

# Implementation of Decision Support System for Scholarship Recipients at Bank Indonesia

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## Abstract

The Bank Indonesia Scholarship is a Bank Indonesia social program in the form of tuition assistance for undergraduate students (S1) at various State Universities (PTN). However, often in terms of determining scholarship recipients it is not right on target, this is caused because the scholarship award has not used the tools or methods used to determine scholarship recipients, for that a system is designed to determine scholarship recipients. The selection process for Bank Indonesia Scholarships requires accuracy and a long time because each student data will be compared one by one according to predetermined criteria and is also prone to accidental human errors. Meanwhile, Bank Indonesia has not determined a method to help select prospective scholarship recipients and the selection process is still carried out manually by comparing the student data of prospective scholarship recipients one by one, for this reason, the application of the algorithm in this study is to combine the Fuzzy Multiple Decision Making (FMAM) method and Simple Additive Weighting (Saw) with provisions and criteria that have been determined by Bank Indonesia. The FMADM method is used to find alternatives from a number of alternatives with predetermined criteria and the SAW method is used to rank the existing alternatives. The results of this study are used as a tool in making decisions to recommend scholarship recipients.

**Keywords:** Algorithm, Scholarship, FMADM, SAW

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## Introduction

Bank Indonesia (BI) is one of the banks that has always played an active role in the development of education in Indonesia. One form of its realization is by issuing a scholarship program provided by Bank Indonesia (BI) (Moorena et al., 2020). The scholarship program provided by Bank Indonesia (BI) is a form of social responsibility that is shown to increase awareness for communities throughout Indonesia. This is as a means of increasing participation and the position of the organization in the community (von Allmen & Kang, 2018).

One form of Bank Indonesia's concern in the field of education is the provision of scholarships. Scholarships are given to a number of State Universities in all regions in Indonesia, one of which is the University of West Sulawesi which gets a quota for its students in each new academic year to participate in the Bank Indonesia scholarship program for underprivileged students and outstanding students (Nurdin et al., 2021). Based on an initial survey conducted by researchers at the University of West Sulawesi, the recipients of the University of West Sulawesi Scholarship consisted of several majors, namely Informatics Engineering, Management, Accounting, Mathematics Education, Law, Agribusiness, and International Relations.

In each year the number of applicants for Bank Indonesia Scholarships reaches 200-300 students, while Bank Indonesia only provides a quota of 50 scholarship recipients for students at the University of West Sulawesi, therefore scholarships should be given to students who deserve and deserve to get it in accordance with the requirements that have been given, but based on interviews conducted by researchers with several recipients of Bank Indonesia Scholarships, they stated that there were several scholarship recipients who they thought were not right on target (Kardashevskaya & others, 2021).

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The selection process for Bank Indonesia Scholarships requires accuracy and a long time because each student data will be compared one by one according to predetermined criteria and is also prone to accidental human errors. Meanwhile, Bank Indonesia has not determined a method to help select prospective scholarship recipients and the selection process is still being carried out manually by comparing the data of prospective scholarship recipients one by one (Yu, 2020). In determining who is really entitled to a scholarship, a good decision support system is needed to assist the selection team in the selection process for scholarship recipients based on specified criteria because the number of applicants for scholarship recipients is very large, a decision support system is needed to assist the selection process so that easier, faster, and reduce errors in determining scholarship recipients (Miller et al., 2018).

This research on decision support has been researched by (Mi et al., 2019) which finds that the algorithm is successfully implemented and functions well, then research conducted by (Duan et al., 2019) finds that the application of the algorithm in its application can determine the best results from the selection of boarding houses, and from the test results have received a response of 80.70% or a percentage above 80%, further research from (Marbun et al., 2021) found that the decision-making system implemented was very helpful in providing recommendations for PPA scholarship acceptance at DN universities, further research from (Hasan et al., 2019) got the results that the SAW method provided the best alternative in supporting the decision to accept scholarships at SMKN 1 Ciomas, and further research from (Wang et al., 2022) found that the algorithm applied could rank for selection. new student admissions.

