

Decision Support System For Prospective Scholarship Recipients Using Smarter And Forward Chaining Method

Muhammad Fairuzabadi*¹, Joyanda Agustia Rizki², Sunggito Oyama³

^{1,2,3}Department of Informatics Universitas PGRI Yogyakarta Indonesia

E-mail: *fairuz@upy.ac.id, ³oyama@upy.ac.id

Abstract

The purpose of this research is to design and build a web-based decision support system application to determine prospective scholarship recipients at MAN 2 Yogyakarta and test its reliability. The Decision Support System is a problem-solving system with supporting tools. This system can solve problems using algorithm methods. One of the decision support system methods that can be applied to scholarship cases at MAN 2 Yogyakarta is the Simple Multi-Attribute Rating Technique Exploiting Ranks (SMARTER) method and forward chaining. The SMARTER method is a decision support method by determining the criteria and sub-criteria and their weight using the ROC (Rank Order Centroid). Meanwhile, the forward chaining method is a search method or a forward tracking technique that starts with existing information and combines rules to produce a conclusion or goal. The advantages of the DSS that have been developed are as follows. (1) The DSS built can be used by the scholarship selection team to recommend students who have the potential to get scholarships more quickly and objectively (2) The DSS for prospective scholarship recipients that was developed uses two methods of calculation, namely the Simple Multi-Attribute Rating Technique Exploiting Ranks (SMARTER) and Forward Chaining methods so that the prediction results are better and faster. The SMART method emphasizes more detailed criteria and the Forward Chaining Method allows for a faster selection process.

Keywords : Decision Support System, Forward Chaining Method, Simple Multi-Attribute Rating Technique Exploiting Ranks (SMARTER) Method, Website.

1. INTRODUCTION

MAN 2 Yogyakarta is a secondary education unit with Islamic characteristics under the auspices of the Ministry of Religion. There are 2 ongoing scholarships at MAN 2 Yogyakarta, namely the KMS (Towards Prosperity Card) scholarship and the PIP (Smart Indonesia Program) scholarship. The categories that are considered for scholarship recipients are madrasa students who are orphans/orphans/children with special needs (ABK), students who come from families who are vulnerable to poverty, have KIP/KKS/PKH, and have not received PIP, and students who affected by the national disaster due to Covid-19, namely parents experiencing layoffs. The source of funds for the two scholarships is from the government, however, this KMS scholarship is given only to residents of the City of Yogyakarta. The scholarship recipient quota proposed by the school for KMS scholarships is 20 students and for PIP scholarships is 25 students.

The selection process is carried out by the management, namely for KMS scholarships managed by the Treasurer of the Committee while PIP scholarships are managed by the Student Affairs and Counseling (BK) section of the Administration. The process of channeling scholarship funds begins with students submitting themselves as potential recipients of the PIP scholarship by gathering the necessary conditions. The required files are collected by the Counseling

Guidance teacher. From Counseling Guidance the data is then selected again to check the completeness of the files from each student. The data is then submitted to the Madrasah KSKK Directorate. The Madrasah KSKK Directorate will collect student data based on suggestions from Madrasahs (schools) specifically allocated to new students as a result of PPDB implementation.

The school offers scholarships, especially for outstanding students. The Counseling Guidance Teacher conducts the selection in several stages. Each selection stage requires a lot of time and effort to look at student data one by one. The process that has been carried out so far is by collecting files from students who will submit themselves as potential scholarship recipients, then the files are checked for completeness. The next stage is summarizing student data and then selecting to group into small groups to facilitate assessment. After obtaining the selected data through several considerations, then the selected data will be reported for submission to the Madrasah KSKK Directorate. Apart from wasting a lot of time, the scholarship selection method at MAN 2 Yogyakarta has not yet implemented a decision support system. Therefore it is necessary to have a decision support method for selecting prospective scholarship recipients.

The Decision Support System is a problem-solving system with supporting tools [2]. This system can solve problems using algorithm methods. One of the decision support system methods that can be applied to scholarship cases at MAN 2 Yogyakarta is the Simple Multi-Attribute Rating Technique Exploiting Ranks (SMARTER) method and forward chaining. The SMARTER method is a decision support method by determining the criteria and sub-criteria and their weight using the ROC (Rank Order Centroid). Meanwhile, the forward chaining method is a search method or a forward tracking technique that starts with existing information and combines rules to produce a conclusion or goal [3].

