

RASKIN RECIPIENT ELIGIBILITY DECISION SUPPORT SYSTEM USING THE AHP METHOD

Zulfi Azhar^{1*}, Neni Mulyani¹, Jeperson Hutahaean¹, Sapriyanti¹

¹Program Studi Informasi, Sekolah Tinggi Manajemen Informatika dan Komputer Royal

*email: *¹zulfi_azhar@yahoo.co.id*

Abstract: Some people in Sei Silau Timur Village in Buntu Pane, Kisaran, have low incomes with the existence of a government policy in the food management program that cooperates with Bulog to ease the burden on the community by distributing Raskin to villages where people have low incomes. And not all people get the chance to receive RASKIN because the quota is limited. There needs to be a selection in determining the eligibility of RASKIN for the right people and avoiding mistakes. The selection process can be completed using the application of computer science. Based on this, a decision support system is needed that can be used by the Sei Silau Timur village head's office staff in distributing RASKIN rice, which later this application can help and benefit the village community. This research uses the AHP method, which is carried out by comparing a matrix of several criteria and alternatives. The final assessment result is implementing the AHP method, where criterion 4, namely Total Income, is selected, with Alternative 1 named Selamat.

Keywords: AHP; public; RASKIN; selection; SPK

Abstrak : Sebagian dari masyarakat di Desa Sei Silau Timur di kecamatan Buntu Pane, Kisaran mempunyai penghasilan yang rendah. Dengan adanya kebijakan pemerintah dalam program penanggulangan pangan yang bekerja sama dengan pihak Bulog untuk meringankan beban masyarakat dengan menyalurkan raskin ke desa-desa yang masyarakatnya berpenghasilan yang rendah. Dan tidak semua masyarakat mendapatkan kesempatan penerimaan RASKIN karena kuotanya terbatas. Perlu dilakukan dengan seleksi dalam penentuan pemberian kelayakan RASKIN kepada orang-orang yang tepat dan menghindari kekeliruan. Proses seleksi tersebut dapat diselesaikan dengan menggunakan penerapan secara ilmu komputer. Berdasarkan hal tersebut maka diperlukan suatu sistem pendukung keputusan yang dapat dipergunakan oleh petugas kantor Kepala Desa Sei Silau Timur dalam proses pembagian beras RASKIN, yang nantinya aplikasi ini dapat membantu dan bermanfaat bagi masyarakat desa tersebut. Penelitian ini menggunakan metode AHP, dimana metode yang dilakukan dengan membandingkan matriks sejumlah kriteria dan alternatif. Hasil penilaian akhir yang terpilih merupakan implementasi dari metode AHP, dimana yang terpilih adalah kriteria 4 yaitu Jumlah Penghasilan dengan alternatif 1 bernama Selamat.

Kata Kunci: AHP; masyarakat; RASKIN; seleksi; SPK

INTRODUCTION

Currently, countries are experiencing a financial crisis, both developed and developing countries. The impact of the crisis will be that many people will experience job loss. As a result of the prolonged economic crisis, the ability of the Indonesian population to meet various basic needs such as food, clothing, and housing is increasingly difficult. The overall impact of this condition is a decline in the level of welfare in specific sectors of life in Indonesian society. One way to overcome this crisis is the government's Special Market Operations program, which provides monthly rice assistance to needy people throughout Indonesia. The Special Market Operation Program distributes medium-quality rice to underprivileged families (KPS) or low-income families in every village throughout Indonesia. The RASKIN program is a national program that aims to help meet food sufficiency and reduce the financial burden on poor households (RTM) through the provision of subsidized rice[1]–[3]. Just like the East Sei Silau Village Head's Office carried out the government's mandate to provide rice to low-income families (RASKIN). The method used in the East Sei Silau village head's office in making decisions on rice recipients for low-income families (Raskin) still uses manual methods, and the database used is still in paper form, so it takes a long time to process, and the biggest obstacle is the difficulty in determining who the residents are. Who has the right to receive Raskin and other issues such as storage or searching for archives that have been stored.

