



Implementation of the Multi Factor Evaluation Process (MFEP) Method in Making Decisions on Providing Assistance to Underprivileged Students

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Abstract—In the activity of receiving Aid for Poor Students, there are several problems, one of which is the distribution of Poor Student Aid funds that are not on target, so that in determining the decision of prospective recipients of Aid for Poor Students, the school must collect various selection files for prospective recipients from student files who come from families. underprivileged to modest. This makes it difficult for the school to make a decision on the recipient of the Poor Student Aid funds. Given the problems faced, this system was created as a means of information to assist schools in selecting prospective recipients of the Poor Student Aid to determine which recipients deserve assistance. This system is in the form of a decision support system (SPK) that can facilitate the school in determining prospective recipients of the Poor Student Assistance, so that the results obtained are effective and efficient.

Keywords: Decision Support System; Scholarship; Multi Factor Evaluation Process Method

1.INTRODUCTION

Education is a basic need of every individual which is also a system of procedures for improving the quality of life of each individual in order to achieve the ideals, the Government requires a minimum of 9 years of education and recommends more, at a glance we can distinguish between the nature and thoughts of educated and uneducated. The Poor Student Assistance Program is a National Program that has a goal of working with disadvantaged students and interested in school by helping disadvantaged students by providing good training and reducing dropout rates. Not only that, the Poor Student Assistance program also aims to attract students who cannot afford to return to school, assist students in meeting their needs in terms of learning exercises, support teaching programs that are required for nine years for basic training to move up to secondary level. Just like helping the smooth running of the school program. Through the Poor Student Assistance Program, it can be trusted that young people from poor families can continue to advance to grades, do not drop out of school, and later it is believed that they will really want to break the chain of poverty that is currently being experienced.

The Poor Student Assistance Program upholds the obligation of public authorities to build a level of training support in poor and remote local/urban communities. The Poor Student Assistance Program is an administrative assistance program in the form of money that is given directly to students who come from underprivileged families who have difficulty in undergoing their education. Madrasah Ibtidaiyah Islamiyah Sentang was founded on July 17, 1991 by the community of Sentang Village, Nibung Hangus District, Batu Bara Regency, which is currently led by the Principal Zulkho Aini, S.Pd. Madrasah Ibtidaiyah Islamiyah Sentang has received a quota for distribution of Poor Student Assistance funds from the ministry of education since 2010 until now, Madrasah Ibtidaiyah Islamiyah Sentang has received an uncertain quota for the Poor Student Assistance program every year. The problem that occurs in Madrasah Ibtidaiyah Islamiyah Sentang is the limited quota of recipients of the Poor Student Assistance provided by the ministry of education, therefore it is difficult for the school to select the file for the recipient of the Poor Student Aid that fits the predetermined criteria.

In a previous study by Mujito in the journal Implementation of the Multi Factor Evaluation Process (MFEP) Algorithm for the selection of investigators at the National Police Criminal Investigation Unit which explained that the decision support system is an activity in carrying out management to achieve a goal. The hypothesis of decision support has a principle component as the head is faced with a particular problem that can measure each other, the goals, values or goals that guide the leader are very clear and the level can be set by a significant demand. Various options for dealing with this problem have been painstakingly researched. The results of each elective are painstakingly selected. Each other option and each running with impact can measure up to other different options and heads will choose other options and results can empower the achievement of goals, values or goals. One strategy that can be used in determining a choice is to use the Multi Factor Evaluation Process (MFEP) Algorithm, especially dynamically resolved by giving subject and intuitive consideration to the factors that are considered important. This comparison is carried out by providing a weighting framework for the multifactors that are included and considered important.

In the activity of receiving Aid for Poor Students, there are several problems, one of which is the distribution of Poor Student Aid funds that are not right on target, so that in determining the decision of prospective recipients of Aid for Poor Students, the school must collect various selection files for prospective recipients from the files of students who come from underprivileged families. to simple. This makes it difficult for the school to make a decision on the recipient of the Poor Student Aid funds. Given the problems faced, this system was created as a means of information to assist schools in selecting prospective recipients of the Poor Student Aid to determine which recipients deserve assistance. This system is in the form of a decision support system (SPK) that can facilitate the school in determining prospective recipients of the Poor Student Assistance, so that the results obtained are effective and efficient.