The purpose of this research is to design and build a web-based decision support system application to determine prospective scholarship recipients at MAN 2 Yogyakarta and test its reliability.

Saleh applies the Simple Multi-Attribute Rating Technique Exploiting Ranks (SMARTER) method in making a decision to select a computer laboratory assistant according to the relevant criteria. Priority criteria such as English language test results, academic potential test results, practicum test results, interview results, results of recommendations from the head of the laboratory, and semester. The results of this study stated that of the 10 applicant data used as an alternative to testing the SMARTER method, there were 8 applicants who were declared accepted and in accordance with the actual results that have been running so far with an accuracy rate of 80% [4].

2. METHOD

A context diagram is the highest level in a data flow diagram that contains one process but includes basic inputs, general systems, and outputs. The context diagram can be seen in Figure 11 below.

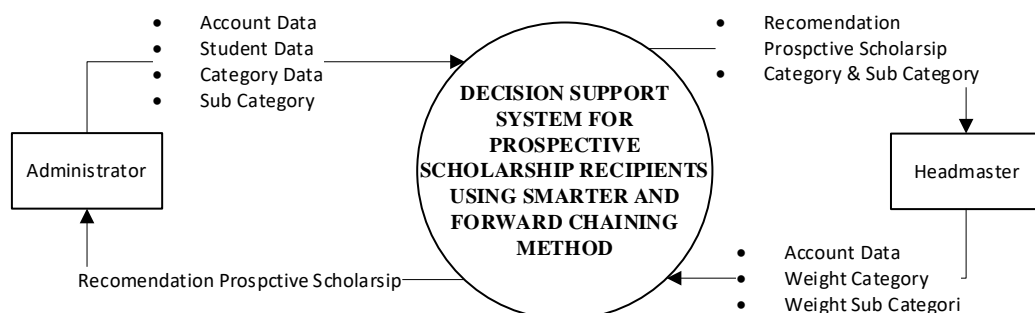


Figure 1. Context diagram

<https://journal.upy.ac.id/index.php/ASTRO/index>

In the DSS that will be developed, the users consist of Administrators and Principals. The administrator of this DSS is the Scholarship Selection Team. The administrator is in charge of entering student data, category data, and subcategory data. DSS provides output to the admin in the form of information on students applying for scholarships, categories, subcategories, and calculations. The Principal has access to view reports on the results of determining scholarships.

DFD level 1 is used to provide a more detailed description of the processes that occur in the DSS and the data storage used. DFD Level 1 can be seen in Figure 2 below.

2.1. Determine the criteria and sub-criteria

Determine the criteria and sub-criteria The criteria that will be used according to the results of interviews with Counseling Guidance teachers include:

Table 1. Criteria

No	Code	Criteria
1	C1	Family Economy
2	C2	Child Status
3	C3	Discipline
4	C4	School Achievement

From the following criteria determine the sub-criteria:

Table 2. Sub Criteria

No	Criteria	Sub Criteria
1	Family Economy	Lower (< 3 million) Intermediate (4-10 million) Upper (<10 million)
2	Child Status	No parents No father No mother Normal
3	Discipline	Discipline (absent < 3) Enough Discipline (absent = 4) Lazy (absent > 5)
4	School Achievement	Top 1-3 (high achievers) Top 4 (achievement) Top 5-10 (quite accomplished) <top 10 (non-performing)

2.2. Determine the weight value of each criterion.

Table 3. Criteria and Weight

No	Criteria	Weight (%)
1	Family Economy	35
2	Child Status	30
3	Discipline	20
4	School Achievement	15
Total		100

2.3. Determine the weight value of each sub-criteria

Table 1. Weight value for family economic criteria

No	Criteria	W1	W2	W3	Weight
1	Lower	1	½	1/3	0,611
2	Intermediate	0	½	1/3	0,278
3	Upper	0	0	1/3	0,111
Total :					1,000

Calculation of weight using the formula:

$$W_k = (1/c) \sum_i^c - c(1/i)$$

Weight calculation for 3 sub-criteria:

$$W1 = (1+1/2+1/3)/3 = 0,611$$

$$W2 = (0+1/2+1/3)/3 = 0,278$$

$$W3 = (0+ 0 +1/3)/3 = 0,111$$

Table 4. Weight Value for Child Status Criteria

No	Criteria	W1	W2	W3	W4	Bobot
1	No parents	1	½	1/3	¼	0,521
2	No father	0	½	1/3	¼	0,271
3	No matter	0	0	1/3	¼	0,146
4	Normal	0	0	0	¼	0,063
Total :						1.000

