service Assessment Data

| No | Lecturer Name                      | Assessment criteria | Amount | Average |
|----|------------------------------------|---------------------|--------|---------|
| 1  | Rebekah Kariani Sembiring          | C1: 60 C2: 75 C3: 100 C4: 80 C5: 150 | 465    | 93      |
| 2  | Novalina Sembiring                 | C1: 60 C2: 75 C3: 80 C4: 80 C5: 120 | 435    | 83      |
| 3  | Asnita Hasibuan                    | C1: 60 C2: 75 C3: 80 C4: 60 C5: 150 | 425    | 85      |
| 4  | Patri Janson Silaban               | C1: 60 C2: 60 C3: 80 C4: 80 C5: 150 | 430    | 86      |
| 5  | DR Naibaho Polin                   | C1: 60 C2: 60 C3: 80 C4: 60 C5: 120 | 380    | 76      |
| 6  | Jontra Jusat Pangaribuan           | C1: 60 C2: 75 C3: 80 C4: 80 C5: 120 | 415    | 83      |
| 7  | Arisan Candra Nainggolan           | C1: 60 C2: 60 C3: 80 C4: 80 C5: 120 | 400    | 80      |
| 8  | Eddy R. Sembiring                  | C1: 60 C2: 75 C3: 100 C4: 60 C5: 150 | 445    | 89      |
| 9  | Happy Marbun                       | C1: 75 C2: 75 C3: 100 C4: 80 C5: 120 | 450    | 90      |
| 10 | Joana L. Saragih                   | C1: 75 C2: 75 C3: 100 C4: 60 C5: 120 | 430    | 86      |
| 11 | Sorang Pakpahan                    | C1: 60 C2: 60 C3: 80 C4: 80 C5: 120 | 400    | 80      |
| 12 | Frida Marta Argareta              | C1: 75 C2: 75 C3: 100 C4: 80 C5: 150 | 480    | 96      |
| 13 | Sinta Dameria Simanjuntak         | C1: 60 C2: 75 C3: 100 C4: 60 C5: 120 | 415    | 83      |
| 14 | Rumiris Lumbangaol                 | C1: 75 C2: 75 C3: 80 C4: 60 C5: 120 | 410    | 82      |
| 15 | Norbeth Sinaga                     | C1: 75 C2: 60 C3: 80 C4: 60 C5: 120 | 395    | 79      |
| 16 | Ancient Desire                     | C1: 75 C2: 60 C3: 80 C4: 80 C5: 150 | 445    | 89      |

Table 4. DP3 Lecturer

| No | Lecturer Name                      | Assessment criteria | Amount | Ket |
|----|------------------------------------|---------------------|--------|-----|
| 1  | Rebekah Kariani Sembiring          | C1: 95.50 C2: 90.00 | 465    | B   |
| 2  | Novalina Sembiring                 | C1: 93.00 C2: 94.20 | 435    | SB  |
| 3  | Asnita Hasibuan                    | C1: 93.80 C2: 87.00 | 425    | SB  |
| 4  | Patri Janson Silaban               | C1: 95.00 C2: 85.50 | 430    | B   |
| 5  | DR Naibaho Polin                   | C1: 95.50 C2: 88.00 | 380    | SB  |
| 6  | Jontra Jusat Pangaribuan           | C1: 93.50 C2: 86.50 | 415    | B   |
| 7  | Arisan Candra Nainggolan           | C1: 96.50 C2: 85.10 | 400    | B   |
| 8  | Emy Ria Aritonang                  | C1: 95.80 C2: 92.50 | 445    | B   |
| 9  | Eddy R. Sembiring                  | C1: 96.50 C2: 90.00 | 430    | B   |
| 10 | Happy Marbun                       | C1: 89.90 C2: 88.20 | 450    | B   |
| 11 | Joana L. Saragih                   | C1: 90.00 C2: 91.20 | 430    | B   |
| 12 | A Pakpahan                         | C1: 93.60 C2: 89.80 | 410    | B   |
| 13 | Frida Marta Argareta              | C1: 92.90 C2: 90.30 | 480    | B   |
| 14 | Sinta Dameria Simanjuntak         | C1: 89.70 C2: 89.80 | 445    | B   |
| 15 | Rumiris Lumbangaol                 | C1: 86.99 C2: 89.70 | 410    | B   |
| 16 | Norbeth Sinaga                     | C1: 85.70 C2: 87.60 | 395    | B   |
| 17 | Ancient Desire                     | C1: 86.89 C2: 89.00 | 445    | B   |
Table 5. Supporting Data

