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IMPLEMENTATION OF THE SAW METHOD FOR PROPOSING KIS-PBI RECIPIENTS IN PADANG SARI VILLAGE

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Abstract: Determining recipients of health assistance at the village level often faces obstacles of subjectivity and inaccuracy of targeting due to the proposal process which is still carried out manually without structured assessment criteria. This study aims to apply the Simple Additive Weighting (SAW) method in determining recipients of the Indonesian Health Card - Contribution Assistance Recipient (KIS-PBI) in Padang Sari Village to improve the accuracy and objectivity of the proposal process. The method used is a computer-based Decision Support System with a Multiple Attribute Decision Making (MADM) approach, where the assessment is carried out based on a number of predetermined social and economic criteria and is weighted according to their level of importance. The calculation process is carried out through the formation of a decision matrix, matrix normalization, and calculation of preference values for each alternative. The results of the study indicate that the application of the SAW method is able to produce a clear ranking of alternatives, thus facilitating the determination of residents who are eligible to be proposed as KIS-PBI recipients. The conclusion of this study is that the SAW method is effective for use as a decision-making tool in the distribution of health assistance at the village level because it is able to produce more objective, transparent, and measurable decisions compared to the manual method.

Keyword: kis-pbi; multiple attribute decision making (MADM); simple additive weighting

Abstrak: Penentuan penerima bantuan kesehatan di tingkat desa seringkali menghadapi kendala subjektivitas dan ketidaktepatan sasaran akibat proses pengusulan yang masih dilakukan secara manual tanpa kriteria penilaian yang terstruktur. Penelitian ini bertujuan untuk menerapkan metode Simple Additive Weighting (SAW) dalam penentuan penerima Kartu Indonesia Sehat–Penerima Bantuan Iuran (KIS-PBI) di Desa Padang Sari guna meningkatkan ketepatan dan objektivitas proses pengusulan. Metode yang digunakan adalah Sistem Pendukung Keputusan berbasis komputer dengan pendekatan *Multiple Attribute Decision Making* (MADM), di mana penilaian dilakukan berdasarkan sejumlah kriteria sosial dan ekonomi yang telah ditetapkan dan diberi bobot sesuai tingkat kepentingannya. Proses perhitungan dilakukan melalui pembentukan matriks keputusan, normalisasi matriks, dan perhitungan nilai preferensi untuk setiap alternatif. Hasil penelitian menunjukkan bahwa penerapan metode SAW mampu menghasilkan perankingan alternatif secara jelas sehingga memudahkan penentuan warga yang layak diusulkan sebagai penerima KIS-PBI. Simpulan dari penelitian ini adalah bahwa metode SAW efektif digunakan sebagai alat bantu pengambilan keputusan dalam penyaluran bantuan kesehatan di tingkat desa karena mampu menghasilkan keputusan yang lebih objektif, transparan, dan terukur dibandingkan dengan metode manual.

Kata kunci: kis-pbi; multiple attribute decision making (MADM); sistem pendukung keputusan

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INTRODUCTION

Health is a fundamental right of every citizen that must be guaranteed by the state, as both physical and mental well-being are essential prerequisites for individuals to carry out daily activities optimally (Edotry Torry Karwur et al., 2024). Therefore, the government is committed to establishing a fair, comprehensive, and equitable health insurance system for all segments of society, including both economically capable and underprivileged groups, to ensure access to essential health services.

One concrete manifestation of this commitment is the National Health Insurance–Indonesia Health Card (JKN-KIS) program, managed by BPJS Kesehatan and officially launched in 2014 (Kusuma Astuti, n.d.). This program consists of two participant categories: Contribution Assistance Beneficiaries (PBI) and Non-Contribution Assistance Beneficiaries. The KIS-PBI program specifically targets economically disadvantaged communities that face limitations in financing healthcare services. Through this program, the government covers healthcare costs for underprivileged citizens at both primary healthcare facilities and advanced referral facilities.

At the regional level, the implementation of the KIS-PBI program is supported by funding from the State Revenue and Expenditure Budget (APBN) and the Regional Revenue and Expenditure Budget (APBD), including in Asahan Regency, where funding allocation is regulated through local government policies. However, despite these efforts, issues related to targeting accuracy remain. In Padang Sari Village, the process of proposing KIS-PBI recipients is still conducted manually and is not fully based on structured assessment criteria, which can lead to inaccuracies in identifying truly eligible beneficiaries.