Table 5. Weight value for Discipline Criteria

No	Criteria	W1	W2	W3	Weight
1	Discipline	1	½	1/3	0,611
2	Enough Discipline	0	½	1/3	0,278
3	Lazy	0	0	1/3	0,111
Total :					1.000

Weight calculation for 4 sub-criteria:

$$W1 = (1+1/2+1/3+1/4)/4 = 0,521$$

$$W2 = (0+1/2+1/3+1/4)/4 = 0,271$$

$$W3 = (0+0+1/3+1/4)/4 = 0,146$$

$$W4 = (0+0+0+1/4)/4 = 0,063$$

Table 6. School Achievement weight value

No	Criteria	W1	W2	W3	W4	Weight
1	high achievers	1	1/2	1/3	1/4	0,521
2	achievement	0	1/2	1/3	1/4	0,271
3	quite accomplished	0	0	1/3	1/4	0,146
4	non-performing	0	0	0	1/4	0,063
Total :						1.000

The following is the data that will be calculated to determine students who are eligible for scholarships.

Table 7. Student data

No	Name of Student	Family Economy	Status of Children	School Achievement	Discipline (total absences)
1	Anjas Raditya Prabowo	2.000.000	piatu	4	1
2	Muhammad Afnan Razan	2.000.000	normal	2	2
3	Rifky Putra Septanuary	2.500.000	yatim	7	1
4	Septian Noordiyanto	3.000.000	normal	9	1
5	Yuningsih Sulistyowati	2.000.000	normal	12	3
6	Carissa Azahra C	4.000.000	piatu	5	1
7	Muh Fuad Khalish NT	8.000.000	normal	7	2
8	Siti Karlina Lubis	3.500.000	piatu	9	1
9	Tino Adi Prasetyo	7.000.000	normal	5	2
10	Anisah Tata Fidefi	3.000.000	normal	6	3
11	Khoirul Imam	2.000.000	normal	10	4
12	Muhammad Alif Z	5.000.000	normal	1	2
13	Muhammad Zeba J	4.000.000	piatu	7	1
14	Muhammad Chairul EB.	6.000.000	normal	8	1
15	Syarifah Nabila RA.	2.000.000	normal	9	1

The following are the student's qualitative data:

Table 8. Student Qualitative Data

No	Name of Student	Family Economy	Status of Children	School Achievement	Discipline (total absences)
1	Anjas Raditya Prabowo	Lower	No matter	achievement	Discipline
2	Muhammad Afnan Razan	Lower	Normal	high achievers	Discipline
3	Rifky Putra Septanuary	Lower	No father	quite accomplished	Discipline
4	Septian Noordiyanto	Lower	Normal	quite accomplished	Discipline
5	Yuningsih Sulistyowati	Lower	Normal	Tidak Berprestasi	Enough Discipline
6	Carissa Azahra C	Intermediate	No Mather	quite accomplished	Discipline
7	Muh Fuad Khalish NT	Intermediate	Normal	quite accomplished	Discipline
8	Siti Karlina Lubis	Lower	No matter	quite accomplished	Discipline
9	Tino Adi Prasetyo	Menengah	Normal	quite accomplished	Discipline
10	Anisah Tata Fidefi	Lower	Normal	quite accomplished	Enough Discipline
11	Khoirul Imam	Lower	Normal	quite accomplished	Enough Discipline
12	Muhammad Alif Z	Intermediate	Normal	high achievers	Discipline
13	Muhammad Zeba J	Intermediate	No matter	quite accomplished	Discipline
14	Muhammad Chairul EB.	Intermediate	Normal	quite accomplished	Discipline
15	Syarifah Nabila RA.	Lower	Normal	quite accomplished	Discipline

criteria based on sub-criteria weight values, while the results of the normalization can be seen in Table 2.10