2. RESEARCH METHODOLOGY

2.1 Decision Support System (DSS)

According to Keen and Scoot Morton "Decision Support System is a mixture of individual information sources with the ability to further develop the quality of choices. Decision Support System is also a computer-based data framework for decision-making management that handles structured and unstructured problems using information and models The decision support system functions to assist decision makers in making choices by providing appropriate decision alternatives [1].

2.1.1 Characteristics of Decision Support System (DSS)

Some attributes of decision support systems that have some differences from ordinary information systems, among others, according to be exact [2]

1. The choice of a decision support system is intended to assist leaders in dealing with semi-organized and unstructured issues.
2. The choice of a decision support system is planned so that it is easy to use by people who do not have high essential PC skills.
3. The choice of a decision support system is planned by highlighting the parts of high adaptability and versatility so that it is effectively adapted to various ecological changes that occur and the needs of the client.
4. In its handling, the decision support system combines the use of insightful models with regular information delivery methods and data retrieval capabilities.
5. Decision support systems provide assistance by using a PC to solve unstructured contributors to this problem, administrators are more responsible for managing unstructured problems. The regional head and BU work together collectively to deal with issues that generally exist in semi-organized areas.
6. Decision support systems increase the viability of choices made over working on their skills. That is, the network of emotionally supportive choices is not planned to stay on a dynamic cycle as productive as one would like it to be. Regardless of whether the administrator's time is wholly important and thus not worth wasting, the fundamental advantage of choosing an emotionally supportive network is the better choice.

2.2 Multi Factor Evaluation Process (MFEP) Method

Multi factor Evaluation Process (MFEP) is a quantitative technique that uses the "Weighting System" framework, in which the weighting system is carried out subjectively by considering several factors that have an important effect on alternative choices. All criteria that are important factors in the review are given an appropriate weighting as well as the alternatives to be selected, and then can be evaluated based on these considerations. The final result of this method determines that the alternative with the highest value is the best solution based on the selected criteria. [3]

2.3 Spiral Method

In the study using spiral method this process model is a process model that combines the iterative properties of the prototyping process model with the control and systematic aspects of the waterfall model. This process model provides the potential for rapid development of incremental versions of the software. The project axis can be used as the beginning of iteration or evaluation of the iteration that has been done by each work area is distinguished by the color of the region, where each region rotates in a certain working order. In this model, the final result and evaluation of a work area will be the initiation of the next work area. The spiral model provides the possibility for rapid software development, which moves from a less complete version of the software to an increasingly complete version. So there is no need for rebuilding of the application if there are system changes [4].

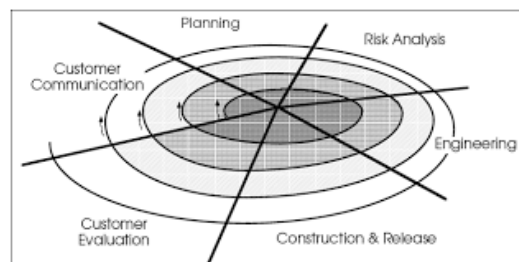


Figure 1. Spiral Method

- a. Planning, planning stage is the stage where the communion between the person who will develop the software (system analysis) with his client. The planning phase includes time estimation, schedule costs, work environment and data source.
- b. Risk analysis, this stage serves to identify potential risks to occur and produce an alternative solution technically and strategic management of risk management.

- c. Engineering stage, at this stage conducted testing, coding, system developers, software installation and report making related to the analysis of system deficiencies or weaknesses
- d. Evaluation stage, this stage is a response related to the results of the software built. If there is a change then all stages are improved according to the wishes or satisfaction of the user.