These conditions indicate the need for a more objective, systematic, and measurable decision-making mechanism to assist village governments in proposing KIS-PBI recipients accurately. One approach that can be adopted is a computer-based Decision Support System using the Simple Additive Weighting (SAW) method, which is capable of evaluating alternatives based on multiple criteria and predefined weights. This study aims to implement the SAW method in determining KIS-PBI recipients in Padang Sari Village, with the expectation of assisting village authorities in making decisions that are more accurate, fair, and transparent.

The research gap in this study is seen from Although the JKN-KIS program has been running since 2014, the distribution of aid at the village level such as in Padang Sari Village still relies heavily on manual observations that do not have clear quantitative parameters. Previous studies have discussed the SAW method for selecting outstanding students or promotional media, but the integration of village-specific socio-economic criteria (such as home ownership status and history of chronic diseases) into a web-based system for the accuracy of health assistance is still limited in its implementation in village officials. so that the urgency of the research can be known, namely Inaccurate targeting in the distribution of KIS-PBI can cause residents who really need it not to get their right to health insurance, which is a fundamental right of citizens. Therefore, a systematic decision-making mechanism is needed to minimize data errors and social jealousy in the community. For this reason, the purpose of this study is to apply the SAW method to build a decision support system that is able to rank residents based on the weight of predetermined criteria, thereby simplifying the tasks of village officials. The novelty in this study is that this study integrates six specific criteria (Home Ownership, Physical Condition of the House, Income, Chronic Disease, Number of Dependents, and Electricity) which are adjusted to the local policies of Padang Sari Village into a PHP-based application, creating a more comprehensive selection instrument than manual methods.

METHOD

The research method used in this study is the Simple Additive Weighting (SAW) method, which belongs to the Multiple

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Attribute Decision Making (MADM) category (Shely Amalia & Alita, 2023). The SAW method is also known as the weighted summation method (Susilo & Wahyuni, 2024), here the basic concept involves summing the normalized performance values of each alternative multiplied by the weight of each criterion (Radulescu & Radulescu, 2024). This method was selected because it is capable of producing objective alternative rankings based on predefined criteria (Soleman, 2024).

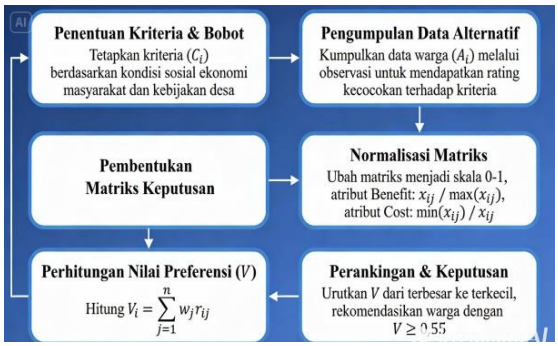

Image 1. Research Stages with the SAW Method

The stages of implementing the SAW method in this study are as follows. First, determining the criteria used as the basis for decision-making in selecting KIS-PBI recipients, denoted as Ci. These criteria are established based on the socio-economic conditions of the community and applicable village government policies. Second, determining the suitability rating value of each alternative (resident) for each criterion. These values are obtained from observation and data collection. Third, constructing a decision matrix based on the suitability ratings of each alternative for all criteria. The decision matrix is then normalized so that the values of each criterion are on a comparable scale. The normalization process is carried out by adjusting the type of criterion attribute, whether it is a benefit attribute or a cost attribute (Ulum et al., 2024). In this study, matrix normalization is performed using the following equation :

For benefit attributes:

$$r_{ij} = \frac{x_{ij}}{\max(x_{ij})} \quad (1)$$

For cost attributes:

$$r_{ij} = \frac{\min(x_{ij})}{x_{ij}} \quad (2)$$

Where r_{ij} represents the normalized performance rating of alternative A_i on criterion C_j, and x_{ij} denotes the value in the decision matrix. The values $\max(x_{ij})$ and $\min(x_{ij})$ represent the maximum and minimum values in each criterion column.

