International Journal of Computer Sciences and Mathematics Engineering Vol. 2 No. 2 (2023)
Published by: CV. HAWARI

International Journal of Computer Sciences and Mathematics Engineering
Journal homepage: www.ijecom.org

Recommendation System For Selecting Residential Complexes Using The SAW Method In Decision Support

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Article Info

Article history:

Received Nov 20, 2023
Revised Nov 23, 2023
Accepted Nov 25, 2023

Keywords:

Decision Support System
Housing
Residence
Recomendation
SAW

ABSTRACT

Housing is one of the main needs of society. Homes are selected based on the buyer's constraints, needs, and desires. The characteristics of housing for each family's needs and desires are different, so a selection process must be carried out. Constraints in collecting information and data for each house complex manually result in the process being less effective and efficient because it takes time and money. Several factors influence the choice of housing, namely the price of the residential unit, the area of the residence, the legality of the residence, the residential rooms, and the need for a clean water source. The SAW method is a data management method that can help buyers make decisions in choosing housing that suits their needs and desires. The SAW method will calculate the final preference value for each alternative house complex based on 20 alternative data samples for house complexes and 5 attributes. Recommendations for choosing a home complex are several options that can be adjusted or eliminated according to the buyer's constraints, needs, and desires. The results of the SAW method calculations can help and make it easier for buyers to make decisions in choosing housing from several recommended housing complexes. The SAW method can be applied in the housing selection process based on the buyer's constraints, needs, and desires. Using a decision support system can save time and minimize errors.

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1. INTRODUCTION

A decision is the final result of solving a problem based on several solution options. The choice of solution to a problem must be adjusted to the supporting attribute factors. Supporting factors will provide an assessment for each alternative solution. A decision support system consists of several alternatives with supporting attributes. Various kinds of decision support methods can solve structured and semi-structured problems. The method will help minimize errors or confusion in making decisions. Because several problems have almost the same attribute values and weights.

Housing is one of the main needs of society to live life in a certain location. People need residential homes that suit their needs and desires. A residence is a place that influences the process of daily activities. If the residence is comfortable then activities can run smoothly. Choosing a residence is a process that must be done to suit your needs and desires. The characteristics of housing for each family's needs and desires are different, so a

ISSN 2962-4274

selective selection process must be carried out. Because housing prices are quite expensive and buying a house is for the long term.

The process of selecting housing often becomes a problem or obstacle because it is difficult to find residential attributes that suit your needs and desires. Several factors influence the choice of housing, namely the price of the residential unit, the area of the residence, the legality of the residence, the residential rooms, and the need for a clean water source. This is due to the difficulty of managing all residential information on house complexes available in one area. Buyers have to search and collect information manually and independently for all housing complexes in an area so that they can assess their suitability to their needs and desires. Buyers must collect brochures or visit the location of the house complex one by one to get information about the attributes of the house complex. This activity requires time and money because it cannot be done quickly in a short time. What often happens is that when buyers have decided on a residence for a particular house complex, it turns out it doesn't match their needs and desires. The housing selection process that is carried out manually and without using appropriate data management methods is often less effective and efficient. So data management methods are needed that can help buyers make decisions in choosing a home that suits the attributes of their needs and desires.

The SAW method is a decision support method that can provide recommendations or the best decision options from the results of calculating preference values. The SAW method has been applied to various cases and decision-making problems. This helps produce decisions that are by the attributes. Several structured and semi-structured problems require decision methods because they provide convenience and time efficiency.

The selection is carried out to determine the recipients of habitable houses which are carried out by the government based on applicable regulations. The SAW method is used in selection by providing alternatives and criteria for selection, the final result is the choice with the greatest value which is entitled to receive a habitable house. Supporting criteria are housing conditions, salary, work, and living expenses. The SAW method can solve unstructured problems into structured and computerized ones [1].