In general, the problems that occur in providing poor rice assistance are still not optimal because when selecting poor rice recipients, there is no supporting system,

so during the selection process, only estimates are used, and there are no calculations when selecting poor rice recipients. So, a small or large number of people sometimes protest because people are supposed to get help, but they don't get that help, and vice versa. For this reason, a decision support system is needed[4]. The method used to determine aid distribution to low-income families in each village is still manual. So, processing, storing, and searching data archives takes a long time. The Analytic Hierarchy Process (AHP) method was selected in making this decision support system. Application of appropriate methods to support the creation of this decision support system. Apart from that, AHP is suitable if applied in the decision analysis with substantive complexity. This is because the modeled properties can be done comprehensively, structuredly, and logically[5]–[8]. Decision-making to determine the criteria for rice recipients that has occurred usually refers to something other than the criteria for low-income families. Determining the criteria for low-income families requires a sound information system to prevent mistakes made by the management committee. This decision support system is designed to help assess each low-income family, change criteria, and change weight values. This is useful for making it easier for decision-makers regarding the problem of selecting recipients of rice for low-income families (RASKIN) so that families will be found who are most worthy of receiving RASKIN. Therefore, in this research, the decision support system for low-income families (RASKIN) will use several criteria expected to be by the criteria for low-income families.

A sound decision support system is essential as a tool to aid decision-making. Improving the quality of decisions is fur-

ther supported if a computer-based decision system supports it. The creation of a decision support system for selecting rice recipients for low-income families (RASKIN) is intended to provide support to decision-makers based on needs precisely, quickly, and accurately. DSS are built to support solutions to problems or opportunities and are used to make decisions[9][10]

METHOD

Research stages

The research stages were carried out in the following way[11]:

The First way : Document Data Collection

Data was collected among the people of East Sei Silau Village in Buntu Pane, Kisaran, using an assessment matrix form in collecting data (documents). Data collection was carried out by observation, interviews, and literature study[12]. This research uses a questionnaire or questionnaire that serves as instrumentation to obtain data in determining families worthy of family status as Beneficiary Families in the area[13] Sei Silau Timur Village in Buntu Pane, Kisaran.

Second way : Analyzing Data

Analyze and design the system to be used with several of specified criteria.

Third way : Testing the System

Testing the system using the Excel matrix application, system testing is carried out using the AHP method calculations which are carried out using existing calculations in the system.

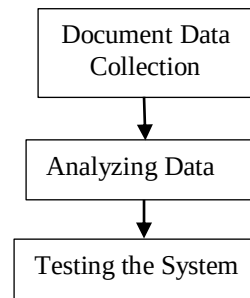


Image 1. The Research Stages

AHP Procedure

The procedure in the AHP method includes several steps as follows[9]: (1) Definition of the problem and determining the desired solution, then compiling a hierarchy of the problems faced. Hierarchizing is the human ability to perceive objects and ideas, identify them, and communicate what they observe. To obtain detailed knowledge, our minds organize complex reality into parts that are its main elements, and then these parts are divided into further parts, and so on in hierarchical stages[10], [14]–[19]., (2) Determination of element priorities, The first step in determining element priority is to create a pair comparison matrix[20]. The pairwise comparison matrix is filled in using numbers to represent the relative importance of one element to other elements., (3) Syntesis, Considerations from pairwise comparisons are synthesized to obtain overall priorities., (4) Consistency Measurement, Knowing how good consistency is in making decisions is essential because we want decisions based on something other than considerations with high consistency. (5) The things done in this step are Calculating Consistency Index (CI) with the formula:

$$CI = (\lambda_{maks} - n) / n - 1 \quad (1)$$

where n = number of elements

λ_{maks} = maximum eigenvalue of the pairwise comparisons matrix

(6) Calculating the Consistency Ratio (CR) with the formula :

$$CR = CI / RI \quad (2)$$

where CR = Consistency Ratio,

RI = Random Index

CI = Consistency Index,

(7) Hierarchy Consistency Check, The judgment data assessment must be corrected if the value is more than 10%. However, if the consistency ratio (CI/IR) is less than or equal to 0.1 ($CR < 0.1$),

then the calculation results can be declared correct.

$$CR < 0,1 \quad (3)$$

Decision support systems can handle semistructured and unstructured situations), a problem can be described as structured or unstructured only by considering the decision maker or a specific problem.