After obtaining the normalized matrix (r_{ij}), the fourth step is calculating the preference value for each alternative by summing the product of normalized values and the corresponding criterion weights using the following equation:

$$V_i = \sum_{j=1}^{n} w_j r_{ij} \quad (3)$$

Where V_i is the final preference value of alternative A_i, w_j is the weight of criterion-j, and r_{ij} is the normalized matrix value. The alternative with the highest preference value is considered the most eligible and prioritized as a KIS-PBI recipient.

RESULT AND DISCUSSION

The research results were obtained through the application of the Simple Additive Weighting (SAW) method in determining KIS-PBI recipients in Padang Sari Village. The initial stage of the study established six main criteria used as the basis for assessment: home ownership status, physical condition of the residence, income, history of chronic illness, number of dependents, and electricity availability. These criteria were selected based on the socio-economic conditions of the community and village government policies related to health assistance eligibility.

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Table 1. Criteria Data

No	Criteria	Description	Attribute
1	C1	Home ownership status	Benefit
2	C2	Physical condition of the residence	Benefit
3	C3	Income	Cost
4	C4	History of chronic illness	Benefit
5	C5	Number of dependents	Benefit
6	C6	Electricity availability	Cost

Each of the criteria is assigned a specific weight. The determination of these weights is based on a predefined scale, as presented below.

Table 2. Criteria Weight Scale

No	Weight Value	Scale
1	1	Not Important
2	2	Less Important
3	3	Moderately Important
4	4	Important
5	5	Very Important

In assigning the weights, the total weight is equal to 1 ($\sum w = 1$); therefore, weight normalization is required. For clarity, the normalized weights are presented in Table 3

Table 3. Criteria Weight Values

Criteria	Weight Value	Weight Normalization
Home ownership status	4	0,20
Physical condition of the residence	2	0,10
Income	5	0,25
History of chronic illness	3	0,15
Number of dependents	4	0,20
Electricity availability	2	0,10

In defining the criteria, a weighting process is applied to each criterion used in the evaluation. This weighting aims to assign different values or levels of importance to each criterion so that the assessment process can be conducted in a more objective and structured manner. The applied weighting scheme is as follows :

Table 4. Weights for Home Ownership Status Criteria

	Criteria	Weight
Home ownership status	Rented < 2 Years	1
	Owner-Occupied	2
	Owned by Family / Others	3
	Rented > 2 Years	4

Table 5. Weights for Physical Condition of the Residence Criteria

	Criteria	Weight
Physical condition of the residence	Plastered Brick Wall	1
	Unplastered Brick Wall	2
	Semi-Permanent Structure	3
	Bamboo Wall	4

Table 6. Weights for Income Criteria

	Criteria	Weight
Income	< 500.000	1
	500.000 - 999.999	2
	1.000.000 - 1.999.999	3
	2.000.000 – 2.500.000	4

Table 7. Weights for History of Chronic Illness Criteria

	Criteria	Weight
History of chronic illness	No	1
	Yes	2

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Table 8. Weights for Number of Dependents Criteria

	Criteria	Weight
Income	No Dependents	1
	1–2 Dependents	2
	3–4 Dependents	3
	5–6 Dependents	4

Table 9. Weights for Electricity Availability

	Criteria	Weight
Electricity availability	Not Available	1
	450 Watt	2
	900 watt	3
	1300 watt	4
	> 1300 watt	5

Next, the suitability values of each alternative (Ai) with respect to the predefined criteria (Ci) are determined by assigning scores to each alternative based on those criteria.

Table 10. Suitability Rating Data

No	Nama	Criteria					
		C1	C2	C3	C4	C5	C6
1	A1	2	1	3	1	3	3
2	A2	2	4	3	1	3	1
3	A3	3	1	4	2	3	2
4	A4	3	1	3	1	2	2
5	A5	2	1	5	1	3	2
6	A6	2	1	3	2	2	2
7	A7	2	1	5	1	3	2
8	A8	2	1	5	1	1	2
9	A9	2	3	3	2	2	2
10	A10	2	1	3	1	2	2
11	A11	2	1	3	1	2	2
12	A12	2	1	3	1	2	2
13	A13	3	3	2	2	3	2
14	A14	2	1	2	2	2	3
15	A15	3	3	3	1	4	2
16	A16	2	3	4	2	1	2
17	A17	4	1	4	1	2	2
18	A18	3	1	5	1	2	2
19	A19	2	1	5	1	3	2
20	A20	2	1	4	1	3	2