The leader or head of the organization must be chosen openly and selectively based on criteria and conditions. The selection was carried out using a questionnaire distributed to members. To be more objective, calculations were carried out using a decision support method, namely the SAW method. The SAW method can produce chair recommendations based on criteria and weight improvements using the PIPRECIA method [2].

There are many choices of residential locations available to consumers, so it is difficult to choose the best and most appropriate one. The system is used to make it easier for consumers to make decisions about choosing a place to live based on several criteria. The SAW method is used to provide a faster assessment, where the criteria and weights have been determined first. The SAW method can make it easier for consumers to choose a place to live based on the criteria of price, distance, facilities, and estimated food prices [3].

Decision-making in a problem is the process of determining the method of action in solving the problem [4]. A system with a methodology to assist interactive and flexible decision-making [5]. Information technology helps humans create, store, and distribute information [6]. Decision support systems present information, models of a system, and sample data engineering processes [7]. The system in supporting a decision has an important role in presenting decision results that the user can choose. The use of the system will help the analysis and processing of data and supporting attributes [8]. Decisions are the result of solving problems. Decisions and questions are closely related. The concept of a system to support decisions is an interactive system that supports computer-based decision-making, based on data and models in a structured, systematic, or semi-structured problem-solving process [9] [10]. The system is used to support solutions to obstacles or problems, if there is an opportunity it will be evaluated [11]. Making decisions that originate from several behaviors that serve as alternatives results in the achievement of several goals based on what has been implemented [12].

The SAW method requires a matrix normalization process in solving problems rather than ranking alternatives [13]. The SAW method is a solution for finding performance from the sum of the weight ratings for each alternative for all attributes [14]. The SAW method belongs to the category of methods that find the widest application in solving multi-criteria models [15]. The SAW method has two attributes, namely the profit attribute with a benefit value and the expenditure attribute with a reduction or cost value, both of which have different bases [16]. The SAW method is a technique that uses the relative importance values of decision-makers to support the alternative evaluation process. The most important thing is to determine the importance of attributes and determine the value of each attribute [17]. The SAW method can assess more precisely and accurately, because it is based on specified criteria values and weights [18]. The SAW method can cover the

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shortcomings of other methods [19]. The SAW method is very well known and very widely used in facing MADM challenges MADM [20] [21].
The SAW method in the calculation process has stages, namely, the initial stage of determining alternatives based on the needs of the problem to be solved [22]. Alternatives will be the solution options that will be recommended [23]. Next, determine the basic attributes in decision-making [24]. Attributes include data in the form of values that relate to and support the decision-making process [25]. The third stage is determining the preference weight for each alternative attribute. The weight of each attribute must be determined by the decision-maker based on the level of importance of each attribute. The overall weight of the attributes, if added up, must be one. Next, determine the level of suitability of each attribute, namely the benefit or cost attribute. If the attribute is profitable then it would be better to have a maximum match level, but if it is a cost attribute then it would be better to have a minimum match level. The next stage is to form a decision matrix from the level of suitability of each alternative with each attribute. Normalizing the decision matrix with the process of calculating normalized performance level values from alternatives for attributes. The normalization results form a normalized matrix. The final stage is the final result of the preference value derived from the total for multiplying the row portion of the normalized matrix with the appropriate weights as well as the column portion of the matrix[26][27].

2. RESEARCH METHOD

The research method is a description of the research design, stages of the research process, research provisions and processing of test data using the method to produce conclusions. The following image is a research framework.