Table 9. Normalization result data

No	Student Name	C1	C2	C3	C4
1	Anjas Raditya Prabowo	0,6110	0,146	0,271	0,611
2	Muhammad Afnan Razan	0,6110	0,063	0,521	0,611
3	Rifky Putra Septanuary	0,6110	0,271	0,146	0,611
4	Septian Noordiyanto	0,6110	0,063	0,146	0,611
5	Yuningsih Sulistyowati	0,6110	0,063	0,063	0,278
6	Carissa Azahra C	0,2278	0,146	0,146	0,611
7	Muh Fuad Khalish NT	0,2278	0,063	0,146	0,611
8	Siti Karlina Lubis	0,6110	0,146	0,146	0,611
9	Tino Adi Prasetyo	0,2278	0,063	0,146	0,611
10	Anisah Tata Fidefi	0,6110	0,063	0,146	0,278

11	Khoirul Imam	0,6110	0,063	0,146	0,278
12	Muhammad Alif Z	0,2278	0,063	0,521	0,611
13	Muhammad Zeba J	0,2278	0,146	0,146	0,611
14	Muhammad Chairul EB.	0,2278	0,063	0,146	0,611
15	Syarifah Nabila RA.	0,6110	0,063	0,146	0,611

2.4. Determine the Utility Value

The normalized value will be converted into a utility value using the equation. The following utility values for each criterion can be seen in Table 10.

Table 10. Utility Value

No	Nama Siswa	K1	K2	K3	K4
1	Anjas Raditya Prabowo	21,385	4,380	5,420	9,165
2	Muhammad Afnan Razan	21,385	1,890	10,420	9,165
3	Rifky Putra Septanuary	21,385	8,130	2,920	9,165
4	Septian Noordiyanto	21,385	1,890	2,920	9,165
5	Yuningsih Sulistyowati	21,385	1,890	1,260	4,170
6	Carissa Azahra Candraningtyas	7,973	4,380	2,920	9,165
7	Muh Fuad Khalish Nur Tsany	7,973	1,890	2,920	9,165
8	Siti Karlina Lubis	21,385	4,380	2,920	9,165
9	Tino Adi Prasetyo	7,973	1,890	2,920	9,165
10	Anisah Tata Fidefi	21,385	1,890	2,920	4,170
11	Khoirul Imam	21,385	1,890	2,920	4,170
12	Muhammad Alif Zulfikar	7,973	1,890	10,420	9,165
13	Muhammad Zeba Jayawardana	7,973	4,380	2,920	9,165
14	Muhammad Chairul Endra B.	7,973	1,890	2,920	9,165
15	Syarifah Nabila Rihhadatul A.	21,385	1,890	2,920	9,165

Calculation:

$$U_{\text{Aafreda}}(C_1) = 0,611 \times 35 = 21,385$$

$$U_{\text{Aafreda}}(C_2) = 0,146 \times 30 = 4,380, \dots \text{ect.}$$

The final result is calculated by the utility value, then the results are summed.

Table 11. SMARTER Method Calculation Results

No	Nama Siswa	K1	K2	K3	K4	Hasil
1	Anjas Raditya Prabowo	21,385	4,380	5,420	9,165	40,350
2	Muhammad Afnan Razan	21,385	1,890	10,420	9,165	42,860
3	Rifky Putra Septanuary	21,385	8,130	2,920	9,165	41,600
4	Septian Noordiyanto	21,385	1,890	2,920	9,165	35,360
5	Yuningsih Sulistyowati	21,385	1,890	1,260	4,170	28,705
6	Carissa Azahra Candraningtyas	7,973	4,380	2,920	9,165	24,438
7	Muh Fuad Khalish Nur Tsany	7,973	1,890	2,920	9,165	21,948
8	Siti Karlina Lubis	21,385	4,380	2,920	9,165	37,850
9	Tino Adi Prasetyo	7,973	1,890	2,920	9,165	21,948
10	Anisah Tata Fidefi	21,385	1,890	2,920	4,170	30,365

<https://journal.upy.ac.id/index.php/ASTRO/index>

11	Khoiril Imam	21,385	1,890	2,920	4,170	30,365
12	Muhammad Alif Zulfikar	7,973	1,890	10,420	9,165	29,448
13	Muhammad Zeba Jayawardana	7,973	4,380	2,920	9,165	24,438
14	Muhammad Chairul Endra B.	7,973	1,890	2,920	9,165	21,948
15	Syarifah Nabila Rihhadatul A.	21,385	1,890	2,920	9,165	35,360

Calculating:

$$n_1 = 21,385 + 4,380 + 5,420 + 9,165 = 40,350$$

$$n_2 = 21,385 + 1,890 + 10,420 + 9,165 = 42,860$$

$$n_3 = 21,385 + 8,130 + 2,920 + 9,165 = 41,600, \text{ etc}$$

2.5. Calculation method Forward Chaining

Furthermore, the results of SMARTER calculations are then used to determine the eligibility of scholarship recipients using the Forward Chaining method based on the following rules:

Table 12. Rule Base

IF ranking ≤ 5	THEN	Can
IF ranking > 5		Can not

The following is the result of the calculation obtained:

Table 13. The results of the selection using the forward chaining method

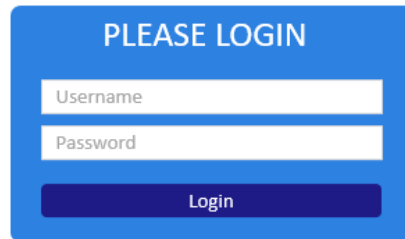
No	Student's name	Results	Ranking	Information
1	Anjas Raditya Prabowo	40,350	3	Dapat
2	Muhammad Afnan Razan	42,860	1	Dapat
3	Rifky Putra Septanuary	41,600	2	Dapat
4	Septian Noordiyanto	35,360	5	Dapat
5	Yuningsih Sulistyowati	28,705	10	Tidak Dapat
6	Carissa Azahra Candraningtyas	24,438	11	Tidak Dapat
7	Muh Fuad Khalish Nur Tsany	21,948	13	Tidak Dapat
8	Siti Karlina Lubis	37,850	4	Dapat
9	Tino Adi Prasetyo	21,948	14	Tidak Dapat
10	Anisah Tata Fidefi	30,365	7	Tidak Dapat
11	Khoiril Imam	30,365	8	Tidak Dapat
12	Muhammad Alif Zulfikar	29,448	9	Tidak Dapat
13	Muhammad Zeba Jayawardana	24,438	12	Tidak Dapat
14	Muhammad Chairul Endra B.	21,948	15	Tidak Dapat
15	Syarifah Nabila Rihhadatul A.	35,360	6	Tidak Dapat

From the calculation results, 5 students who received scholarships were Rifky Putra Septanuary, Anjas Raditya Prabowo, Muhammad Afnan Razan, Siti Karlina Lubis, and From the calculation results, 5 students who received scholarships were Rifky Putra Septanuary, Anjas Raditya Prabowo, Muhammad Afnan Razan, Siti Karlina Lubis, and Septian Noordiyanto

3. RESULT AND DISCUSSION

3.1. Result

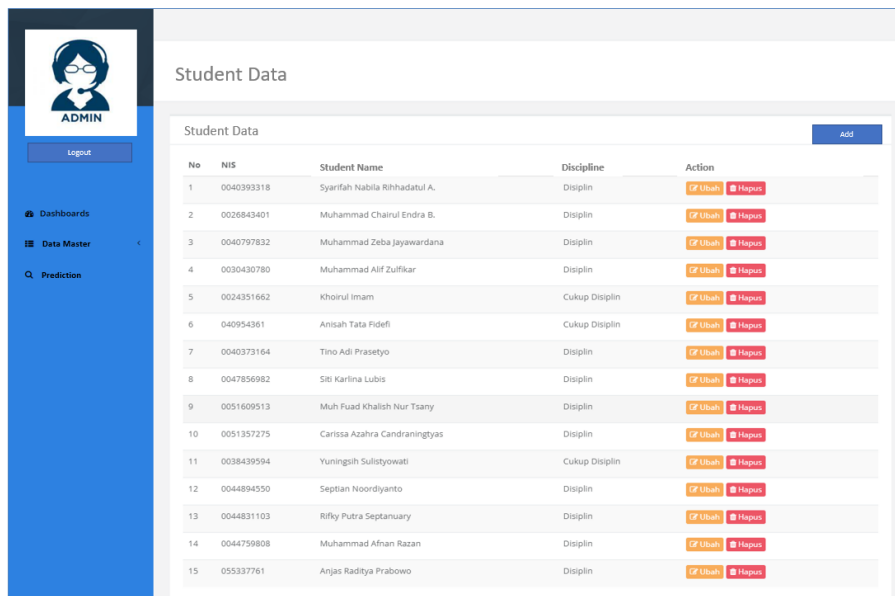
The developed DSS is implemented in the form of web pages that can be accessed by users based on their authority. The login page is used to guarantee that users who will enter the DSS have the authority to access it. Users are required to enter a username and password.