Decision support systems are defined as systems based on computing that can help make decisions using data and models to solve certain problems. The method that will be used in this study for the decision-making system for determining scholarship recipients is the Fuzzy Multi Attribute Decision Making method and the Simple Additive Weighting (SAW) method. used to find the optimal alternative from a number of alternatives with certain criteria.

## **Method**

The research method used is Research and Development (R & D). This research method is a research method used to produce certain products and test the effectiveness of these methods, the product is not only in the form of objects or hardware (hardware). But it can also be in the form of software (software) (Serevina et al., 2018).

## **Research Stages**

The description of the research stages as follows:

1. Identifying the problem in question is that researchers carry out the first stage in conducting research, namely formulating the problem to be studied. This stage is the most important stage in research, because all the research will be guided by the formulation of the problem. Without a clear problem formulation, researchers will lose direction in conducting research.
2. This literature study aims to determine the methods and basic knowledge or references that support the development of a decision support system. Literature study includes: 1) Decision Support Systems, 2) Fuzzy SAW method, useful literature is needed for understanding concepts and deepening theories about decision support systems using the Fuzzy SAW method from several sources of international journals, books and the internet.
3. The data used comes from the data of prospective students who register according to the required criteria. Collecting data from the results of previous studies. However, if it is deemed necessary, data collection is carried out again from potential system users as a complement to the missing documents.
4. Analyze the data that has been collected to be processed using the Fuzzy Multiple Attribute Decision Making and Simple Additive Weighting method
5. System design is very important in building an information system because this process describes how a system is formed starting from the planning description to the stage of making functions that are useful for the course of an application.
6. Implementation of the system, system testing is carried out to determine the accuracy of the methods and systems used

## System Flow

In general, the system that will be created is shown in Figure 1. The website-based system uses the PHP programming language by applying two methods, namely Fuzzy. And SAW The flow chart of the Bank Indonesia Scholarship Receipt system is as follows:

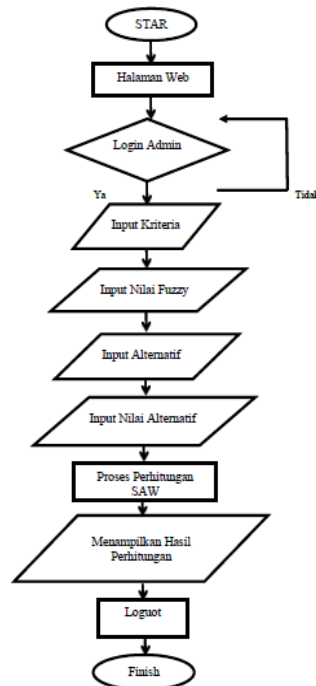


Figure 1. System Flow

The data to be used in this study is sourced from data obtained from the Bank Indonesia office and data on prospective scholarship recipients which will be processed in determining scholarship recipients. In addition, this study also requires supporting data sourced from books, journals, and other literature. that are relevant to this research are related to what features support the determination of scholarship recipients (Wachid & Yun\ita, n.d.).

## System Test

The test was conducted to determine whether the Decision Support System for Bank Indonesia Scholarship Recipients was functioning properly in dealing with existing problems. Testing using testing techniques using black box testing. black box testing is used to test the functional input and output of the application.

## Results and Discussion

### Result

This study uses 2018-2019 data based on scholarship registrant data in that year. There are 10 parameters or attributes in determining prospective scholarship recipients which are shown in table 1. The total data used is 200 data which is divided into 100 data for training data and 100 data for training data. data for testing data for the two methods used. There are two classes in this classification process, namely the feasible and the unfeasible classes. Eligible class is intended as the category of scholarship recipients, while the unqualified class is defined as those who did not receive a Bank Indonesia scholarship. The following criteria are shown in table 1. below:

Table 1. Criteria

No.	Name of criteria	Sub criteria
1.	Student who are active	Active Not active
2.	Have complete a minimum of 40 credits	Achieved Did not achieve
3.	Have a minimu IPK of 3.00 (scale 4.0)	3.00 - 3.25 3.26 - 3.40 3.41 – 3.60 3.61 – 3.80 3.81 – 4.00
4	Maximum age 23 years old	18-23 years old 24-27 years old
5.	Not currently receiving another scholarship	Nor receiving Received another scholarship
6.	Coming from an economically disadvantaged family (pre-prosperous)	Have SKTM Do not have SKTM
7.	Make motivation letters	1 2 3 4 5
8.	Include a letter of recommendation from one figure (academic or non-academic)	Have Do not have
9.	Willing to play an active role in the New Generation of Indonesia and participate in activities carried out by Bank Indonesia	Have Do not have
10.	Have Interest and Experience	0 Certificate 1 Certificates 2-3Certificates 3-5 Certificates 6-20Certificates

### Calculation Using Fuzzy Logic and Simple Additive Weigthing (SAW)

There are several calculation steps that are used in this system to produce recommendations for majors in accordance with predetermined variables. Here are some calculation steps using fuzzy logic and simple additive weighting (SAW):

1. Specifies the variable to be used.
2. Determine the weight for each variable.
3. Perform calculations using fuzzy logic.
4. Specifies the linguistic value for each predefined variable.
5. Determine the categorization for the linguistic value of each variable.
6. Determine the membership function based on the categorization that will be used to calculate the degree of membership of each variable.
7. Enter the value of the variable to get the value of the degree of membership of each variable and then look for the max value of the degree of membership.
8. Perform defuzzification by finding the average value of the degree of membership in each variable that has been determined.
9. Perform calculations using SAW (simple additive weighting)

10. Normalize the variables that have been determined based on the equation that is adjusted to the type (profit attribute or cost attribute) so that normalization results are obtained.

Perform ranking, the addition of the multiplication between the weights with the results of normalization so that the largest value is chosen as the best alternative

### Set of Match Ratings

The suitability rating set is a rating set consisting of linguistic variables for alternative assessments with decision criteria. Like the interest rating set, the match rating set also uses triangular fuzzy numbers in which each linguistic variable consists of 3 values, namely the lower limit, middle limit and upper limit. The compatibility rating can be seen in table 2.

Tabel 2. Match Rating

Linguistic Variables	Lower limit	Middle limit	Upper limit
Very less	0.1	0.1	0.25
Not enough	0.1	0.25	0.25
Enough	0.25	0.5	0.75
well	0.5	0.75	1
Very good	0.75	1	1

From the table above, the degree of fuzzy membership can be described as shown in Figure 2.

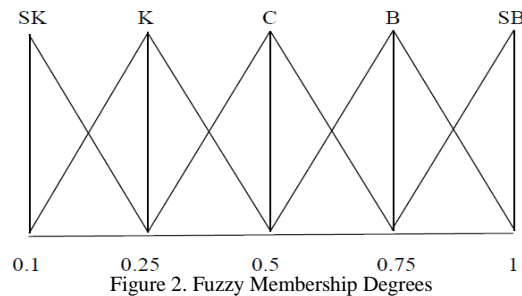


Figure 2. Fuzzy Membership Degrees

### Discussion

#### Implementasi Sistem

System Implementation is the application of a decision support system (DSS) model for recommendations for determining the prospective recipients of Bank Indonesia Scholarships using the Fuzzy Saw Method (Aman et al., 2022).

#### Form Login

Figure 3. Display Login Form

Figure 3. above is the initial view when entering the system for admins. When the username is wrong or the password is wrong, the user will not be able to enter the system successfully

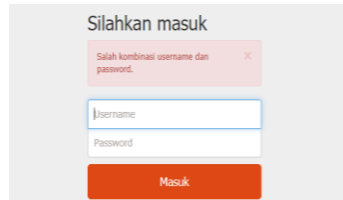


Figure 4. Display when Username and Password is Wrong

## Home Menu Display

After the user successfully logs into the system, the first display that appears is the home menu as shown in figure5.