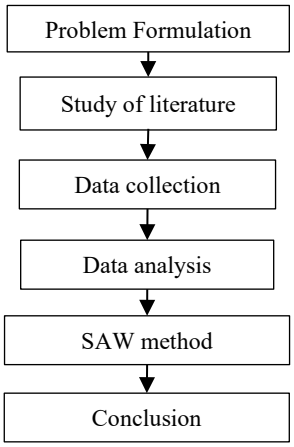

Figure 1. Research Framework

Details of the framework for the research methods carried out are as follows:
1. Problem Formulation
Problems in the research will be identified to provide appropriate solutions and solutions in determining a residence as a place to live based on the housing categories available in an area. Identification is carried out based on needs, constraints, and benefits to be obtained.
2. Literature Study
Collecting the information needed for research is based on literature studies from various trusted and accredited sources such as research, books, journals, and proceedings. Science and information will contribute to developing and completing research. Knowledge and information related to the SAW method and the characteristics of housing are the basis for research.
3. Data Collection
Data will be the basis of research as information. Data comes from various sources, namely studying library sources, direct interviews, and observations of the environment or region that support the research process. Data on characteristics and types of residential housing will be processed in research. Supporting attributes are the price of the residential unit, the area of the residence, the legality of the residence, the residential rooms, and the need for a clean water source.

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4. Data Analysis
Data that has been obtained from trusted sources will be selected according to processing needs. The method that will be used in data processing is the SAW method. This data has its own level of importance based on the information that has been obtained.
5. SAW method
The SAW method will be used in the data processing process. The available housing alternatives will be a choice based on the results of data processing. The SAW method has a gradual process, namely preparing alternative data, selecting attributes that suit the alternative based on importance, attribute weights will be obtained from data sources or weight processing, and calculation of preference values will be the final recommendation based on ranking from highest to the lowest value.
6. Conclusion
Conclusions are one of the most important parts of research. The conclusion will provide results in the form of a solution or resolution of a problem. So it is hoped that it can provide maximum benefits. Based on the discussion of the problem, a solution can be obtained for selecting a residential unit based on the constraints, needs, and desires of the buyer.

3. RESULTS AND DISCUSSIONS

3.1. Results

House occupancy data processing comes from 20 alternative samples of house complexes. The attributes for each alternative are the price of the residential unit, the area of the residence, the legality of the residence, the residential rooms, and the need for a clean water source. The calculation process uses the SAW method as a decision support method. The provisions for the value of each attribute can be seen based on the following table.

Table 1. Residential Prices (K1)

Residential Prices (Rp)	Value
> 1.500.000.000	5
1.000.000.000 > 1.500.000.000	4
500.000.000 > 1.000.000.000	3
250.000.000 > 500.000.000	2
> 250.000.000	1

Table 2. Residential Area (K2)

Residential an Area (m^2)	Value
> 500	5
250 > 500	4
200 > 250	3
150 > 200	2
> 100	1

Table 3. Residential Legality (K3)

Residential Legality	Value
SHM	5
HGB	3
PPJB, girik and adat	1

Table 4. Residential Room (K4)

Number of Residential Rooms	Value
5	5
4	4
3	3
2	2
1	1

Table 5. Clean Water Source (K5)

Clean Water Source	Value
PDAM	5
Water Well	3
Other Sources	2
None	1

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Table 6. Alternative Suitability Value Data

No.	Alternatives	K1	K2	K3	K4	K5
1	Savanna S.	1	4	5	3	3
2	River Valley R.	5	5	3	5	5
3	C. Maryland	5	5	3	4	5
4	Villa The Green M.	5	5	1	4	5
5	A. Land B.	3	5	1	5	5
6	C. Turi Asri	3	5	3	5	5
7	Batusalam R.	5	5	3	3	5
8	G. S. Mancirim	3	3	1	4	1
9	G. V. Sunggal	1	3	3	3	1
10	S. Raya B.	3	4	3	3	1
11	Jati Indah	1	3	5	3	3
12	Signature R.	3	5	1	3	5
13	Tlogomas R. B.	3	3	3	4	3
14	Faiz Sabilal R.	1	3	3	4	5
15	Cipta R. 2	3	5	3	3	1
16	Fadillah R.	1	3	3	3	3
17	Palm. M. Indah	3	5	3	4	5
18	R. Indah B.	4	3	5	3	2
19	River Valley R.	3	5	1	3	3
20	Artaland R. B.	3	5	3	4	3

Table 6 is data on the suitability of each alternative housing complex with the value of each attribute. The weight of each attribute can be seen in Table 7.