A blue rectangular login form with the text "PLEASE LOGIN" at the top. It contains two input fields: "Username" and "Password". Below the fields is a dark blue button labeled "Login".

Figure 2. Login Page

The Student Data page is used by administrators to enter student data that register for the scholarship program.



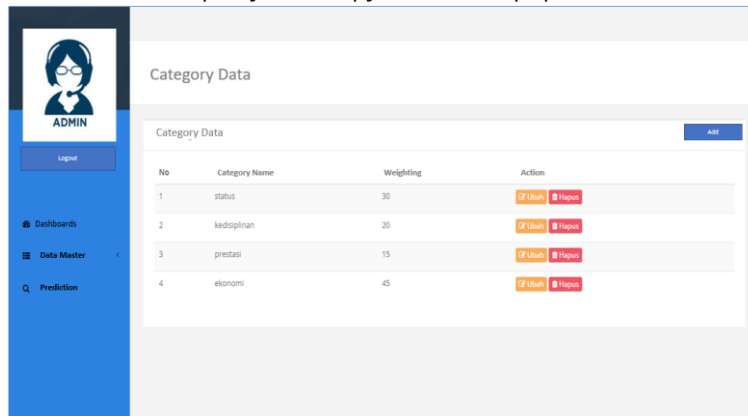
The screenshot shows a web interface for "Student Data". On the left is a blue sidebar with a user profile icon labeled "ADMIN" and a "Logout" button. Below the profile are menu items: "Dashboards", "Data Master", and "Prediction". The main content area is titled "Student Data" and contains a table with 15 rows of student data. Each row includes a "No" (number), "NIS" (ID), "Student Name", "Discipline", and "Action" (with "Ubah" and "Hapus" buttons). An "Add" button is located at the top right of the table.

No	NIS	Student Name	Discipline	Action
1	0040393318	Syarifah Nabila Rihhadatul A.	Disiplin	Ubah Hapus
2	0026843401	Muhammad Chairol Endra B.	Disiplin	Ubah Hapus
3	0040797832	Muhammad Zeba Jayawardana	Disiplin	Ubah Hapus
4	0030430780	Muhammad Alif Zulfikar	Disiplin	Ubah Hapus
5	0024351662	Khoirul Imam	Cukup Disiplin	Ubah Hapus
6	040954361	Anisah Tata Fidefi	Cukup Disiplin	Ubah Hapus
7	0040373164	Timo Adi Prasetyo	Disiplin	Ubah Hapus
8	0047856982	Siti Karlina Lubis	Disiplin	Ubah Hapus
9	0051609513	Muh Fuad Khalish Nur Tsany	Disiplin	Ubah Hapus
10	0051357275	Carissa Azahra Candraningtyas	Disiplin	Ubah Hapus
11	0038439594	Yuningsih Sulistyowati	Cukup Disiplin	Ubah Hapus
12	0044894550	Septian Noordiyanto	Disiplin	Ubah Hapus
13	0044831103	Rifly Putra Septanuary	Disiplin	Ubah Hapus
14	0044759808	Muhammad Afnan Razan	Disiplin	Ubah Hapus
15	055337761	Anjas Raditya Prabowo	Disiplin	Ubah Hapus

Figure 3. Student Data Page

The Category Data page is used by the administrator to input each category and its weight. The total weighting value of each category must be equal to 100.

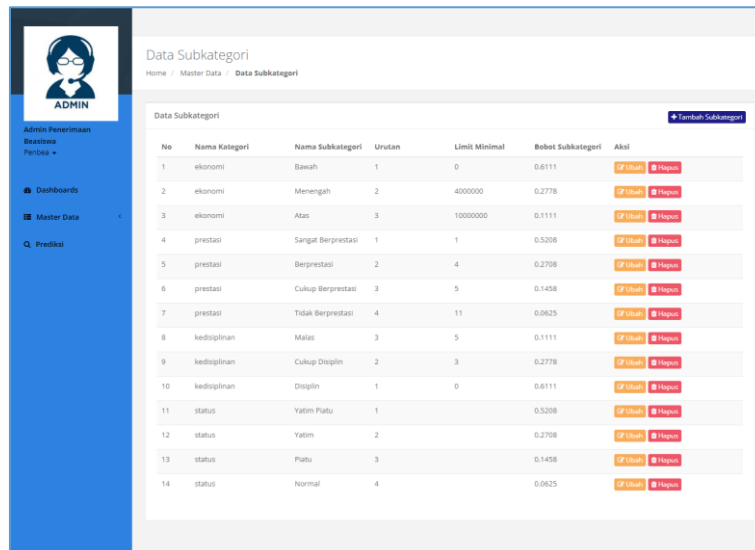
<https://journal.upy.ac.id/index.php/ASTRO/index>