2.4 PHP

PHP, is a programming language with which it has a public license or in other words open source users can develop PHP function codes with the need. PHP programming can be written in two forms, namely writing PHP lines of code in a single file and writing PHP code on html pages. PHP is also often used in the creation of dynamic and open source websites so that users are free to develop the desired system as needed and with good programming capabilities PHP can also run well on operating systems based on windows, linux and macOS [5].

2.5 MySQL

MySQL is a database that connects PHP scripts using the same query commands and escape characters as PHP. And MySQL also has a user friendly look that makes it easier for users to operate their system [11]. MySQL is also in the database relation management system where users use the table structure in their database, almost all web server service providers have MySQL in the development of website-based applications managed by the web developer MySQL interface is PHPMyadmin where it serves to connect between the PHP programming language with MySQL for the process of managing databases on the website [6].

2.7 System

The system is a group of elements closely related to each other that function together to achieve a specific goal. The system is also an organized component or variable, interdependent and integrated. With the management system in an organization will be better so as to improve the quality of service of an organization or institution to the community [7].

2.5 Information

Information Systems (SI) is a combination of information technology and the activities of people technology to support operations and management. In a very broad sense, The term information system that is often used refers to interactions between people, algorithmic processes, data, and technology. In this sense, the term is used to refer not only to the use of information and communication technology (ICT) organizations, but also to the way in which people interact with these technologies in support of business processes There are those that make a clear distinction between information systems, and computer ICT systems, and business processes. Information systems that differ from information technology in information systems are usually looks like it has ict components. This is mainly related to the purpose of utilization of information technology. Information systems are also different from business processes. Information systems help to control business process performance [8].

2.3 Database

Databases are collected and organized data that relates to each other which can result in easier information-getting activities. The purpose of the database is that the time in the system that uses file-based streaming can be resolved [9].

3. RESULT AND DISCUSSION

3.1 Calculation Steps

Calculation Steps Using the Multi Factor Evaluation Process Method below are the steps for the calculation process for the Multi Factor Evaluation Process method according to Debi Mariza Nitbani:

- a. Determine the factor and the weight of the factor where the total weighting must be equal to 1 (Σ weighting = 1), namely the factor weight.
- b. Fill in the value for each factor that influences decision making from the data to be processed, the value entered in the decision-making process is an objective value, which is certain.
- c. The process of calculating the weight evaluation which is the process of calculating the weight between the factor weight and the evaluation factor with the summation of all the results of the weight evaluation to obtain the total evaluation results. Each selection participant has an evaluation value for the three factors that are considered, to get the total evaluation value of each selection participant by calculating the following:

Formula to perform normalization:

$$N_{be} = N_{be} = N_{bf} \times N_{ef}$$

Information:

N_{be} : Evaluation Weight Value

N_{ef} : Factor Evaluation Value

N_{bf} : Factor Weight Value

Calculation of total evaluation value

$$Tne = Nbe1 + Nbe2 + Nbe3$$

Information:

Tne : Total evaluation score

Nbe : Evaluation weight value

Table 1. Weighted Criteria Score

Criteria	Criteria Weight Value
Parent's Income <1 Million = 10 , >1 million = 5	Number of Parent Dependents 1 person = 3
2 people = 5	3 people = 7
4 people = 9	5 people = 11
>5 people = 15	Certificate of Incapacity Letter exists = 10
Letter Missing = 5	Letter Orphan Status Exist = 10
Letter Missing = 5	Status of Expiration Letter Exist = 10

Note: The value of each criterio has been determined in advance by the author based on the level of need for the criteria/sub-criteria value which can be seen in table 4.2 above.

Table 2. Alternative Student Participant/I Scholarship Selection

Code	Name	Description
A101	Andika Putra Participant Selection	Dedi Selection Participants
A102	Gunawan Selection Participants	Heri Kurniawan Selection Participant
A103	Sartika Sari Selection Participants	July Goddess of Selection Participants
A104	Andika Putra Participant Selection	Dedi Selection Participants
A105	Gunawan Selection Participants	Heri Kurniawan Selection Participant
A106	Sartika Sari Selection Participants	July Goddess of Selection Participants

In implementing the Multi Factor Evaluation Process, the first thing that must be done is determining the factors that are considered important in the accepted participants. The next step is to compare these factors to get which factor is the most important, the second most important, and so on. And next is to give weighting to the factors used where the total weighting must be equal to 1 (Σ weighting = 1).