Figure 5. Home Menu Display

## Criteria Page View

Figure 6 display criteria page

No	Kode	Nama Kriteria	Bobot	Nilai
1	C10	Status Kewarganegaraan	0.5	0.5
2	S05	SNI	0.75	0.5
3	C10	IPK	1	0.5
4	C10	Usia	0.5	0.5
5	C10	Status Mahasiswa	1	0.5
6	C10	Status Keluarga	0.5	0.5
7	C10	Pekerjaan Orang Tua	0.75	0.5
8	C10	Jumlah Siblings	0.5	0.5
9	C10	Status Kewarganegaraan	1	0.5
10	C10	Pengalaman	0.75	0.5

Figure 6. Criteria page

## Scips Value Page View

The page display in Figure 7 is that the Script Value is where the admin will input the respective Membership Degree Value.

No	Nama Kriteria	Rentangan	L	M	H	Nilai
1	Status Kewarganegaraan	Tahan 100%	0.5	0.5	0.25	0.5
2	Status Kewarganegaraan	4000	0.75	1	1	0.5
3	SNI	22-30 SNI	0.5	0.5	0.25	0.5
4	SNI	40-100 SNI	0.75	1	1	0.5
5	IPK	3.00-3.25	0.5	0.5	0.25	0.5
6	IPK	3.26-3.40	0.5	0.25	0.25	0.5
7	IPK	3.41-3.60	0.25	0.5	0.75	0.5
8	IPK	3.61-3.80	0.5	0.75	1	0.5
9	IPK	3.81-4.00	0.75	1	1	0.5
10	Pengalaman	24-27 Tahun	0.5	0.5	0.25	0.5

Figure 7. Fuzzy Values Page

## Alternatives Page Views

The Alternative page in Figure 8. is where the admin will input the alternative name or in other words, the prospective recipient of the Bank Indonesia Scholarship.

























No	Kode	Nama Alternatif	Jurusan	Aksi
1	A001	Ayza Hasman	Manajemen	 
2	A002	Albar	Matematika	 
3	A003	Afandhy	Informatika	 
4	A004	Andi Zamira Manasyur	Hukum	 
5	A005	Andi Haseardi	Informatika	 
6	A006	Afandhy	Akuntansi	 
7	A007	Dani Shintya Mahanasi	Akuntansi	 
8	A008	Dian Huseini	Informatika	 
9	A009	Eri Alhasyanti	Hubungan Internasional	 
10	A010	Erlisa Yulia Pratata	Manajemen	 
11	A011	Febrianti Dweng Mangesthen	Akuntansi	 
12	A012	Fibiani R.	Matematika	 

Figure 8. Alternative Page

The page display in Figure 9 serves to process the SAW calculation data to obtain alternative weight values.







Kode	Nama Alternatif	Status Keluarga	Motivation Letter	Surat Rekomendasi	Status Keaktifan	Status Beasiswa	Usia	IPK	SKS	Status Keaktifan	Pengalaman	Aksi
A001	Ayza Hasman	Aktif	40-130 SKS	3.61 - 3.80	18 - 23 Tahun	Memiliki	Tidak Memiliki	4	Tidak Memiliki	Memiliki	2-3 Sertifikat	
A002	Albar	Aktif	40-130 SKS	3.26 - 3.40	18 - 23 Tahun	Memiliki	Memiliki	5	Tidak Memiliki	Memiliki	1 Sertifikat	
A003	Afandhy	Aktif	40-130 SKS	3.26 - 3.40	18 - 23 Tahun	Tidak Memiliki	Tidak Memiliki	4	Memiliki	Memiliki	2-3 Sertifikat	
A004	Andi Zamira Manasyur	Aktif	40-130 SKS	3.26 - 3.40	18 - 23 Tahun	Memiliki	Memiliki	4	Memiliki	Memiliki	2-3 Sertifikat	
A005	Andi Haseardi	Aktif	40-130 SKS	3.61 - 3.80	18 - 23 Tahun	Memiliki	Memiliki	3	Tidak Memiliki	Memiliki	1 Sertifikat	
A006	Afandhy	Aktif	40-130 SKS	3.00 - 3.25	18 - 23 Tahun	Memiliki	Tidak Memiliki	5	Memiliki	Memiliki	3-5 Sertifikat	

