



# Decision Support System for Determining Homeroom Teachers at Musda Perbaungan Private Vocational Schools Using the Simple Additive Weighting Method

**Ravyson Purba**

Informatics Engineering, STMIK Pelita Nusantara, Indonesia

## ARTICLE INFO

### Article history:

Received Apr03, 2021  
Revised Mei 10, 2021  
Accepted Jun 30, 2021

### Keywords:

Decision Support System,  
Homeroom Teacher  
Determinants, Simple Additive  
Weighting (SAW).

## ABSTRACT

This research is based on observations, the MUSDA Perbaungan Private Vocational School is one of the vocational schools that cannot be separated from the struggle of the Regional Government of Serdang Bedagai Regency which is located in Tualang. MUSDA Perbaungan Private Vocational School has majors in Computer Network Engineering, Software Engineering, Light Vehicle Engineering, Motorcycle Engineering, and Mechanical Engineering with a total number of 45 teachers. Making a decision support system for determining homeroom teachers is very much needed by the MUSDA Perbaungan Private Vocational School. This system will make it easier to determine homeroom teachers, and also this system can help evaluate teacher performance systems that are lacking in performance standards in general. Thus, a decision support system using the Simple Additive Weighting (SAW) method is suitable to be developed in this system. This system will make it easier to find and determine teachers who are worthy of being homeroom teachers and will speed up the calculation of assessments and attributes to determine teachers who are worthy of being homeroom teachers. The Simple Additive Weighting method can be used as a method in making applications in decision making. Simple Additive Weighting uses a value ordering system in determining attribute ratings, where the rating of each attribute is summed with the weight of the attribute in question. The Simple Additive Weighting method is often also known as the weighted addition method. The basic concept of the Simple Additive Weighting method is to find the weighted sum of the performance ratings for each alternative on all attributes.

access article under the [CC BY-NC](https://creativecommons.org/licenses/by-nc/4.0/) license.



## Corresponding Author:

Ravyson Purba,  
Informatics Engineering,  
STMIK Pelita Nusantara Medan,  
Jl. Iskandar Muda No. 1 Medan, 20154, Indonesia.  
Email: [ravysonprba@gmail.com](mailto:ravysonprba@gmail.com)

## 1. INTRODUCTION

As the development of information and communication technology makes people want to make it easier to carry out all kinds of activities, the function of technology itself is to help humans in facilitating all activities or work and streamlining work time. In addition, the human error factor can be minimized as small as possible by the existence of information and communication technology.

MUSDA Perbaungan Private Vocational School is one of the vocational schools that cannot be separated from the struggle of the Regional Government of Serdang Bedagai Regency which is

located in Tualang. MUSDA Perbaungan Private Vocational School has majors in Computer Network Engineering, Software Engineering, Light Vehicle Engineering, Motorcycle Engineering, and Mechanical Engineering with a total number of 45 teachers. The role of the teacher is the most important educator factor in an educational institution, especially in the homeroom teacher can be said to be a substitute for parents at school. Therefore, the role of homeroom teachers can be said to be important in the development of the teaching and learning process and in the structure of school performance, as well as playing a role in fostering and improving the education quality of students in the daily teaching and learning process in the classroom.

The system for determining homeroom teachers at the MUSDA Perbaungan Private Vocational School in general still uses a manual system, so schools still have problems in determining which teachers are eligible to be homeroom teachers, so that in general the teachers selected manually do not match the criteria values. And then the teacher who will be selected later to become the homeroom teacher must achieve the required criteria values.

Making a decision support system for determining homeroom teachers is very much needed by the MUSDA Perbaungan Private Vocational School. This system will make it easier to determine homeroom teachers, and also this system can help evaluate teacher performance systems that are lacking in performance standards in general. Thus, a decision support system using the Simple Additive Weighting (SAW) method is suitable to be developed in this system. This system will make it easier to find and determine teachers who are worthy of being homeroom teachers and will speed up the calculation of assessments and attributes to determine teachers who are worthy of being homeroom teachers.

The Simple Additive Weighting method can be used as a method in making applications in decision making. Simple Additive Weighting uses a value ordering system in determining attribute ratings, where the rating of each attribute is summed with the weight of the attribute in question. The Simple Additive Weighting method is often also known as the weighted addition method. The basic concept of the Simple Additive Weighting method is to find the weighted sum of the performance ratings for each alternative on all attributes. The Simple Additive Weighting method is suggested to solve the selection problem in a multi-process decision-making system. The Simple Additive Weighting method is a method that is widely used in decision making that has many attributes.