The following step involves calculating the normalization values for each processed data set using the matrix normalization formula (r_{ij}), which is adjusted according to the type of attribute, whether it is a benefit or a cost. This normalization aims to present the values on a more uniform scale, thereby facilitating further analysis. The normalized values (r_{ij}) are shown in the following table :

Table 11. Normalization of Each Alternative for Each Criterion

No	Nama	Criteria					
		C1	C2	C3	C4	C5	C6
1	A1	0,5	0,25	0,667	0,5	0,75	0,333
2	A2	0,5	1	0,667	0,5	0,75	1
3	A3	0,75	0,25	0,5	1	0,75	0,5
4	A4	0,75	0,25	0,667	0,5	0,5	0,5
5	A5	0,5	0,25	0,4	0,5	0,75	0,5
6	A6	0,5	0,25	0,667	1	0,5	0,5
7	A7	0,5	0,25	0,4	0,5	0,75	0,5
8	A8	0,5	0,25	0,4	0,5	0,25	0,5
9	A9	0,5	0,75	0,667	1	0,5	0,5
10	A10	0,5	0,25	0,667	0,5	0,5	0,5
11	A11	0,5	0,25	0,667	0,5	0,5	0,5
12	A12	0,5	0,25	0,667	0,5	0,5	0,5
13	A13	0,75	0,75	1	1	0,75	0,5
14	A14	0,5	0,25	1	1	0,5	0,333
15	A15	0,75	0,75	0,667	0,5	1	0,5
16	A16	0,5	0,75	0,5	1	0,25	0,5
17	A17	1	0,25	0,5	0,5	0,5	0,5
18	A18	0,75	0,25	0,4	0,5	0,5	0,5
19	A19	0,5	0,25	0,4	0,5	0,75	0,5
20	A20	0,5	0,25	0,5	0,5	0,75	0,5

Subsequently, the preference value (Vi) for each alternative is calculated based on the weights of each attribute. These preference values are then sorted from the highest to the lowest through a ranking process. The ranking results serve as the basis for selection in determining the most eligible alternatives to receive assistance. The results of these calculations are presented as follows :

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Table 12. Results of Alternative Ranking

No	Name	Result	Rangking	Eligibility
1	SH	0,550	11	Eligible
2	SP	0,692	3	Eligible
3	DH	0,650	5	Eligible
4	HR	0,567	9	Eligible
5	SUK	0,500	18	Not Eligible
6	IPS	0,592	7	Eligible
7	SUR	0,500	19	Not Eligible
8	TII	0,400	20	Not Eligible
9	SAR	0,642	6	Eligible
10	DAR	0,517	13	Not Eligible
11	RIA	0,517	14	Not Eligible
12	SUY	0,517	15	Not Eligible
13	RAT	0,825	1	Eligible
14	RIW	0,658	4	Eligible
15	WAG	0,717	2	Eligible
16	RUK	0,550	10	Eligible
17	BA	0,575	8	Eligible
18	SUH	0,500	16	Not Eligible
19	JUR	0,500	17	Not Eligible
20	GUN	0,525	12	Not Eligible

After obtaining the preference values (V), the results indicate that residents with values ≥ 0.55 are considered eligible, while those with values < 0.55 are classified as ineligible. The calculation using the SAW method functions as a decision-support tool in the decision-making process for determining residents who are eligible to be proposed as KIS-PBI recipients in Padang Sari Village.

The following section presents the results of the SAW method implementation in the system developed using the PHP programming language.