Figure 9. Alternate Weight Value Display

## Page View Process Calculation of results and ranking

The page display of the result calculation process and ranking can be seen in Figures 10, 11, 12, 13,14 and 15 which serves to perform the process of Fuzzy SAW.

Kode	Nama	Status Keaktifan	SKS	IPK	Usia	Status Beasiswa	Status Keluarga	Motivation Letter	Surat Rekomendasi	Status Keaktifan	Pengalaman
A001	Ayza Hasman	Aktif	40-130 SKS	3.61 - 3.80	18 - 23 Tahun	Memiliki	Tidak Memiliki	4	Tidak Memiliki	Memiliki	2-3 Sertifikat
A002	Albar	Aktif	40-130 SKS	3.26 - 3.40	18 - 23 Tahun	Memiliki	Memiliki	5	Tidak Memiliki	Memiliki	1 Sertifikat
A003	Afandhy	Aktif	40-130 SKS	3.26 - 3.40	18 - 23 Tahun	Tidak Memiliki	Tidak Memiliki	4	Memiliki	Memiliki	2-3 Sertifikat
A004	Andi Zamira Manasyur	Aktif	40-130 SKS	3.26 - 3.40	18 - 23 Tahun	Memiliki	Memiliki	4	Memiliki	Memiliki	2-3 Sertifikat
A005	Andi Haseardi	Aktif	40-130 SKS	3.61 - 3.80	18 - 23 Tahun	Memiliki	Memiliki	3	Tidak Memiliki	Memiliki	1 Sertifikat
A006	Afandhy	Aktif	40-130 SKS	3.00 - 3.25	18 - 23 Tahun	Memiliki	Tidak Memiliki	5	Memiliki	Memiliki	3-5 Sertifikat

Figure 10. SAW Calculation Page

Nilai Fuzzy										
Kode	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10
A001	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,5, 0,75, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,25, 0,5, 0,75
A002	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,25	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75	0,75, 1, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,1, 0,25, 0,5
A003	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,25	0,75, 1, 1	0,1, 0,1, 0,25	0,1, 0,1, 0,25	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75
A004	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,25	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75
A005	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75	0,25, 0,5, 0,75	0,1, 0,1, 0,25	0,75, 1, 1	0,1, 0,25, 0,5
A006	0,75, 1, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1
A007	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75	0,75, 1, 1	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1
A008	0,75, 1, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,1, 0,1, 0,25	0,1, 0,1, 0,25	0,5, 0,75, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,25, 0,5, 0,75
A009	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,1, 0,1, 0,25	0,5, 0,75, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,1, 0,25, 0,5
A010	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75	0,5, 0,75, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,1, 0,1, 0,25
A011	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,25	0,75, 1, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,25, 0,5, 0,75	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75
A012	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,25	0,75, 1, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,25, 0,5, 0,75	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,5