Table 7. Weight of Each Attribute

Attributes	Importance Value (W)	Value Weight
Residential Prices	20	0,2
Residential an Area	30	0,3
Residential Legality	15	0,15
Number of Residential Rooms	15	0,15
Clean Water Source	20	0,2
Total	100	1

In Table 7, you can see the weight of each attribute based on its importance, the total weight is one.

3.2. Discussions

In this study, a decision support method was used, namely the SAW method, to process alternative housing data from 20 housing complexes. The stages of the SAW method process can be described as follows.

The initial stage of the method is to determine alternatives derived from sample data of 20 house complexes which are described in Table 6.

The next stage is the second stage in determining the attributes for processing together with alternative data which is described in Table 7.

The third stage, namely determining the preference weight for each attribute obtained from the developer or housing company based on the importance of each attribute in the selection, is explained in Table 7.

The fourth stage, namely the suitability of each attribute, is determined based on the contribution of the attribute, namely profit if it contributes benefits or interests to the selection of housing and expenditure attributes if it does not contribute to the selection calculation. The higher the profit value, the better, and the lower the expenditure value, the better. This is inversely proportional to decision-making.

The fifth stage is building a decision matrix from the level of suitability of each alternative with each attribute.

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$$X = \begin{bmatrix} 1 & 4 & 5 & 3 & 3 \\ 5 & 5 & 3 & 5 & 5 \\ 5 & 5 & 3 & 4 & 5 \\ 5 & 5 & 1 & 4 & 5 \\ 3 & 5 & 1 & 5 & 5 \\ 3 & 5 & 3 & 5 & 5 \\ 5 & 5 & 3 & 3 & 5 \\ 3 & 3 & 1 & 4 & 1 \\ 1 & 3 & 3 & 3 & 1 \\ 3 & 4 & 3 & 3 & 1 \\ 1 & 3 & 5 & 3 & 3 \\ 3 & 5 & 1 & 3 & 5 \\ 3 & 3 & 3 & 4 & 3 \\ 1 & 3 & 3 & 4 & 5 \\ 3 & 5 & 3 & 3 & 1 \\ 1 & 3 & 3 & 3 & 3 \\ 3 & 5 & 3 & 4 & 5 \\ 4 & 3 & 5 & 3 & 2 \\ 3 & 5 & 1 & 3 & 3 \\ 3 & 5 & 3 & 4 & 3 \end{bmatrix}$$

The sixth stage is carrying out the decision matrix normalization process by calculating the normalized performance level values of alternative attributes.

Residential Prices (K1)

$$r_{ij}\left\{\frac{\underset{i}{Min}\, x_{ij}}{x_{ij}}\right\} \quad (1)$$

$\mathrm{r}_{11} = \frac{1}{1} = 1$

$\mathrm{r}_{12} = \frac{1}{5} = 0{,}2$

$\mathrm{r}_{15} = \frac{1}{3} = 0{,}333$

Residential Area (K2)

$$r_{ij}\left\{\frac{x_{ij}}{\underset{i}{Max}\, x_{ij}}\right\} \quad (2)$$

$\mathrm{r}_{21} = \frac{4}{5} = 0{,}8$

$\mathrm{r}_{22} = \frac{5}{5} = 1$

$\mathrm{r}_{28} = \frac{3}{5} = 0{,}6$

Residential Legality (K3)

$\mathrm{r}_{31} = \frac{5}{5} = 1$

$\mathrm{r}_{32} = \frac{3}{5} = 0{,}6$

$\mathrm{r}_{34} = \frac{1}{5} = 0{,}2$

Residential Room (K4)

$\mathrm{r}_{41} = \frac{3}{5} = 0{,}6$

$\mathrm{r}_{42} = \frac{5}{5} = 1$

$\mathrm{r}_{43} = \frac{4}{5} = 0{,}8$

Clean Water Source (K5)