| No | Name                           | Activity |
|----|--------------------------------|----------|
|    |                                | Teaching | Academic | RPS | Thesis |
|    |                                | Attendance| Advisor  |  Creation |  guidance |
| 1  | Rebekah Kariani Sembiring      | √         | √          | √    | √      |
| 2  | Novalina Sembiring             | √         | √          | √    | √      |
| 3  | Asnita Hasibuan                | √         | √          | √    | √      |
| 4  | Patri Janson Silaban           | √         | √          | √    | √      |
| 5  | DR Naibaho Polin               | √         | √          | √    | √      |
| 6  | Jontra Just Pangaribuan        | √         | √          | √    | √      |
| 7  | Arisan Candra Nainggolan       | √         | √          | √    | √      |
| 8  | Emy Ria Aritonang             | √         | √          | √    | √      |
| 9  | Eddy R. Sembiring             | √         | √          | √    | √      |
| 10 | Happy Marbun                   | √         | √          | √    | √      |
| 11 | Joana L. Saragih              | √         | √          | √    | √      |
| 12 | Sorang Pakpahan                | √         | √          | √    | √      |
| 13 | Frida Marta Argareta          | √         | √          | √    | √      |
| 14 | Sinta Dameria Simanjuntak     | √         | √          | √    | √      |
| 15 | Rumiris Lumbangaol            | √         | √          | √    | √      |
| 16 | Norbeth Sinaga                | √         | √          | √    | √      |
| 17 | Ancient Desire                 | √         | √          | √    | √      |

b) Determine the weight of the criteria and the weight of preference on each criterion.

Table 6. Criteria and Criteria Weight

| Criteria Code | Criteria Terms | Criteria Type | Weight |
|---------------|----------------|---------------|--------|
| C1            | Age            | Cost          | 10%    |
| C2            | Years of service | Benefits     | 10%    |
| C3            | Rank           | Benefits      | 25%    |
| C4            | Study          | Benefits      | 20%    |
| C5            | Devotion       | Benefits      | 20%    |
| C6            | DP3            | Benefits      | 10%    |
| C7            | Support        | Benefits      | 5%     |

Table 7. Age Weighting

| Criteria           | Score |
|--------------------|-------|
| 38 Years           | 1     |
| 39 Years - 43 Years| 2     |
| 44 Years - 47 Years| 3     |
| 48 Years - 50 Years| 4     |

Table 8. Weighting Working Period

| Criteria           | Variable    | Score |
|--------------------|-------------|-------|
| 0 – 3              | less worthy | 1     |
| 4 – 5              | Decent enough | 2     |
| 6 – 7              | Worthy      | 3     |
| > 7                | Very Worthy | 4     |

Table 9. Weighting of Ranks

| Criteria            | Variable    | Score |
|---------------------|-------------|-------|
| There is not any    | less worthy | 1     |
| Expert assistant    | Decent enough | 2     |
| Lecturer            | Worthy      | 3     |


**Table 10.** Research Weighting

| Criteria | Variable  | Score |
|----------|-----------|-------|
| 75       | less worthy | 1    |
| 76 – 79  | Decent enough | 2    |
| 80 – 89  | Worthy     | 3    |
| 90 – 100 | Very Worthy | 4    |

**Table 11.** Weighting of Service

| Criteria | Variable  | Score |
|----------|-----------|-------|
| 75       | less worthy | 1    |
| 76 – 79  | Decent enough | 2    |
| 80 – 89  | Worthy     | 3    |
| 90 – 100 | Very Worthy | 4    |

**Table 12.** DP3 Weighting

| Criteria        | Variable  | Score |
|-----------------|-----------|-------|
| Not enough      | less worthy | 1    |
| Enough          | Decent enough | 2    |
| Well            | Worthy     | 3    |
| Very good       | Very Worthy | 4    |

**Table 13.** Supporting Weighting

| Criteria | Variable  | Score |
|----------|-----------|-------|
| 0 - 2    | less worthy | 1    |
| 3 - 4    | Very Worthy | 2    |

c) Provide the value of the suitability rating of each alternative on all criteria.