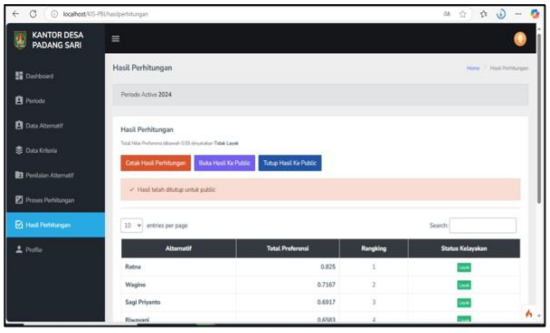

Image 1. Calculation Process Page

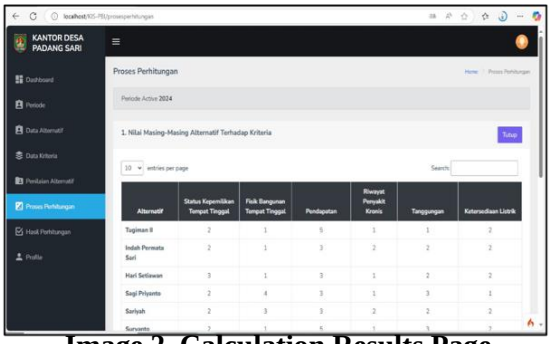

Image 2. Calculation Results Page

Test Result Analysis:

Decision Accuracy: The system sets the eligibility limit at a value of 0.55. Residents with a preference value of ≥ 0.55 are recommended as aid recipients (Status: Eligible), while values below are declared ineligible. **Recipient Distribution:** From the 20 sample data tested, the system successfully filtered 11 residents who were eligible to receive KIS-PBI aid and eliminated 9 residents who were deemed not to have met the priority criteria. **Objectivity:** The difference in the resulting values (e.g., Rank 1 at 0.825 vs Rank 20 at 0.400) shows that the system is able to provide clear differentiation based on the socio-economic conditions of each resident.

CONCLUSION

This research demonstrates that the application of the Simple Additive Weighting (SAW) method is an effective approach to supporting the decision-making process for determining recipients of the Indonesia Health Card–Contribution Assistance Beneficiary (KIS-PBI) program at the village level. By integrating social and economic criteria into a

structured evaluation mechanism, the SAW method provides a more objective and systematic decision-making framework compared to traditional manual approaches. The contribution of this research lies in the application of multi-criteria decision-making methods within the context of village-level public services, particularly in the distribution of health assistance. This approach not only improves the accuracy of beneficiary targeting but also provides a scientific basis for more transparent and accountable decision-making, while opening opportunities for the development of similar systems to support other social policies.

BIBLIOGRAPHY

Edotry Torry Karwur, C., Lumunon, T. H., & Neil Tinangon, E. (2024). Pemenuhan Hak Memperoleh Kesehatan Ditinjau Dari Pasal 28 H Ayat 1 Undang-Undang Dasar Negara Republik Indonesia Tahun 1945 1. In *Jurnal Fakultas Hukum Unsrat Lex privatum* (Vol. 13, Issue 02). http://www.tempointeraktif.com/hg/jakarta/2004/07/16,

Kusuma Astuti, E. (n.d.). Peran Bpjs Kesehatan Dalam Mewujudkan Hak Atas Pelayanan Kesehatan Bagi Warga Negara Indonesia. https://ejournal.undaris.ac.id/index.php/jphi

Radulescu, C. Z., & Radulescu, M. (2024). A Hybrid Group Multi-Criteria Approach Based on SAW, TOPSIS, VIKOR, and COPRAS Methods for Complex IoT Selection Problems. *Electronics (Switzerland)*, *13*(4). https://doi.org/10.3390/electronics13040789

Shely Amalia, F., & Alita, D. (2023). Application of SAW Method in Decision Support System for Determination of Exemplary Students. *ITSESC: Journal of Information Technology, Software Engineering, and Computer Science*, *1*(1).

Soleman. (2024). Evaluation of Determining the Best Product Promotion Media Decisions for MSMEs with ROC Ranking Technique and SAW Ranking Method. *Architecture and High Performance Computing*, *6*(3). https://doi.org/10.47709/cnapc.v6i3.4386

Susilo, J., & Wahyuni, E. G. (2024). Comparison of SAW and TOPSIS Methods in Decision Support Systems for Contraceptive Selection. *International Journal Software Engineering and Computer Science (IJSECS)*, *4*(2), 792–807. https://doi.org/10.35870/ijsecs.v4i2.2815

Ulum, F., Wang, J., & Aryanti, R. (2024). Selection of the Best E-Commerce Platform Based on User Ratings using a Combination Entropy and SAW Methods. *Bulletin of Informatics and Data Science*, *3*(2), 44–53. https://doi.org/10.61944/bids.v3i2.92