The Simple Additive Weighting method is often also known as the weighted addition method. The basic concept of the Simple Additive Weighting method is to find the weighted sum of the performance ratings for each alternative on all attributes. Simple Additive Weighting Method It is recommended to solve the selection problem in a multi-process decision-making system. The Simple Additive Weighting method is a method that is widely used in decision making that has many attributes. The Simple Additive Weighting method requires a decision matrix normalization process.

## **2. RESEARCH METHOD**

### **2.1 Data analysis**

The results of the study contain data from research that has been carried out at the MUSDA Perbaungan Private Vocational School. With the results of research conducted by researchers at the MUSDA Perbaungan Private Vocational School by collecting all the required data. Data obtained directly from interviews and surveys conducted directly in the field and case studies and literature studies that the authors did in stages to obtain appropriate data, then processed to obtain conclusions that were in accordance with the research conducted.

### **2.2 Description of the Simple Additive Weighting (SAW) Method**

The SAW method is often also known as the weighted addition method. The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative on all attributes. The SAW method requires the process of normalizing the decision matrix ( $X$ ) to a scale that can be compared with all existing alternative ratings. The formula for the Simple Additive Weighting (SAW) method can be seen below:

$$r_{ij} = \left\{ \begin{array}{l} \frac{x_{ij}}{\text{Max } x_{ij}^i} \text{ Jika } j \text{ adalah atribut keuntungan (benefit)} \\ \frac{i}{x_{ij}} \text{ jika } j \text{ adalah atribut biaya (cost)} \end{array} \right\}$$

#### SAW Method Formula

Source :Kusumadewi, Fuzzy Multi-Attribute Decision Making, 2006 Page 74 Description:

$r_{ij}$  = normalized performance rating value

$x_{ij}$  = attribute value owned by each criterion

Max  $x_{ij}$  = the greatest value of each criterion

Min  $x_{ij}$  = the smallest value of each criterion

benefits = if the largest value is the best

cost = if the smallest value of  $t$  is the best

Where  $r_{ij}$  as the normalized performance rating of alternative  $A_i$  on attribute  $C_j$ ;  $i=1,2,\dots,m$  and  $j=1,2,\dots,n$ . The preference value for each alternative ( $V_i$ ) can be seen below:

$$V_i = \sum_{j=1}^n W_j r_{ij} \dots \dots \dots (2)$$

#### SAW Method Preference Formula

Source :Kusumadewi, Fuzzy Multi-Attribute Decision Making, 2006 Page 74 Description:

$V_i$  = ranking for each alternative

$W_j$  = weight value of each criterion

$r_{ij}$  = normalized performance rating value

A larger  $V_i$  value indicates that alternative  $A_i$  is preferred

### 3. RESULTS AND DISCUSSIONS

#### 3.1 System Implementation

System implementation is the stage in implementing the system that has been built, where later it will be known the quality of the system designed, whether it can run well and in accordance with the expected goals. To realize the system that has been designed in the information system, other supporting facilities are needed which in principle are usually referred to as technical aspects, namely hardware, software, brainware.

#### 3.2 System implementation stages

The implementation of the Decision Support System for Determining Homeroom Teachers Based on Expertise and Class at MUSDA Perbaungan Private Vocational Schools Using the SAW Method can be seen from the following.

##### a. Login Page

This decision support system login page is for users to log in as admin by entering the username and password "admin".