No	Category Name	Weighting	Action
1	status	30	Ubah Hapus
2	kedisiplinan	20	Ubah Hapus
3	prestasi	15	Ubah Hapus
4	ekonomi	45	Ubah Hapus

Figure 4. Category Data Page

The sub-category page is used by the administrator to manage sub-category data. The data are column name of category, name of subcategory, order, minimum limit, weight of subcategory, and action.



No	Nama Kategori	Nama Subkategori	Urutan	Limit Minimal	Bobot Subkategori	Aksi
1	ekonomi	Bawah	1	0	0.6111	Ubah Hapus
2	ekonomi	Meningah	2	4000000	0.2778	Ubah Hapus
3	ekonomi	Atas	3	10000000	0.1111	Ubah Hapus
4	prestasi	Sangat Berprestasi	1	1	0.5208	Ubah Hapus
5	prestasi	Berprestasi	2	4	0.2708	Ubah Hapus
6	prestasi	Cukup Berprestasi	3	5	0.1458	Ubah Hapus
7	prestasi	Tidak Berprestasi	4	11	0.0625	Ubah Hapus
8	kedisiplinan	Malas	3	5	0.1111	Ubah Hapus
9	kedisiplinan	Cukup Disiplin	2	3	0.2778	Ubah Hapus
10	kedisiplinan	Disiplin	1	0	0.6111	Ubah Hapus
11	status	Yatim Platu	1		0.5208	Ubah Hapus
12	status	Yatim	2		0.2708	Ubah Hapus
13	status	Platu	3		0.1408	Ubah Hapus
14	status	Normal	4		0.0625	Ubah Hapus

Figure 5. Sub Category Data Page

The prediction results page is a page that is used for admins to see the prediction results of students who receive scholarships.

Halaman Perhitungan Prediksi
Home / Prediksi

Data Siswa Awal

No	Tahun	NIS	Nama Lengkap	Ekonomi	Status Anak	Prestasi	Kedisiplinan
1	2021	0040373164	Tino Adi Prasetyo	7000000	normal	5	0
2	2021	0024351662	Khoulul Imam	2000000	normal	10	4
3	2021	0030430780	Muhammad Aif Zulfikar	5000000	normal	1	2
4	2021	0040797832	Muhammad Zeba jayawardana	4000000	platu	7	1
5	2021	0026843401	Muhammad Chairul Endra B.	6000000	normal	8	1
6	2021	0040393318	Syarifah Nabila Rihhadatul A.	2000000	normal	9	1

Normalisasi Kualitatif

No	Tahun	NIS	Nama Lengkap	Ekonomi	Status Anak	Prestasi	Kedisiplinan
1	2021	0040373164	Tino Adi Prasetyo	Menengah	normal	Cukup Berprestasi	Disiplin
2	2021	0024351662	Khoulul Imam	Bawah	normal	Cukup Berprestasi	Cukup Disiplin
3	2021	0030430780	Muhammad Aif Zulfikar	Menengah	normal	Sangat Berprestasi	Disiplin
4	2021	0040797832	Muhammad Zeba jayawardana	Menengah	platu	Cukup Berprestasi	Disiplin
5	2021	0026843401	Muhammad Chairul Endra B.	Menengah	normal	Cukup Berprestasi	Disiplin
6	2021	0040393318	Syarifah Nabila Rihhadatul A.	Bawah	normal	Cukup Berprestasi	Disiplin

Figure 6. Prediction results page

Black box testing is carried out by prospective DSS users and Thesis Supervisors. Testing is done by running each module in the DSS. The goal is to find out whether each module can work according to its function. The results of the tests performed show that the DSS is running well.

Alpha testing was carried out by 30 (thirty) respondents. Respondents run DSS applications that have been developed. Next, the respondents filled out a list of questions to find out their responsive assessment of the performance of the DSS being built. Alpha test results show the system can run well.

3.2. Discussion

The advantages of the DSS that have been developed are as follows.