Figure 11. Display the analysis results from the calculation of SAW

Normalisasi										
Kode	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10
A001	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,1333, 0,1333, 0,3333	0,5, 0,75, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,25, 0,5, 0,75
A002	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,25	0,75, 1, 1	0,75, 1, 1	0,3333, 0,6667, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,1, 0,25, 0,5
A003	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,25	0,75, 1, 1	0,1, 0,1, 0,25	0,1333, 0,1333, 0,3333	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75
A004	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,25	0,75, 1, 1	0,75, 1, 1	0,3333, 0,6667, 1	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75
A005	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,3333, 0,6667, 1	0,25, 0,5, 0,75	0,1, 0,1, 0,25	0,75, 1, 1	0,1, 0,25, 0,5
A006	0,75, 1, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,75, 1, 1	0,1333, 0,1333, 0,3333	0,75, 1, 1	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1
A007	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,3333, 0,6667, 1	0,75, 1, 1	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1
A008	0,75, 1, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,1, 0,1, 0,25	0,1333, 0,1333, 0,3333	0,5, 0,75, 1	0,1, 0,1, 0,25	0,75, 1, 1	0,25, 0,5, 0,75
A009	0,75, 1, 1	0,75, 1, 1	0,5, 0,75, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,1333, 0,1333, 0,3333	0,5, 0,75, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,1, 0,25, 0,5
A010	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75	0,75, 1, 1	0,75, 1, 1	0,3333, 0,6667, 1	0,5, 0,75, 1	0,75, 1, 1	0,1, 0,1, 0,25	0,1, 0,1, 0,25
A011	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,25	0,75, 1, 1	0,75, 1, 1	0,1333, 0,1333, 0,3333	0,25, 0,5, 0,75	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75
A012	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,25	0,75, 1, 1	0,75, 1, 1	0,1333, 0,1333, 0,3333	0,25, 0,5, 0,75	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,5
A013	0,75, 1, 1	0,75, 1, 1	0,25, 0,5, 0,75	0,75, 1, 1	0,75, 1, 1	0,3333, 0,6667, 1	0,5, 0,75, 1	0,75, 1, 1	0,75, 1, 1	0,1, 0,25, 0,5

Figure 12. Normalization

Tertimbang										
Kode	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10
A001	0,375, 0,5, 0,5	0,5625, 0,75, 0,75	0,5, 0,75, 1	0,375, 0,5, 0,5	0,75, 1, 1	0,0133, 0,0133, 0,0333	0,375, 0,5625, 0,75	0,05, 0,05, 0,125	0,75, 1, 1	0,1875, 0,375, 0,5625
A002	0,375, 0,5, 0,5	0,5625, 0,75, 0,25	0,1, 0,25, 0,25	0,375, 0,5, 0,5	0,75, 1, 1	0,0333, 0,0667, 0,1	0,5625, 0,75, 0,75	0,05, 0,05, 0,125	0,75, 1, 1	0,075, 0,1875, 0,375
A003	0,375, 0,5, 0,5	0,5625, 0,75, 0,25	0,1, 0,25, 0,25	0,375, 0,5, 0,5	0,1, 0,1, 0,25	0,0133, 0,0133, 0,0333	0,375, 0,5625, 0,75	0,375, 0,5, 0,5	0,75, 1, 1	0,1875, 0,375, 0,5625
A004	0,375, 0,5, 0,5	0,5625, 0,75, 0,25	0,1, 0,25, 0,25	0,375, 0,5, 0,5	0,75, 1, 1	0,0333, 0,0667, 0,1	0,375, 0,5625, 0,75	0,375, 0,5, 0,5	0,75, 1, 1	0,1875, 0,375, 0,5625
A005	0,375, 0,5, 0,5	0,5625, 0,75, 0,75	0,5, 0,75, 1	0,375, 0,5, 0,5	0,75, 1, 1	0,0333, 0,0667, 0,1	0,1875, 0,375, 0,5625	0,05, 0,05, 0,125	0,75, 1, 1	0,075, 0,1875, 0,375
A006	0,375, 0,5, 0,5	0,5625, 0,75, 0,25	0,1, 0,1, 0,25	0,375, 0,5, 0,5	0,75, 1, 1	0,0133, 0,0133, 0,0333	0,5625, 0,75, 0,75	0,375, 0,5, 0,5	0,75, 1, 1	0,375, 0,5625, 0,75
A007	0,375, 0,5, 0,5	0,5625, 0,75, 0,25	0,5, 0,75, 1	0,375, 0,5, 0,5	0,75, 1, 1	0,0333, 0,0667, 0,1	0,5625, 0,75, 0,75	0,375, 0,5, 0,5	0,75, 1, 1	0,375, 0,5625, 0,75
A008	0,375, 0,5, 0,5	0,5625, 0,75, 0,25	0,1, 0,1, 0,25	0,375, 0,5, 0,5	0,1, 0,1, 0,25	0,0133, 0,0133, 0,0333	0,375, 0,5625, 0,75	0,05, 0,05, 0,125	0,75, 1, 1	0,1875, 0,375, 0,5625