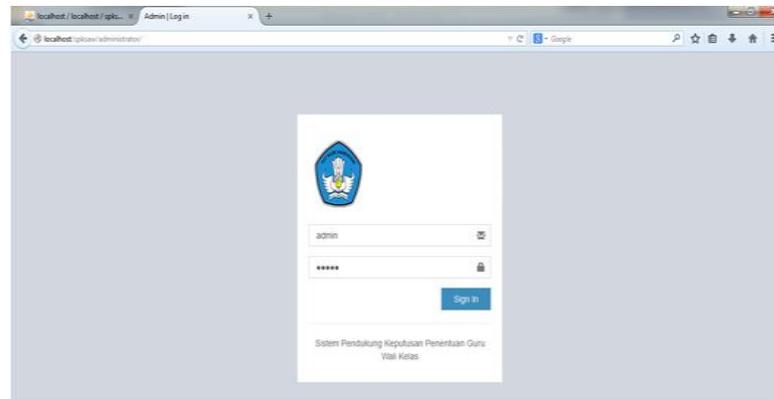


Figure 1. Login page

## b. Main page

The main page of the decision support system that has been built below contains menus that function to call other pages. The menus are Class Data, Group Data, Teacher Data, Weighting Criteria, Criteria Data, Classification Data and Analysis Results.

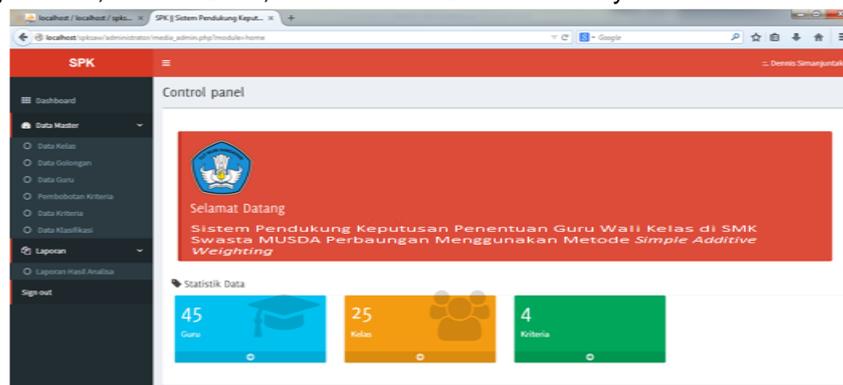


Figure 2. Main page

## c. Teacher Data Page

The teacher data page is used for teacher data processing such as adding teacher data, viewing teacher data in detail, changing teacher data and deleting teacher data. The following shows the teacher data for a total of 45 teachers.

No	NIP	Nama	Jenis Kelamin	Golongan	Pangkat	Tanggal Masuk	Aksi
1	19570919 197	MASRY WILAYAT SIMANGUNSONG	L	IV/b	Pembina	1987-08-03	Edit Hapus Detail
2	19581227 198	SARMALINA SORMIN, S.Pd	P	IV/a	Pembina	1983-03-06	Edit Hapus Detail
3	19590115 198	MELINDA LISBET SILALAH, S.Pd	P	IV/a	Pembina	1986-02-02	Edit Hapus Detail
4	19590327 198	R HANNA MARIANCI, S.Pd	P	IV/a	Pembina	1984-03-02	Edit Hapus Detail
5	19590526 198	Hj. NELLIWATI, S.Pd	P	IV/a	Pembina	1983-03-05	Edit Hapus Detail
6	19591231 198	DARWIN SEMBRING, S.Pd	L	IV/a	Pembina	1985-01-07	Edit Hapus Detail
7	19601107 198	SULASNI, S.Pd	P	IV/b	Pembina	1983-03-01	Edit Hapus Detail
8	19601223 198	TIUR PARULIAN, S.Pd	P	IV/b	Pembina	1982-02-04	Edit Hapus Detail
9	19610621 198	SONAK PARPAHAN, S.Pd	P	IV/b	Pembina	1985-03-15	Edit Hapus Detail
10	19610711 198	HOTMA GULTOM, S.Pd	P	IV/b	Pembina	1983-03-03	Edit Hapus Detail

Figure 4. Teacher data page

d. Teacher data input page and teacher data details

The teacher data input page functions to add teacher data and detail data for teachers who teach at MUSDA Perbaungan Private Vocational Schools.