$\mathrm{r}_{51} = \frac{3}{5} = 0{,}6$

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$r_{52} = \frac{5}{5} = 1$
$r_{58} = \frac{1}{5} = 0{,}2$

The seventh step is that the results of normalization will form a normalized matrix.

$$\begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1j} \\ \vdots & & & \vdots \\ r_{i1} & r_{i2} & \cdots & r_{ij} \end{bmatrix} \quad (3)$$

$$X = \begin{bmatrix} 1 & 0{,}8 & 1 & 0{,}6 & 0{,}6 \\ 0{,}2 & 1 & 0{,}6 & 1 & 1 \\ 0{,}2 & 1 & 0{,}6 & 0{,}8 & 1 \\ 0{,}2 & 1 & 0{,}2 & 0{,}8 & 1 \\ 0{,}333 & 1 & 0{,}2 & 1 & 1 \\ 0{,}333 & 1 & 0{,}6 & 1 & 1 \\ 0{,}2 & 1 & 0{,}6 & 0{,}6 & 1 \\ 0{,}333 & 0{,}6 & 0{,}2 & 0{,}8 & 0{,}2 \\ 1 & 0{,}6 & 0{,}6 & 0{,}6 & 0{,}2 \\ 0{,}333 & 0{,}8 & 0{,}6 & 0{,}6 & 0{,}2 \\ 1 & 0{,}6 & 1 & 0{,}6 & 0{,}6 \\ 0{,}333 & 1 & 0{,}2 & 0{,}6 & 1 \\ 0{,}333 & 0{,}6 & 0{,}6 & 0{,}8 & 0{,}6 \\ 1 & 0{,}6 & 0{,}6 & 0{,}8 & 1 \\ 0{,}333 & 1 & 0{,}6 & 0{,}6 & 0{,}2 \\ 1 & 0{,}6 & 0{,}6 & 0{,}6 & 0{,}6 \\ 0{,}333 & 1 & 0{,}6 & 0{,}8 & 1 \\ 0{,}25 & 0{,}6 & 1 & 0{,}6 & 0{,}4 \\ 0{,}333 & 1 & 0{,}2 & 0{,}6 & 0{,}6 \\ 0{,}333 & 1 & 0{,}6 & 0{,}8 & 0{,}6 \end{bmatrix}$$

The final stage of the method is the final result of the preference value derived from the total for multiplying the row portion of the normalized matrix with the appropriate weights and the column portion of the matrix.

$V_i = \sum_{j=1}^{n} w_j r_{ij}$ (4)

$v_1 = 1(0{,}2) + 0{,}8(0{,}3) + 1(0{,}15) + 0{,}6(0{,}15) + 0{,}6(0{,}2) = 0{,}8$
$v_2 = 0{,}2(0{,}2) + 1(0{,}3) + 0{,}6(0{,}15) + 1(0{,}15) + 1(0{,}2) = 0{,}78$
$v_3 = 0{,}2(0{,}2) + 1(0{,}3) + 0{,}6(0{,}15) + 0{,}8(0{,}15) + 1(0{,}2) = 0{,}75$

Based on the final results, the preference value for each alternative housing complex can be described in Table 8.

Table 8. Alternative Preference Value Results

No.	Alternatives	V_i	Rank
1	Savanna S.	0,8	2
2	River Valley R.	0,78	4
3	C. Maryland	0,75	6
4	Villa The Green M.	0,69	11
5	A. Land B.	0,7466667	7
6	C. Turi Asri	0,8066667	1
7	Batusalam R.	0,72	9
8	G. S. Mancirim	0,4366667	19
9	G. V. Sunggal	0,69	11
10	S. Raya B.	0,5266667	18
11	Jati Indah	0,74	8
12	Signature R.	0,6866667	12
13	Tlogomas R. B.	0,5766667	16
14	Faiz Sabilal R.	0,79	3
15	Cipta R. 2	0,5866667	15