Figure 13. Weighted Normalization

Rata-Rata										
Kode	C01	C02	C03	C04	C05	C06	C07	C08	C09	C10
A001	0,4583	0,6875	0,75	0,4583	0,9167	0,02	0,5625	0,075	0,9167	0,375
A002	0,4583	0,6875	0,2	0,4583	0,9167	0,0667	0,6875	0,075	0,9167	0,2125
A003	0,4583	0,6875	0,2	0,4583	0,15	0,02	0,5625	0,4583	0,9167	0,375
A004	0,4583	0,6875	0,2	0,4583	0,9167	0,0667	0,5625	0,4583	0,9167	0,375
A005	0,4583	0,6875	0,75	0,4583	0,9167	0,0667	0,375	0,075	0,9167	0,2125
A006	0,4583	0,6875	0,15	0,4583	0,9167	0,02	0,6875	0,4583	0,9167	0,5625
A007	0,4583	0,6875	0,75	0,4583	0,9167	0,0667	0,6875	0,4583	0,9167	0,5625
A008	0,4583	0,6875	0,15	0,4583	0,15	0,02	0,5625	0,075	0,9167	0,375
A009	0,4583	0,6875	0,75	0,4583	0,15	0,02	0,5625	0,4583	0,15	0,2125
A010	0,4583	0,6875	0,5	0,4583	0,9167	0,0667	0,5625	0,4583	0,15	0,1125
A011	0,4583	0,6875	0,2	0,4583	0,9167	0,02	0,375	0,4583	0,9167	0,375
A012	0,4583	0,6875	0,2	0,4583	0,9167	0,02	0,375	0,4583	0,9167	0,2125

Figure 14. The average value of the calculation of SAW



Perangkingan			
Rank	Kode	Nama	Total
1	A007	Devi Shanty Maharani	5.9625
2	A049	Yudistira	5.8375
3	A066	Humadina	5.8167
4	A060	Siti Hadrah	5.775
5	A061	Nur Fadila	5.65
6	A025	Nurhayati	5.6125
7	A065	Imandi	5.5875
8	A016	Hanus Fatma	5.5702
9	A054	Seaklangi	5.4408
10	A064	Feni Rizvazi	5.4408
11	A078	Feni Arlana	5.4
12	A073	Nur Wahida	5.4

Figure 15. The ranking display of the SAW method

## Pasword Page

The admin password page menu in Figure 16 functions to change the password, namely replacing the old password with a new password.

Fuzzy SAW
Kriteria
Alternatif
Perhitungan
Password
Logout

### Ubah Password

Password Lama \*

Password Baru \*

Konfirmasi Password Baru \*

Figure 16. Change Password Page

## Conclusions and suggestion

### Conclusions

Based on the results of the tests that have been carried out, it can be concluded that the decision support system (SPK) that has been made has met the expectations of being able to assist in determining Bank Indonesia Scholarship Recipients by implementing the Fuzzy method as weighting and SAW performing calculations with predetermined criteria. Where the results of the black box test can be concluded that the system is able to meet the functional requirements or is running well, and produces a recommendation in determining Bank Indonesia Scholarship Recipients, based on the test results of 100 data testing carried out, an accuracy rate of 84% is obtained with a comparison of the amount of data that is not 16 valid data and 84 valid data.

### Suggestion

1. Further researchers who want to develop a decision support system regarding the determination of prospective home renovation recipients can be done by adding criteria using the FMADM and SAW methods
2. Using another method in the weighting of the criteria. As a comparison of the results of the accuracy of the method, so that later it can be used as a reference for further researchers.

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