The screenshot shows a web application interface for adding a teacher. The page title is 'Tambah pengajar'. The form contains the following fields:

- NIP: Text input field
- Nama Lengkap: Text input field
- Golongan: Dropdown menu (Pilih Golongan)
- Pangkat: Dropdown menu (Pilih Pangkat)
- Tanggal Masuk: Date picker (02 October 2017)
- Alamat: Text input field
- Tempat Lahir: Text input field
- Tanggal Lahir: Date picker (02 October 2017)
- Jenis Kelamin: Radio buttons (Laki, Perempuan)
- Agama: Dropdown menu (Pilih Agama)
- No HP/Tip: Text input field (No HP)

Figure 5. Teacher data input page

The screenshot shows the 'Detail Data Guru' page for a teacher named Masry Wilater Simangunsong. The page includes a profile card with a photo and the following details:

- Profil Lengkap:**
  - Nama: MASRY WILATER SIMANGUNSONG
  - Alamat: Jl. Sempurna
  - Tempat Lahir: Samosir
  - Tgl Lahir: 1957-09-19
  - Jenis Kelamin: Laki - Laki
  - Agama: Kristen
  - Tanggal Masuk: 1987-08-03
  - Email: masrymangunsong@gmail.com
  - No, HP: 081267544389
  - Bidang Keahlian: Matem
- Personal Information:**
  - NIP: 19570919 197
  - Golongan: N/b
  - Pangkat: Pembina

Figure 6. Teacher details page

e. Criteria data page

The criteria data page displays criteria data and the weight value of each criterion in determining prospective homeroom teacher candidates. On this page, there is a data display of 4 teacher criteria, Professionalism, Pedagogy, Personality, and Social Sense as well as the weight value of each criterion.

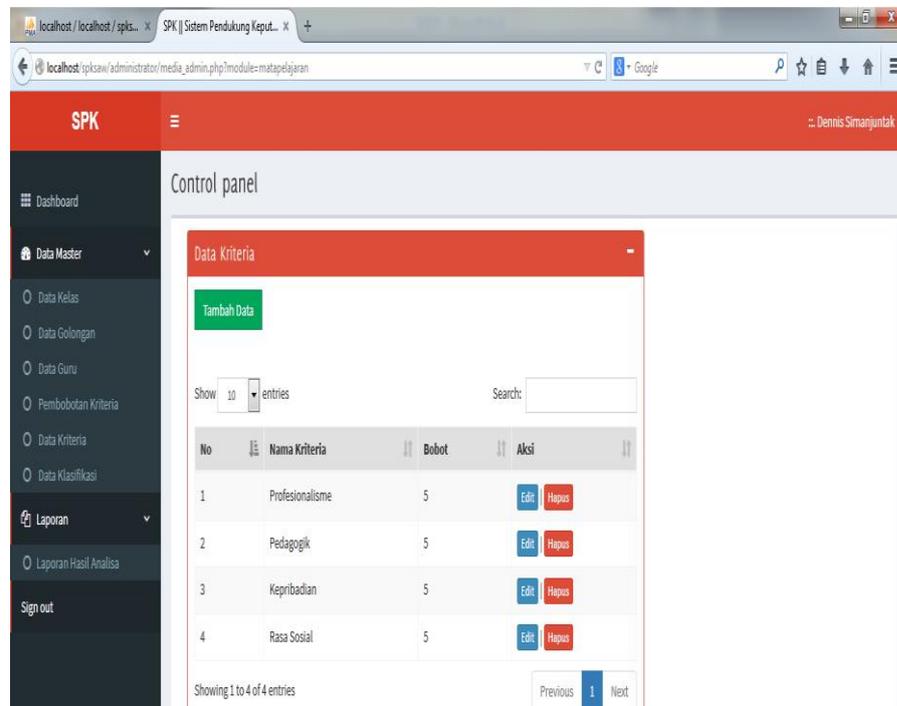


Figure 7.Criteria data page

f. Classification data page

The classification data page is a page for grouping teachers with the criteria and weights of each criterion. The following shows the overall classification data for 45 teachers.