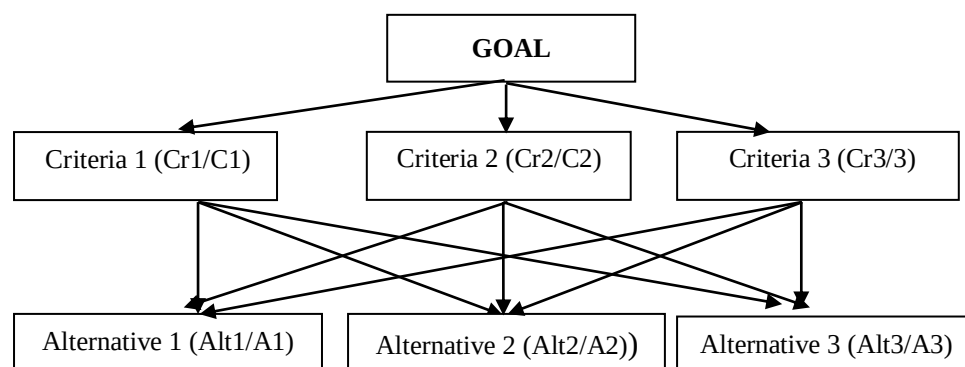


Image 2. Hierarchy Structure in the AHP Method

RESULT AND DISCUSSION

The data collection results in the field using a filling form to assess the people of East Sei Silau Village in Buntu Pane, Kisaran. The criteria data used are

five criteria; the criteria chosen in this study are Number of Dependents (Cr1), House Condition (Cr2), Owner Status (C3), Total Income (Cr4), and Welfare Status (Cr5).

Table 1. Hierarchical Assessment

Value	Meaning	Description
1	Equally important	Have the same influence
3	Slightly important	Moderate comparison of others
5	More important	Comparison more than others
7	Very important	Comparison is much more than others
9	Important	Powerful comparison of others
2,4,6,8	Values include	Adjacent assessment

Table 2. Calculation of Criteria

Criteria	C1	C2	C3	C4	C5
Cr1	1	5	3	0,333	3
Cr2	0,2	1	0,333	0,2	0,333
Cr3	0,333	3	1	0,2	0,333
Cr4	3	5	5	1	3
Cr5	0,333	3	3	0,333	1
Amount	4,867	17	12,333	2,067	7,667

Table 3. Normalizing Criterion Values

Criteria	C1	C2	C3	C4	C5	Amount
Cr1	0,205	0,294	0,243	0,161	0,391	1,295
Cr2	0,041	0,059	0,027	0,097	0,043	0,267
Cr3	0,068	0,176	0,081	0,097	0,043	0,466
Cr4	0,616	0,294	0,405	0,484	0,391	2,191
Cr5	0,068	0,176	0,243	0,161	0,130	0,780
Amount	1	1	1	1	1	5

Table 4. Ranking and Priority Results

Criteria	Priority	Persentase	Rangking
Cr1	0,259	25,9	2
Cr2	0,053	5,3	5
Cr3	0,093	9,3	4
Cr4	0,438	43,8	1
Cr5	0,156	15,6	3
Amount	1	100	

Table 5. Maximum eigenvalue results

Criteria	λ max	CI	CR
Cr1	1,261	0,105283	0,094002679
Cr2	0,908		
Cr3	1,150		
Cr4	0,906		
Cr5	1,196		
Amount	5,421		

If the Consistency Ratio (CR) value is < 0.1 . The criteria will be met.

$$CR = CI / RI$$

CR = Consistency Ratio

CI = Consistency Index

RI = Random Index

$$CI = (\lambda_{maks} - n) / n - 1$$

n = number of elements (n=5)

λ_{maks} = maximum eigenvalue result from the pairwise comparisons matrix.

The result of the maximum λ value with the addition in table 2, multiplied by the priority percentage column in table 4, IR value = 1.12

CR value = $CI/IR = 0.105283/1.12 = 0.094002679$, $CR < 0.1$. The conditions are met.

Table 6. Index Random

n	1, 2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0,58	0,90	1,12	1,24	1,32	1,41	1,45	1,49	1,51	1,48	1,56	1,57	1,59

In Table 4, Ranking and Priority Results, the criterion that received rank 1 is Total Income (Cr4). The selection of Raskin recipients with the names of 5 people from East Sei Silau Village in Buntu Pane, Kisaran as alternative

RASKIN recipients, namely: Selamat (Alt1), Basri (Alt2), Nasib (Alt3), Suriono (Alt4) and Solihin (Alt5). The maximum eigenvalue results are in Table 10, with the sum in Table 7 multiplied by the priority column in Table 9.