**Table 14.** Match Rating

| No  | Kode Dosen | C1 | C2 | C3 | C4 | C5 | C6 | C7 |
|-----|------------|----|----|----|----|----|----|----|
| 1   | D1         | 1  | 2  | 3  | 3  | 4  | 3  | 2  |
| 2   | D2         | 1  | 3  | 2  | 4  | 3  | 4  | 2  |
| 3   | D3         | 1  | 3  | 3  | 3  | 3  | 3  | 2  |
| 4   | D4         | 1  | 3  | 3  | 3  | 3  | 3  | 2  |
| 5   | D5         | 1  | 3  | 2  | 3  | 2  | 4  | 2  |
| 6   | D6         | 1  | 2  | 2  | 4  | 3  | 3  | 2  |
| 7   | D7         | 1  | 2  | 2  | 3  | 3  | 3  | 2  |
| 8   | D8         | 4  | 3  | 3  | 3  | 3  | 3  | 2  |
| 9   | D9         | 4  | 4  | 4  | 3  | 3  | 4  | 2  |
| 10  | D10        | 4  | 4  | 2  | 4  | 3  | 3  | 2  |
| 11  | D11        | 4  | 3  | 3  | 3  | 3  | 3  | 2  |
| 12  | D12        | 2  | 3  | 3  | 3  | 3  | 3  | 2  |
| 13  | D13        | 2  | 3  | 3  | 3  | 3  | 3  | 2  |
| 14  | D14        | 1  | 3  | 3  | 2  | 3  | 3  | 2  |
| 15  | D15        | 2  | 3  | 3  | 3  | 3  | 3  | 2  |
| 16  | D16        | 3  | 4  | 2  | 3  | 2  | 3  | 2  |
| 17  | D17        | 2  | 3  | 3  | 2  | 3  | 3  | 2  |

d) Make a decision matrix X from each criterion. The decision matrix X is formed from the results of the match rating table.
e) Normalize the decision matrix by calculating the value of the normalized performance rating ($r_{ij}$) from the alternative ($A_i$) with criteria ($C_j$).

a. Age Criteria
- $C_1A_1 = 1/1 = 1$
- $C_1A_2 = 1/1 = 1$
- $C_1A_3 = 1/1 = 1$
- $C_1A_4 = 1/1 = 1$
- $C_1A_5 = 1/3 = 0.333333333$

b. Working Period Criteria
- $C_2A_1 = 2/4 = 0.5$
- $C_2A_2 = 3/4 = 0.75$
- $C_2A_3 = 3/4 = 0.75$
- $C_2A_4 = 3/4 = 0.75$
- $C_2A_5 = 2/4 = 0.5$

c. Ranking Criteria
- $C_3A_1 = 3/4 = 0.75$
- $C_3A_2 = 2/4 = 0.5$
- $C_3A_3 = 3/4 = 0.75$
- $C_3A_4 = 3/4 = 0.75$
- $C_3A_5 = 2/4 = 0.5$

d. Research Criteria
- $C_4A_1 = 3/4 = 0.75$
- $C_4A_2 = 4/4 = 1$
- $C_4A_3 = 3/4 = 0.75$
- $C_4A_4 = 3/4 = 0.75$
- $C_4A_5 = 3/4 = 0.75$

e. Service Criteria
- $C_5A_1 = 4/4 = 1$
- $C_5A_2 = 3/4 = 0.75$
- $C_5A_3 = 3/4 = 0.75$
- $C_5A_4 = 3/4 = 0.75$
- $C_5A_5 = 2/4 = 0.5$

f. DP3 Criteria
- $C_6A_1 = 3/4 = 0.75$
- $C_6A_2 = 4/4 = 1$

Figure 1. Alternative Match Rating
g. Supporting Criteria
C7A1 = 2/2 = 1
C7A2 = 2/2 = 1
C7A3 = 2/2 = 1
C7A4 = 2/2 = 1
C7A5 = 2/2 = 1

f) The results of the normalized performance value (rij) form a normalized matrix R.

\[ R = \begin{bmatrix}
1 & 0.5 & 0.75 & 0.75 & 1 & 0.75 & 1 \\
1 & 0.75 & 0.5 & 1 & 0.75 & 1 & 1 \\
1 & 0.75 & 0.75 & 0.75 & 0.75 & 1 & 1 \\
1 & 0.75 & 0.75 & 0.75 & 0.75 & 0.75 & 1 \\
0.3333333333 & 0.5 & 0.5 & 0.75 & 0.5 & 1 & 1 \\
1 & 0.5 & 0.5 & 1 & 0.75 & 0.75 & 1 \\
0.25 & 0.75 & 0.75 & 0.75 & 0.75 & 1 & 1 \\
0.25 & 1 & 1 & 0.75 & 0.75 & 1 & 1 \\
0.25 & 1 & 0.5 & 0.5 & 1 & 0.75 & 1 \\
0.25 & 0.75 & 0.75 & 0.75 & 0.75 & 1 & 1 \\
0.5 & 0.75 & 0.75 & 0.75 & 0.75 & 1 & 1 \\
0.5 & 0.75 & 0.75 & 0.75 & 0.75 & 0.75 & 1 \\
0.3333333333 & 0.5 & 0.5 & 0.75 & 0.5 & 1 & 1 \\
0.5 & 0.75 & 0.75 & 0.75 & 0.75 & 1 & 1 \\
0.5 & 0.75 & 0.75 & 0.75 & 0.75 & 0.75 & 1
\end{bmatrix} \]

\[ \text{Figure 2. Normalized Matrix R} \]

g) Finding the final result of the ranking of each alternative. The final alternative result is obtained from the sum of the normalized matrix row elements (R) with preference weights (W) corresponding to the matrix column elements.