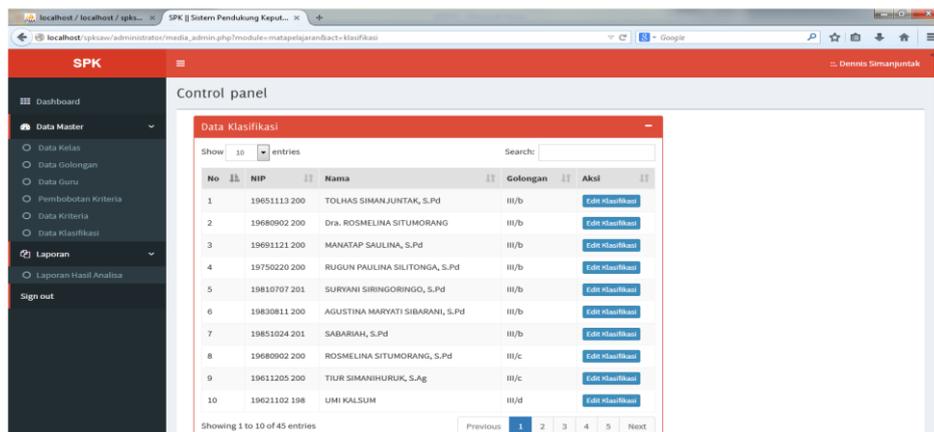


Figure 8.Classification data page

The screenshot shows the 'Data Klasifikasi' page in the SPK system. The table displays the following data:

No	NIP	Nama	Golongan	Aksi
41	19671112 199	MUSPIDA BR SITEPU, S.Pd	I/b	<a href="#">Edit Klasifikasi</a>
42	19690110 199	ERLINDA BERUTU, S.Pd	I/b	<a href="#">Edit Klasifikasi</a>
43	19690614 199	PASU TIUR RONITUA PANJAITAN, S.Pd	I/b	<a href="#">Edit Klasifikasi</a>
44	19691127 199	MARDIANI, S.Pd	I/b	<a href="#">Edit Klasifikasi</a>
45	19730523 200	CITRA HUTASOHI, S.Pd	I/b	<a href="#">Edit Klasifikasi</a>

Figure 9. Classification data page

g. Initial value analysis result page

The page of the results of the initial value data analysis to display the results of the analysis of the values of the weights on each teacher's criteria using the SAW method. The following is a display of the results of the initial score analysis of 45 teachers.

The screenshot shows the 'Data Nilai Awal' page in the SPK system. The table displays the following data:

No	NIP	Nama	C1	C2	C3	C4
1	19570919 197	MASRY WILAYER SIMANGUNSONG	86-100	86-100	76-85	76-85
2	19581227 198	SARMAJINA SORMIN, S.Pd	86-100	86-100	76-85	76-85
3	19590115 198	MELINDA LISBET SILALAH, S.Pd	86-100	76-85	76-85	76-85
4	19590327 198	R HANNA MARIANCI, S.Pd	86-100	86-100	86-100	76-85
5	19591231 198	DARWIN SEMBIRING, S.Pd	86-100	86-100	76-85	76-85
6	19601307 198	SULASMI, S.Pd	76-85	86-100	76-85	76-85
7	19601223 198	TIUR PARULIAN, S.Pd	86-100	86-100	76-85	76-85
8	19610621 198	SONAK PAKPAHAN, S.Pd	86-100	86-100	76-85	76-85
9	19610711 198	HOTMA GULTOM, S.Pd	86-100	86-100	76-85	76-85
10	19610712 198	Dr. H. MABATUA	86-100	86-100	76-85	76-85

Figure 10. Initial value analysis result page

h. Start matrix page

This initial matrix results page displays the results of the order of the scoring matrix for each weight value of the criteria C1, C2, C3, and C4. The following shows the initial matrix of 45 teachers.

Figure 11. Initial matrix result page

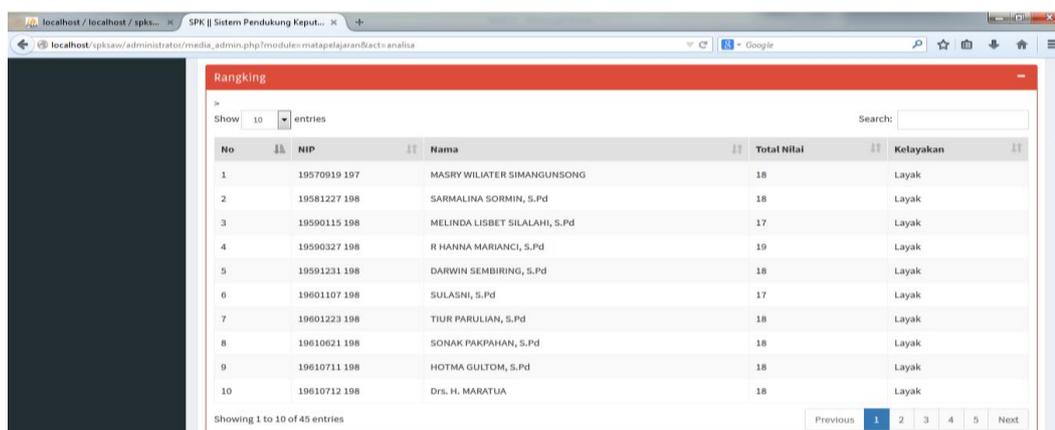
i. Normalization result page

This normalization results page displays the results of the normalization of SAW calculations from a total of 45 teachers on each weighted value for each criterion.