Table 7. Alternative Calculation Method

Alternative	Alt1	Alt2	Alt3	Alt4	Alt5
Selamet	1	3	3	3	7
Basri	0,333	1	0,5	2	3
Nasib	0,333	2	1	0,5	3
Suriono	0,333	0,5	2	1	3
Solihin	0,143	0,333	0,333	0,333	1
Amount	2,143	6,833	6,833	6,833	17

Table 8. Normalizing Alternative Values

Alternative	Alt1	Alt2	Alt3	Alt4	Alt5	Amount
Selamet	0,467	0,439	0,439	0,439	0,412	2,196
Basri	0,156	0,146	0,073	0,293	0,176	0,844
Nasib	0,156	0,293	0,146	0,073	0,176	0,844
Suriono	0,156	0,073	0,293	0,146	0,176	0,844
Solihin	0,067	0,049	0,049	0,049	0,059	2,272
Amount	1	1	1	1	1	5

Table 9. Ranking and Priority Results

Alternative	Priority	Persentase	Rangking
Selamet	0,439	43,9	1
Basri	0,169	16,9	2
Nasib	0,169	16,9	3
Suriono	0,169	16,9	4
Solihin	0,054	5,4	5
Amount	1		

Table 10. Maximum Eigenvalue Results

Alternative	λ max	CI	CR
Selamet	0,941	0,081616338	0,07287173
Basri	1,154	CI and CR values are calculated only at rank 1 as a consistency check.	
Nasib	1,154		
Suriono	1,154		
Solihin	0,924		
Amount	5,326		

The results of the CR value, $CR = 0.081616338/1.12 = 0.07287173$, $CR < 0.1$, are declared correct (consistent). In the final assessment of the test results, it turned out that the selection of RASKIN recipients based on the Total Income (Cr4) criteria Selamat (Alt1) was selected based on these criteria.

CONCLUSION

Using the AHP method can provide an assessment of several criteria with several choices in selecting RASKIN recipients in East Sei Silau Village in Buntu Pane, Kisaran. The selected final assessment result is an implementation of the AHP method, where the selected criteria are the amount of income, with the alternative being Selamat. Priority results whose values coincide with alternatives need to be reassessed to obtain the required ranking priority results based on comparing the criteria. To get better results, adding a number of appropriate and necessary criteria is necessary.

REFERENCES

- [1] M. Hismawati and H. Hardiyan, "Pengambilan Keputusan Dalam Penerima Bantuan Raskin Dengan Metode Simple Additive Weigthing (SAW)," *Swabumi*, vol. 6, no. 2, pp. 110–116, 2018, doi: 10.31294/swabumi.v6i2.4557.
- [2] I. Asmungi, Amroni, and P. A. Jusia, "Analisa dan Perancangan Sistem Pendukung Keputusan Kelayakan Penerima Bantuan Beras Miskin Pada Desa Lambur II Muara Sabak Timur," *J. Ilm. Media Sisfo*, vol. 12, no. 1, pp. 1012–1037, 2018.
- [3] D. A. Astika, D. Nugroho, and T. Irawati, "Sistem Pendukung Keputusan Penerimaan Beras Untuk Keluarga Miskin Menggunakan Metode Simple Additive Weighting Di Kantor Kepala Desa Gumpang," *J. Teknol. Inf. dan Komun.*, vol. 6, no. 1, 2018, doi: 10.30646/tikomsin.v6i1.351.
- [4] A. R. Muqoddes, "SISTEM PENDUKUNG KEPUTUSAN PENERIMA BERAS MISKIN (RASKIN) MENGGUNAKAN METODE ANALYTICAL HIERARCHY PROCESS (AHP) DAN WEIGHTED PRODUCT," 1945.
- [5] F. A. Pangestu, D. M. Kusumawardani, M. D. Nanda, and M. K. Sari, "Sistem Penyaluran Bantuan Kepada Keluarga Miskin di Desa Ciberem dengan Metode AHP," *Conf. Electr. Eng. Telemat. Ind. Technol. Creat. Media*, vol. 2, no. 1, pp. 147–157, 2019.
- [6] I Putu Putrayana Wardana, "e-ISSN 2716-2753 Journal of Informatics Engineering and Technology (," vol. 01, no. 1, pp. 42–49, 2020.
- [7] P. Wolo, A. S. M. Paseng, and Y. W. Roberth, "Sistem Pendukung Keputusan Penentuan Penerimaan Raskin Menggunakan Metode Simple Additive Weighting (Studi Kasus Kelurahan Kota Uneng)," *Teknika*, vol. 8, no. 1, pp. 74–77, 2019, doi: 10.34148/teknika.v8i1.151.
- [8] D. H. Sinaga, H. S. Tambunan, and J. Jalaluddin, "Sistem Pendukung Keputusan Dalam Penentuan Penerima Rastra (Beras Sejahtera) Menggunakan Metode Simple Additive Weighting (Studi Kasus Desa Karang Bangun)," *KOMIK (Konferensi Nas. Teknol. Inf. dan Komputer)*, vol. 3, no. 1, pp. 772–778, 2019, doi: 10.30865/komik.v3i1.1691.
- [9] F. Atmajayanti, A. Qashlim, and B.