- 1) The DSS built can be used by the scholarship selection team to recommend students who have the potential to get scholarships more quickly and objectively.
- 2) The DSS for prospective scholarship recipients that was developed uses two methods of calculation, namely the Simple Multi-Attribute Rating Technique Exploiting Ranks (SMARTER) and Forward Chaining methods so that the prediction results are better and faster. The SMART method emphasizes more detailed criteria and the Forward Chaining Method allows for a faster selection process.

The weaknesses of the system, are as follows:

- 1) Does not consider dynamic aspects, tends to only consider static data, and does not consider dynamic aspects such as changes in economic or social conditions that may influence decisions.
- 2) Does not consider non-numeric factors still considers numerical factors and does not consider non-numeric factors such as individual needs or preferences which are difficult to measure quantitatively.

4. CONCLUSION

The conclusion of this research is as follows:

- 1) This research has succeeded in building a decision support system application for prospective scholarship recipients using the Simple Multi-Attribute Rating Technique Exploiting Ranks (SMATER) and the Forward Chaining method has been successfully built. The DSS can assist schools in determining scholarship recipients quickly and on target.
- 2) The results of black box testing show that the DSS developed functionally can be used and runs well. Alpha test results were carried out by distributing questionnaires to 30 respondents indicating that the developed system was very reliable

5. SUGGESTION

- 1) The system is developed considering dynamic aspects, such as changes in economic or social conditions that may influence decisions.
- 2) The system considers non-numerical factors such as individual needs or preferences that are difficult to measure quantitatively

REFERENCES

- [1] “<https://www.kemdikbud.go.id/>,”2022.
<https://www.kemdikbud.go.id/main/blog/2016/09/pendaftaran-kip-diperpanjang-hingga-30-september-2016> (accessed Jun. 06, 2022).
- [2] E. Turban, *Decision Support Systems and Intelligent Systems*. Yogyakarta: ANDI, 2005.
- [3] N. P. Russell S, *Inference In First-Order Logic, Forward Chaining. Artificial Intelligence, A modern Approach*. New Jersey: Prince Hall, 2003.
- [4] A. Saleh, “Penerapan Metode Simple Multi Attribute Rating Technique Exploiting Rank dalam Sistem Pendukung Keputusan Rekrutmen Asisten Laboratorium Komputer,” *Masy. Telemat. dan Inf.*, vol. 8, pp. 1–10, 2018.
- [5] S. R. Andani, “Penerapan Metode SMART dalam Pengambilan Keputusan Penerima Beasiswa Yayasan AMIK Tunas Bangsa,” *J. Sist. dan Teknol. Inf.*, vol. 7, no. 3, p. 166, 2019, doi: 10.26418/justin.v7i3.30112.
- [6] A. Nurul, Munawarah, and H. Tholib, “Sistem Penunjang Keputusan Kriteria Beasiswa Menggunakan Rule Based Dan Forward Chaining,” *Hub. kawarakteristik ODHA dengan kejadian loss to Follow up Ter. ARV di kabupaten jember*, vol. 12 (!), no. 1, pp. 53–64, 2016.
- [7] T. Hastono and S. Oyama, “Identifikasi Penyakit Burung Perkutut Menggunakan Forward Chaining,” *Kumpul. J. Ilmu Komput. Vol. 07, No. 1 Februari 2020 ISSN 2406-7857*, 2020.
- [8] A. Prihatiningsih, M. N. Tentua, and M. Fairuzabadi, “Sistem Rekomendasi Peluang Kerja Alumni Fakultas Sains dan Teknologi Universitas PGRI Yogyakarta,” *Seri Pros. Semin. Nas. Din. Inform.*, vol. 5, no. 1, pp. 21–24, 2021, [Online]. Available: <http://senadi.upy.ac.id/prosiding/index.php/senadi/article/view/195>

- [9] M. F. A. H. Ahmad Riyadi, "Sistem Pendukung Keputusan Cather of The Month Menggunakan Metode Simple Additive Weighting (SAW) Di Goeboex Coffee Yogyakarta," *Din. Inform. Univ. PGRI Yogyakarta*, pp. 230–237, 2017.
- [10] M. M. Fiqry, M. Fairuzabadi, and S. Wardani, "Sistem Pendukung Keputusan Penentuan Kinerja Pegawai Pada Perusahaan Kontraktor Di CV. ZEIN Perwira Mandiri Menggunakan Metode Simple Additive Weighting (SAW) Berbasis Web," vol. 2018, no. Senadi, pp. 39–42, 2018.