Figure 12. Normalization result page

j. Ranking results page

This ranking results page displays the results of the weighted sum ranking, the results of this ranking are the final results of the teacher's criteria assessment. These results also show the overall ranking of 45 teachers who have been graded from the highest to the lowest scores, as well as showing which teachers are eligible and which are not eligible to become homeroom teacher candidates.



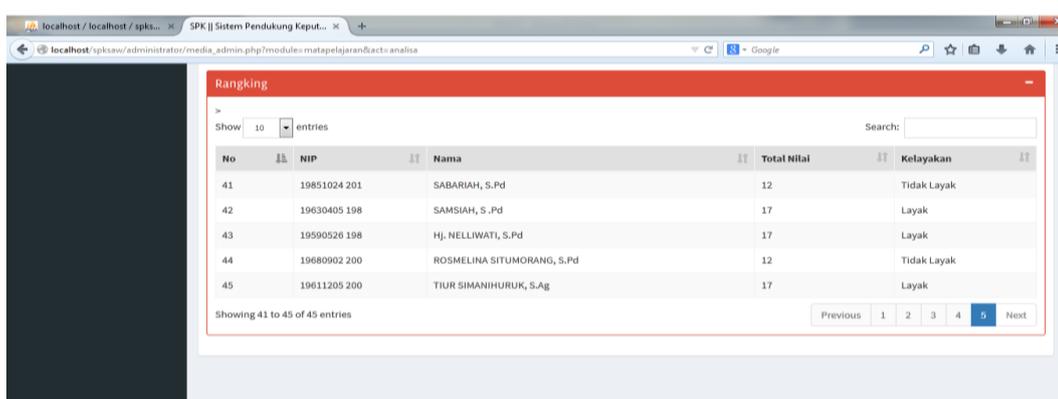
Ranking

Show 10 entries

No	NIP	Nama	Total Nilai	Kelayakan
1	19570919 197	MASRY WILIATER SIMANGUNSONG	18	Layak
2	19581227 198	SARMALINA SORMIN, S.Pd	18	Layak
3	19590115 198	MELINDA LISBET SILALAH, S.Pd	17	Layak
4	19590327 198	R HANNA MARIANCI, S.Pd	19	Layak
5	19591231 198	DARWIN SEMBIRING, S.Pd	18	Layak
6	19601107 198	SULASNI, S.Pd	17	Layak
7	19601223 198	TIUR PARULIAN, S.Pd	18	Layak
8	19610621 198	SONAK PAKPAHAN, S.Pd	18	Layak
9	19610711 198	HOTMA GULTOM, S.Pd	18	Layak
10	19610712 198	Drs. H. MARATUA	18	Layak

Showing 1 to 10 of 45 entries

Figure 14. Ranking results page



Ranking

Show 10 entries

No	NIP	Nama	Total Nilai	Kelayakan
41	19851024 201	SABARIAH, S.Pd	12	Tidak Layak
42	19630405 198	SAMSIJAH, S.Pd	17	Layak
43	19590526 198	Hj. NELLIWATI, S.Pd	17	Layak
44	19680902 200	ROSMELINA SITUMORANG, S.Pd	12	Tidak Layak
45	19611205 200	TIUR SIMANIHURUK, S.Ag	17	Layak

Showing 41 to 45 of 45 entries

Figure 15. Ranking results page

### 3.3 System Weaknesses and Strengths

The advantages and disadvantages can be used as material for the development of this system in the future.

#### 1. Implementation and Testing Results

The system weaknesses observed by the authors are as follows:

- The system cannot determine a teacher as homeroom teacher in a certain class
- The system does not display the methods of matrix calculation and normalization

#### 2. System Advantages

The advantages of the system observed by the author are as follows:

- This system can determine teachers who are eligible to be homeroom teachers.
- This system can be used as a tool for principals to determine eligibility to become homeroom teachers based on rankings.