Table 3. Criteria

Code Criteria	Criteria Name	Factor Weight
C101	Parents' Income	0.1
C102	Number of Parent Dependents	0.3
C103	Certificate of Incapacity	0.5
C105	Orphan Status	0.9
C104	Status Description Pkh	0.7
C106	Attendance Status	0.2

Note: In table 4.4 factor weighting is determined by the author based on previous research which is the reference for weighting according to the needs of the assessment of the criteria level. The value of the weight factor which includes 0.1,0,3,0.5, 0.9, 0.7, and 0.2 is determined by the author based on the level of importance of a criterion based on the order. After the Factor data on the criteria, and the criteria (Crips) and alternatives have been made, the next step is the calculation process, that is, we first calculate the Factor Evaluation on the Alternative, namely giving the Factor Evaluation value for each alternative according to the test results:

Table 4. Alternative Evaluation Factors

Criteria Factor	A101	A102	A103	A104	A105	A106
C101	10	10	10	10	10	10
C102	3	5	7	9	11	15
C103	10	10	10	10	10	10
C104	10	10	10	10	10	10
C105	10	10	10	10	10	10
C106	15	13	11	9	7	5

Table 4: each alternative value from alternative A101 to alternative A106, while the values in the row of each alternative are obtained from the input value of the criteria where each criterion has sub-criteria that have a value value as can be seen in table 3 above. With the information mentioned above, the total number of evaluation scores for each alternative or selection participant is obtained. Each selection participant has an evaluation value for the six criteria that are considered, to get the total evaluation value of each prospective scholarship member by calculating the following:

Information:

Nef: Factor Evaluation Value

Nbf: Factor Weight Value

Then each of the alternative candidates for participating members is evaluated, then we calculate the first alternative, namely Andika Putra with code 101.

Table 5. Evaluation of Alternatives (A101)

Criteria Factor	Factor Weight	Factor Evaluation	Evaluation Weight
C101	0.1	10	1
C102	0.3	3	0.9
C103	0.5	10	5
C104	0.7	10	7
C105	0.9	10	9
C106	0.2	15	3
TOTAL	2.7		25.9

From the table above, it can be seen that Andika's Evaluation Weight is 25.9. the value of 25.9 is obtained from the total sum of the evaluation weights in table 5. While the value of 2.7 on the factor weights is obtained from the sum of each factor weight in table 5 above.

Table 6. Alternative Evaluation (A102)

Criteria Factor	Factor Weight	Factor Evaluation	Evaluation Weight
C101	0.1	10	1
C102	0.3	5	1.5
C103	0.5	10	5
C104	0.7	10	7
C105	0.9	10	9
C106	0.2	13	2.6
Total	2.7		26.1

The value in table 6 above is obtained by adding the multiplication operator between each factor weight value and the factor evaluation value.

(C101) $0.1 \times 10 = 1$, (C102) $0.3 \times 5 = 1.5$, (C103) $0.5 \times 10 = 5$
(C104) $0.7 \times 10 = 7$, (C105) $0.9 \times 10 = 9$, (C106) $0.2 \times 13 = 2.6$.

From the table above, it can be seen that Dedi's Evaluation Weight is 26.1 the result of the total sum of the overall Evaluation Weight values in table 6 above. While the value of 2.7 on the factor weights is obtained from the sum of each factor weight in table 6 above.

Table 7. Alternative Evaluation (A103)

Criteria Factor	Factor Weight	Factor Evaluation	Evaluation Weight
C101	0.1	10	1
C102	0.3	7	2.1
C103	0.5	10	5
C104	0.7	10	7
C105	0.9	10	9
C106	0.2	11	2.2
Total	2.7		26.3

The value in table 7 above is obtained by adding the multiplication operator between each factor weight value and the factor evaluation value.