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16	Fadillah R.	0,68	13
17	Palm. M. Indah	0,7766667	5
18	R. Indah B.	0,55	17
19	River Valley R.	0,6066667	14
20	Artaland R. B.	0,6966667	10

Based on Table 8, the results of calculating the final preference value using the SAW method for 20 alternative samples of house complexes with 5 supporting attributes, the one with the largest preference value (v) is most recommended as the choice of house complex that suits the buyer's constraints, needs and desires. Alternative C. Tri Asri is the alternative that has the largest preference value, namely 0.8066667, which is the most recommended. The Green M. and G. V. Sunggal Villa alternative has a preference value of the same magnitude, namely 0.69. The G. S. Mancirim alternative is the alternative that has the smallest preference value, namely o.4366667, so it is less recommended than all choices. Recommendations for choosing a home complex are several options that can be adjusted or eliminated according to the buyer's constraints, needs, and desires. The calculation results of the SAW method can help buyers make decisions in choosing housing from several recommended housing complexes.

4. CONCLUSION

Choosing a home is one of the things that must be done based on several choices selectively. Constraints in collecting information and data for each house complex manually result in the process being less effective and efficient because it requires time and money. Several factors influence the choice of housing, namely the price of the residential unit, the area of the residence, the legality of the residence, the residential rooms, and the need for a clean water source. The SAW method is a data management method that can help buyers make decisions in choosing a home that suits the attributes of their needs and desires. The SAW method will calculate the final preference value for each alternative house complex based on 20 alternative data samples for house complexes and 5 attributes. The result of the highest final preference value of the alternative will be the most recommended choice for buyers. Alternative C. Tri Asri is the alternative that has the largest preference value, namely 0.8066667, which is the most recommended. The Green M. and G. V. Sunggal Villa alternative has a preference value of the same magnitude, namely 0.69. The G. S. Mancirim alternative is the alternative that has the smallest preference value, namely o.4366667, so it is less recommended than all choices. Recommendations for choosing a home complex are several options that can be adjusted or eliminated according to the buyer's constraints, needs, and desires. The calculation results of the SAW method can help and make it easier for buyers to make decisions in choosing housing from several recommended housing complexes. The SAW method can be applied in the housing selection process based on the buyer's constraints, needs, and desires. Using a decision support system can save time and minimize errors. The calculation process can be developed by adding a weighting method for each attribute so that it has a more specific value according to data conditions.

REFERENCES

[1] A. Wahyu Aranski and A. Yunaldi, "Sistem Pengambilan Keputusan Kelayakan Pemberian Bantuan Rumah Layak Huni dengan Metode SAW," *Jurnal Riset Sistem Informasi Dan Teknik Informatika (JURASIK)*, vol. 8, no. 2, pp. 677–687, 2023, [Online]. Available: https://tunasbangsa.ac.id/ejurnal/index.php/jurasik

[2] S. Setiawansyah and V. H. Saputra, "Kombinasi Pembobotan PIPRECIA-S dan Metode SAW dalam Pemilihan Ketua Organisasi Sekolah," *Jurnal Ilmiah Informatika dan Ilmu Komputer (JIMA-ILKOM)*, vol. 2, no. 1, pp. 32–40, Mar. 2023, doi: 10.58602/jima-ilkom.v2i1.16.

[3] S. Alam, B. E. W. Asrul, P. Wahyuningsih, M. Akbar, and M. Sawawi, "Sistem Pendukung Keputusan Pencarian Lokasi Tempat Tinggal Menggunakan Metode Simple Additive Weighting," *Jurnal IT: Media Informasi STMIK Handayani Makassar*, vol. 14, no. 1, pp. 1–7, 2023.

[4] F. Shely Amalia, "Application of SAW Method in Decision Support System for Determination of Exemplary Students," *Journal of Information Technology, Software Engineering, and Computer Science (ITSECS)*, vol. 1, no. 1, 2023.