With the formula:

\[ V_i = \sum_{j=1}^{n} W_j r_{ij} \]

\[ V_1 = (0.10)(1) + (0.10)(0.5) + (0.25)(0.75) + (0.20)(0.75) + (0.20)(1) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.8125} \]
\[ V_2 = (0.10)(1) + (0.10)(0.75) + (0.25)(0.5) + (0.20)(0.5) + (0.20)(0.75) + (0.10)(1) + (0.05)(1) = \mathbf{0.8} \]
\[ V_3 = (0.10)(1) + (0.10)(0.75) + (0.25)(0.5) + (0.20)(0.75) + (0.20)(0.75) + (0.10)(1) + (0.05)(1) = \mathbf{0.8125} \]
\[ V_4 = (0.10)(1) + (0.10)(0.75) + (0.25)(0.75) + (0.20)(0.75) + (0.20)(0.75) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.7875} \]
\[ V_5 = (0.10)(0.3333333333) + (0.10)(0.5) + (0.25)(0.5) + (0.20)(0.75) + (0.20)(0.75) + (0.10)(1) + (0.05)(1) = \mathbf{0.6083} \]
\[ V_6 = (0.10)(1) + (0.10)(0.5) + (0.25)(0.5) + (0.20)(1) + (0.20)(0.75) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.75} \]
\[ V_7 = (0.10)(1) + (0.10)(0.5) + (0.25)(0.5) + (0.20)(0.75) + (0.20)(0.75) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.7} \]
\[ V_8 = (0.10)(0.25) + (0.10)(0.75) + (0.25)(0.75) + (0.20)(0.75) + (0.20)(0.75) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.7125} \]
\[ V_9 = (0.10)(0.25) + (0.10)(1) + (0.25)(0.5) + (0.20)(0.5) + (0.20)(0.75) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.825} \]
\[ V_{10} = (0.10)(0.25) + (0.10)(1) + (0.25)(0.5) + (0.20)(0.5) + (0.20)(1) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.675} \]
\[ V_{11} = (0.10)(0.25) + (0.10)(0.75) + (0.25)(0.75) + (0.20)(0.5) + (0.20)(0.75) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.6625} \]
\[ V_{12} = (0.10)(0.5) + (0.10)(0.75) + (0.25)(0.5) + (0.20)(0.75) + (0.20)(0.75) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.7625} \]
\[ V_{13} = (0.10)(1) + (0.10)(0.75) + (0.25)(0.5) + (0.20)(0.5) + (0.20)(1) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.75} \]
\[ V_{14} = (0.10)(1) + (0.10)(0.75) + (0.25)(0.75) + (0.20)(0.5) + (0.20)(0.75) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.7375} \]
\[ V_{15} = (0.10)(0.5) + (0.10)(0.75) + (0.25)(0.75) + (0.20)(0.75) + (0.20)(0.75) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.7375} \]
\[ V_{16} = (0.10)(0.3333333333) + (0.10)(0.5) + (0.25)(0.5) + (0.20)(0.75) + (0.20)(0.5) + (0.10)(0.75) + (0.05)(1) = \mathbf{0.633333} \]
4. CONCLUSION

With this decision support system, it can make it easier for the foundation of the Santo Thomas Catholic University Medan in making decisions to determine lecturers who are entitled to receive doctoral scholarships. With this system, lecturers who apply for the doctoral scholarship must first log in to register for the doctoral scholarship through the system. And the admin then only checks the file and then the system will do the calculation process. The application of this method produces the 5 best alternatives from a number of existing alternatives. Where the best alternative is obtained from the calculation of predetermined criteria so that from the 17 alternatives it is found that Eddy R Sembiring, Asnita Hasibuan, Ribka Kariani Sembiring, Novalina Sembiring and Patri Janson Silaban who are entitled to the S3 scholarship provided by the foundation. The design of the SAW method for determining lecturers who are entitled to receive doctoral scholarships is able to make decisions quickly, precisely and accurately.

Acknowledgement
The author would like to thank the Catholic University of Santo Thomas Medan for granting permission and supporting the implementation of this research.

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