(C101) $0.1 \times 10 = 1$, (C102) $0.3 \times 7 = 2.1$, (C103) $0.5 \times 10 = 5$
(C104) $0.7 \times 10 = 7$, (C105) $0.9 \times 10 = 9$, (C106) $0.2 \times 11 = 2.2$.

From the table above, it can be seen that the evaluation weight of Gunawan is 26.3 which is obtained from the sum of the overall evaluation weight values in table 4.8. While the value of 2.7 on the factor weights is obtained from the sum of each factor weight in table 7 above.

Table 8. Alternative Evaluation (A104)

Criteria Factor	Factor Weight	Factor Evaluation	Evaluation Weight
C101	0.1	10	1

Criteria Factor	Factor Weight	Factor Evaluation	Evaluation Weight
C102	0.3	9	2.7
C103	0.5	10	5
C104	0.7	10	7
C105	0.9	10	9
C106	0.2	9	1.8
Total	2.7		26.5

The values in table 8 above are obtained by adding the multiplication operator between each factor weight value and the factor evaluation value.

(C101) $0.1 \times 10 = 1$, (C102) $0.3 \times 7 = 2.1$, (C103) $0.5 \times 10 = 5$

The value in table 8 above is obtained by adding the multiplication operator between each factor weight value and the factor evaluation value.

(C101) $0.1 \times 10 = 1$, (C102) $0.3 \times 7 = 2.1$, (C103) $0.5 \times 10 = 5$
 (C104) $0.7 \times 10 = 7$, (C105) $0.9 \times 10 = 9$, (C106) $0.2 \times 11 = 2.2$.

From the table above, it can be seen that the evaluation weight of Heri Kurniawan is 26.5. This value is obtained from the sum of the overall evaluation weights in table 4.9 above. While the value of 2.7 on the factor weights is obtained from the sum of each factor weight in table 8 above.

Tabel 10. Alternative Evaluation A(105)

Criteria Factor	Factor Weight	Factor Evaluation	Evaluation Weight
C101	0.1	10	1
C102	0.3	11	3.3
C103	0.5	10	5
C104	0.7	10	7
C105	0.9	10	9
106	0.2	7	1.4
Total	2.7		26.7

The value in table 10 above is obtained by adding the multiplication operator between each factor weight value and the factor evaluation value.

(C101) $0.1 \times 10 = 1$, (C102) $0.3 \times 11 = 3.3$, (C103) $0.5 \times 10 = 5$
 (C104) $0.7 \times 10 = 7$, (C105) $0.9 \times 10 = 9$, (C106) $0.2 \times 7 = 1.4$

From the table above, it can be seen that the evaluation weight of Sartika Sari is 26.7 which is obtained from the sum of the overall evaluation weight values in table 10. While the value of 2.7 on the factor weights is obtained from the sum of each factor weight in table 10 above.

Table 11. Alternative Evaluation (A106)

Criteria Factor	Factor Weight	Factor Evaluation	Evaluation Weight
C101	0.1	10	1
C102	0.3	15	4.5
C103	0.5	10	5
C104	0.7	10	7
C105	0.9	10	9
C106	0.2	5	1
Total	2.7		27.5

The value in table 11 above is obtained by adding the multiplication operator between each factor weight value and the factor evaluation value.

(C101) $0.1 \times 10 = 1$, (C102) $0.3 \times 15 = 4.5$, (C103) $0.5 \times 10 = 5$
 (C104) $0.7 \times 10 = 7$, (C105) $0.9 \times 10 = 9$, (C106) $0.2 \times 5 = 1$

From the table above, it can be seen that the evaluation weight of Juli Dewi is 27.5 which is obtained from the sum of all the evaluation weight values in table 11 above. While the value of 2.7 on the factor weights is obtained from the sum of each factor weight in table 11 above.