[5] D. Kurniawati, F. N. Lenti, and R. W. Nugroho, "Implementation of AHP and SAW Methods for Optimization of Decision Recommendations," *Journal of International Conference Proceedings*, vol. 4, no. 1, pp. 254–265, Jul. 2021, doi: 10.32535/jicp.v4i1.1152.

[6] M. I. Mgunda, "The Impacts Information Technology On Business," in *Journal of International Conference Proceedings (JICP)*, 2019, pp. 149–156.

ISSN 2962-4274

[7] S. Supiyandi, E. Hariyanto, C. Rizal, M. Zen, and S. H. R. Pasaribu, "Sistem Pendukung Keputusan Menentukan Kualitas Ayam Petelur Menggunakan Metode Simple Additive Weighting," *Building of Informatics, Technology and Science (BITS)*, vol. 4, no. 1, pp. 256–262, 2022, doi: 10.47065/bits.v4i1.1627.

[8] A. Rizka, S. Efendi, and P. Sirait, "Gain ratio in weighting attributes on simple additive weighting," in *2nd Nommensen International Conference on Technology and Engineering*, 2018, pp. 1–7. doi: 10.1088/1757-899X/420/1/012099.

[9] I. Afifah, I. Zulkarnain, A. Ulan Bani, and Fauziyah, "Sistem Pendukung Keputusan Penentuan Siswa Berprestasi Pada SD Muhammadiyah 3 Depok Dengan Metode SAW," *Jurnal Informatika dan Teknologi Informasi*, vol. 1, no. 1, pp. 52–69, 2022, doi: 10.56854/jt.v1i1.19.

[10] A. Rizka, "IDENTIFICATION OF MORTGAGE HOUSE CHOICE USING THE WEIGHTED PRODUCT METHOD AS A DECISION SUPPORT SYSTEM," in *Proceedings The 1st Annual Dharmawangsa International Conference*, 2023, pp. 326–334.

[11] D. Sri and H. Tamando Sihotang, "Decision Support Systems Assessment of the best village in Perbaungan sub-district with the Simple Additive Weighting (SAW) Method," *Jurnal Mantik*, vol. 3, no. January, pp. 31–38, 2019.

[12] A. Wanto *et al.*, *Sistem Pendukung Keputusan: Metode & Implementasi*, 1st ed. Yayasan Kita Menulis, 2020. Accessed: Sep. 04, 2022. [Online]. Available: https://books.google.co.id/books?id=t5PYDwAAQBAJ&pg=PA18&hl=id&source=gbs_toc_r&cad=3#v=onepage&q&f=false

[13] W. Hadikurniawati, E. Winarno, T. D. Cahyono, and D. Abdullah, "Retracted: Comparison of AHP-TOPSIS Hybrid Methods, WP and SAW for Multi-Attribute Decision-Making to Select the Best Electrical Expert," *Journal of Physics: Conference Series*, vol. 1114, no. 1. Institute of Physics Publishing, Dec. 07, 2018. doi: 10.1088/1742-6596/1114/1/012100.

[14] B. S. Br Sembiring, M. Zarlis, Sawaluddin, A. Agusnady, and T. Qowidho, "Comparison of SMART and SAW Methods in Decision Making," in *Journal of Physics: Conference Series*, Institute of Physics Publishing, Sep. 2019. doi: 10.1088/1742-6596/1255/1/012095.

[15] H. L. H. S. Warnars, A. Fahrudin, and W. H. Utomo, "Student performance Prediction Using Simple Additive Weighting Method," *IAES International Journal of Artificial Intelligence*, vol. 9, no. 4, pp. 630–637, 2020, doi: 10.11591/ijai.v9.i4.pp630-637.

[16] A. Rizka, R. M. Sari, L. Ulandari, and D. Pratiwi, "IDENTIFICATION OF STUDENT GRADES USING THE SAW METHOD IN A DECISION SUPPORT SYSTEM," in *Proceeding International Conference of Science Technology and Social Humanities ICESSHI 2022*, 2022, pp. 17–22.