## 4. CONCLUSION

Based on research conducted by researchers, it can be concluded several things as follows: The existence of a decision support system to determine homeroom teachers at the MUSDA Perbaungan Private Vocational School will assist the principal in determining homeroom teachers for each class. With this decision support system, it proves that the Simple Additive Weighting method

has been successfully implemented into the system and has been proven during research testing. The calculation of the different weight values of each criterion will produce different values and produce different decisions.

## REFERENCES

- Muji Syukur, Susanto, "Employee Performance Assessment Decision Support System Using AHP Methode at PT. Nayati", *Journal of Informatics Dynamics*, Vol. 5, No.2, pp. 116-154, 2020
- Bain Khusnul Khotimah, "Spencer-Based Employee Performance Assessment Decision Support System with Analytical Hierarchy Process Method (Case Study: BAPERJAKAT Trunojoyo University Madura)", *Engineering Journal*, Vol. 4, No. 2, pp. 136-143, 2019.
- Eko Nurmianto, Nurhadi Siswanti, "Design of Employee Performance Assessment Based on Spencer's Competence Using Analytical Hierarchy Process Method (Case Study at Sub-Department of Irrigation, Service of Public Works, City of Probolinggo)", *Journal of Industrial Engineering*. Vol. 8, No.1, 40-53, 2016.
- Dudih Gustian, Ade Bahrum, Sudin Saepudin, "Employee Performance Assessment Decision System Using Analytical Hierarchy Process Method", *Journal TAM (Technology Acceptance Model)*, Vol. 9, No. 2, pp. 93100, 2018.
- Endang Wahyuningsih, "Employee Performance Assessment Decision Support System Using Analytical Hierarchy Process (AHP) Method", *Information Technology Research Seminar (SRITI)*, 2016.
- Maya Hardianti, et al, "Decision Support System for Employee Performance Assessment Using the Analytical Hierarchy Process (AHP) Method". *Journal of Informatics, Management and Computers*. Vol. 9. No. 2, 2017.
- Zaenal Mustofa, Arsito Ari Kuncoro, Rizky Aji Prasetyo, "Decision Support System for Employee Performance Assessment Using the Analytic Hierarchy Process (AHP) Method", *Scientific Journal of Electronics and Computers*, Vol. 13, No. 1, pp. 116-120, 2020.
- Eko Desta Budi Santoso, Nasrul Rofiah Hidayati, Fatim Nugrahanti, "Design and Build a Decision Support System for Employee Performance Assessment Using Desktop-Based AHP Method at PDAM Madiun Regency", *SENATIK Journal (National Seminar on Information and Communication Technology)*, 2020.
- Rohmat Taufiq, et al, "Analysis and Design of a Decision Support System for Employee Performance Assessment with the Analytical Hierarchy Process (AHP) Method", *Pamulang University Informatics Journal*, Vol. 5, No. 3, ISSN: 2341-1004, e-ISSN: 2622-4615, pp. 307-314, 2020.
- Sumardi, "Design Support System for Employee Performance Assessment at LPK Alfabank Semarang Using Analytical Hierarchy Process (AHP) Method", *Journal of INFOKOM*, No. 1, Th. XII, pp. 59-70, 2016.
- Kenty Ludfiandini and Susatyo Nugroho, "Analysis and Assessment of Employee Performance at Mining Company Dump Truck Operators Using the AHP Method and Rating Scale (Case Study at PT. Pama Indo Mining)", *Jurnal TEKNIK*, Vol. 41, No. 2, 2020.
- Maulita Lutfiani, Mohamad Syamsul Maarif, Trioso Purnawarman, "Decision Support Analysis of Job Performance Assessment Based on Work Targets and Work Behavior of Education Personnel", *Scientific Journal of Management*, Vol. 9, No. 1, 2019.
- Agnia Eva Munthafa and Husni Mubarak, "Application of the Analytical Hierarchy Process Method in Decision Support Systems for Determining Student Achievements", *Siliwangi Journal*, Vol. 3. No. 2, 2017.
- Fendi Hidayat, "Basic Concepts of Health Information Systems", First Printing, Deepublish Publisher (CV. Budi Utama Publishing Group), Yogyakarta, 2017.