After knowing the overall value of the evaluation weight, if we make a ranking it looks like this:

Table 12. Ranking Values

Criteria Factor	A101	A102	A103	A104	A105	A106
C101	10	10	10	10	10	10

Criteria Factor	A101	A102	A103	A104	A105	A106
C102	3	5	7	9	11	15
C103	10	10	10	10	10	10
C104	10	10	10	10	10	10
C105	10	10	10	10	10	10
C106	15	13	11	9	7	5
Total	25.9	26.1	26.3	26.5	26.7	27.5
Rank	6	5	4	3	2	1

Description: Each value in the column and row starting alternative A101-A106 as previously explained the value is obtained from the input criteria and sub-criteria values in table 3 above. The total for each alternative A101-A106 is obtained from the sum of each overall value obtained by each alternative which has been described in tables 7 to 11 which have been discussed in detail above previously. The Ranking Results Based on the number of sequences from the largest to the smallest value obtained by each alternative value. So the conclusion is the highest value and Rank 1 is by alternative A106 with a value of 27.5 on behalf of Juli Dewi.

3.2 Implementation Program

a. Display of Factor Evaluation and evaluation of alternatives

Factor Evaluation Data and Alternative Evaluation function to generate scores from students who are inputted as worthy or not to receive the assistance of these poor students. The following is an image of the alternative evaluation value design.

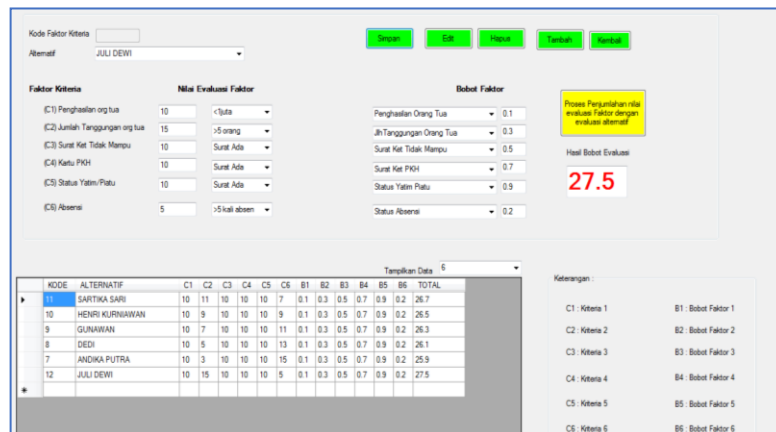


Figure 2. Factor Evaluation and alternative evaluation

b. Display of Report Results

Display Results The report will display a report on the results of the analysis of students who are inputted whether the student is eligible to receive assistance from poor students or not. The following is the output design of the application:

KODE	ALTERNATIF	C1	C2	C3	C4	C5	C6	B1	B2	B3	B4	B5	B6	TOTAL
106	JULI DEWI	10	15	10	10	10	5	0.1	0.3	0.5	0.7	0.9	0.2	27.5
105	SARTIKA SARI	10	11	10	10	10	7	0.1	0.3	0.5	0.7	0.9	0.2	26.7
104	HENRI KURNIAWAN	10	9	10	10	10	9	0.1	0.3	0.5	0.7	0.9	0.2	26.5
103	GUNAWAN	10	7	10	10	10	11	0.1	0.3	0.5	0.7	0.9	0.2	26.3
102	DEDI	10	5	10	10	10	13	0.1	0.3	0.5	0.7	0.9	0.2	26.1
101	ANDIKA PUTRA	10	3	10	10	10	15	0.1	0.3	0.5	0.7	0.9	0.2	25.9

Figure 3. Display of Report Results

4. CONCLUSION

Decision-making for the Determination of Recipients for Poor Student Assistance has become more detailed and easier so that the school can obtain prospective recipients of the assistance in accordance with predetermined criteria. The Multi Factor Evaluation Process (MFEP) method is able to answer the question of selecting criteria for prospective

students who receive the assistance of poor students. This MFEP method has convenience compared to other methods because the use of the formula is very easy to understand and understand by ordinary users and calculations. This method is also very suitable to be applied in case studies of the selection of aid receipts, both funds, scholarships and others.

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