[17] P. Nguyen, J. Tsai, V. A. K. G, and Y. Hu, "Stock Investment of Agriculture Companies in the Vietnam Stock Exchange Market : An AHP Integrated with GRA-TOPSIS-MOORA Approaches *," *Journal of Asian Finance, Economics and Business*, vol. 7, no. 7, pp. 113–121, 2020, doi: 10.13106/jafeb.2020.vol7.no7.113.

[18] I. A. Setyani and Y. R. Sipayung, "Sistem Pendukung Keputusan Menentukan Siswa Berprestasi dengan Metode SAW (Simple Addtive Weighting)," *Jurnal Sistem Komputer dan Informatika (JSON)*, vol. 4, no. 4, p. 632, Jun. 2023, doi: 10.30865/json.v4i4.6179.

[19] R. H. Septy and M. Devega, "SISTEM PENDUKUNG KEPUTUSAN PENERIMA BANTUAN LANGSUNG TUNAI (BLT) MENGGUNAKAN METODE TOPSIS DAN SAW (STUDI KASUS DI KANTOR LURAH LIMBUNGAN)," *Jurnal Sistem Informasi ZONasi*, vol. 4, no. 1, p. 77, 2022.

[20] Ž. Stević, E. Durmić, M. Gajić, D. Pamučar, and A. Puška, "A novel multi-criteria decision-making model: Interval Rough SAW method for sustainable supplier selection," *Information (Switzerland)*, vol. 10, no. 10, Oct. 2019, doi: 10.3390/info10100292.

[21] E. Y. Anggraeni *et al.*, "Poverty Level Grouping Using SAW Method," *International Journal of Engineering & Technology*, vol. 7, no. 2, pp. 218–224, 2018, [Online]. Available: www.sciencepubco.com/index.php/IJET

[22] F. S. Amalia and D. Alita, "Application of SAW Method in Decision Support System for Determination of Exemplary Students," *Journal of Information Technology, Software Engineering and Computer Science (ITSECS)*, vol. 1, no. 1, pp. 14–21, 2023, doi: 10.58602/itsecs.v1i1.9.

[23] Y. U. Chandra, S. Karya, and M. Hendrawaty, "Decision support systems for customer to buy products with an integration of reviews and comments from marketplace e-commerce sites in Indonesia: A proposed model," *Int J Adv Sci Eng Inf Technol*, vol. 9, no. 4, pp. 1171–1176, 2019, doi: 10.18517/ijaseit.9.4.6505.

[24] A. Ibrahim and R. A. Surya, "The Implementation of Simple Additive Weighting (SAW) Method in Decision Support System for the Best School Selection in Jambi," in *The International Conference on Applied Sciences Mathematics and Informatics (ICASHMI) 2018*, Bandar Lampung, 2018. doi: 10.1088/1742-6596/1338/1/012054.

[25] R. Ramadiani, A. R. Rahmana, I. Islamiyah, M. D. Balfas, T. Rahman, and A. Yunianta, "Decision Support System of Direct Cash-Village Fund Recipients Using Multi Attribute Utility Theory," *2021 5th International Conference on Informatics and Computational Sciences (ICICoS)*, pp. 232–237, Dec. 2021, doi: 10.1109/ICICOS53627.2021.9651907.

[26] M. I. Panjaitan, "Simple Additive Weighting (SAW) method in Determining Beneficiaries of Foundation Benefits," *Jurnal Teknologi Komputer*, vol. 13, no. 1, pp. 19–25, 2019.

ISSN 2962-4274

[27] A. S. Awaluddin and A. Simangunsong, "Decision Supporting The Best Student with the Implementation of the SAW Method System in SMK Muhammadyah 8 Medan," *Login: Jurnal Teknologi Komputer*, vol. 14, no. 2, pp. 266–272, 2020, [Online]. Available: http://login.seaninstitute.org/index.php/Login/article/view/57%0Ahttp://login.seaninstitute.org/index.php/Login/article/download/57/76