- Burhanuddin, "Sistem Penunjang Keputusan Penerimaan Bantuan Rumah Layak Huni Menggunakan Metode Ahp Saw," *J. Peqguruang Conf. Ser.*, vol. 3, no. 1, p. 115, 2021, doi: 10.35329/jp.v3i1.1117.
- [10] Z. Azhar and J. Hutahaean, "Penerapan Metode Analytical Hierarchy Process Dalam Pemilihan Tempat Cafe di Kisaran," *Build. Informatics, Technol. Sci.*, 2020, doi: 10.47065/bits.v2i2.560.
- [11] N. Kusumawardhany, "Penerapan Metode Analytical Hierarchy Process (Ahp) Dan Simple Additive Weighting (Saw) Untuk Penentuan Penerima Bantuan Sosial Pandemi Covid-19," *IDEALIS Indones. J. Inf. Syst.*, vol. 3, no. 2, pp. 615–619, 2020, doi: 10.36080/ideal.v3i2.2752.
- [12] A. Mubarak and S. Cahyadi, "Sistem Pendukung Keputusan Seleksi Penerima Subsidi Beras Sejahtera Pada Kelurahan Cibeunying Dengan Metode Analytical Hierarchy Process (Ahp)," *J. Tekno Insentif*, vol. 13, no. 2, pp. 62–69, 2019, doi: 10.36787/jti.v13i2.139.
- [13] Jadianan Parhusip, "Penerapan Metode Analytical Hierarchy Process (AHP) Pada Desain Sistem Pendukung Keputusan Pemilihan Calon Penerima Bantuan Pangan Non Tunai (BPNT) Di Kota Palangka Raya," *J. Teknol. Inf. J. Keilmuan dan Apl. Bid. Tek. Inform.*, vol. 13, no. 2, pp. 18–29, 2019, doi: 10.47111/jti.v13i2.251.
- [14] Z. Azhar, "Analisis Faktor Prioritas dalam Pemilihan Mata Kuliah Praktek pada Prodi Sistem Informasi Menggunakan Metode AHP," *Digit. Zo. J. Teknol. Inf. dan Komun.*, 2020, doi: 10.31849/digitalzone.v11i1.3393.
- [15] Z. Azhar, H. Effendi, and M. Muskhir, "Decision Support System Analytical Hierarchy Process in Learning Method Selection Decision Support System Analytical Hierarchy Process in Learning Method Selection," 2021, doi: 10.1088/1742-6596/1933/1/012065.
- [16] Z. Azhar, J. Jama, and H. Effendi, "The Analytical Hierarchy Process of Decision Support Systems in Choosing Learning Models," vol. 12, no. 10, pp. 2278–2285, 2021.
- [17] Z. Azhar, "Penerapan Metode Analytical Hierarchy Process Dalam Pemilihan Bibit Jagung Unggul," *JURTEKSI (Jurnal Teknol. dan Sist. Informasi)*, vol. 6, no. 2, pp. 145–154, 2020, doi: 10.33330/jurteks.v6i2.528.
- [18] Z. Azhar, W. Wakhinuddin, and W. Waskito, "Sistem Pendukung Keputusan Dalam Pemilihan Pengembangan Model Pembelajaran Dengan Metode Ahp," *JURTEKSI (Jurnal Teknol. dan Sist. Informasi)*, vol. 7, no. 3, pp. 323–332, 2021, doi: 10.33330/jurteks.v7i3.1155.
- [19] Z. Azhar, "Faktor Analisis Prioritas Dalam Pemilihan Bibit Jagung Unggul Menggunakan Metode AHP," pp. 347–350, 2020.
- [20] R. Rahardian, N. Hidayat, and R. K. Dewi, "Sistem Pendukung Keputusan Penentuan Penerima Bantuan Keluarga Miskin Menggunakan Metode Analytical Hierarchy Process – Preference Ranking Organization for Enrichment Evaluation II (AHP-PROMETHEE II)," *J. Pengemb. Teknol. Inf. dan Ilmu Komput.*, vol. 2, no. 5, pp. 1980–1985, 2018.