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PROVIDING LOAN FUNDS FOR PRIMKOPPOL MEMBERS USING THE SAW METHOD

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Abstract: The provision of loan funds is one of the important activities in improving the welfare of Primkoppol members (Police Cooperative). The process of determining the eligibility for loan disbursement in PRIMKOPPOL POLRES Asahan is still lacking systematic timing delays in making decisions in managing the disbursement of loan funds. Therefore, an efficient and effective method is needed to minimize risks and maximize profits for the cooperative and its members. One method that can be used is the Simple Additive Weighting (SAW) method, which has been proven effective in various decision-making contexts. This study aims to apply the SAW method in the process of disbursing loan funds for Primkoppol members, and to evaluate the performance of this method in selecting eligible loan recipients and optimizing fund allocation. The loan disbursement process uses the SAW method, which calculates the relative preference value for each prospective loan recipient based on predetermined criteria. The results of this study indicate that by applying the Simple Additive Weighting method to 10 loan applicants, 3 applicants successfully applied for loans with a preference value > 0.7, in line with the requirements. The implementation of the SAW method in loan disbursement for Primkoppol members has successfully increased efficiency and accuracy in selecting loan recipients.

Keywords : cooperative; decision support systems; simple additive weighting (SAW).

Abstract: Pemberian dana pinjaman merupakan salah satu kegiatan yang penting dalam meningkatkan kesejahteraan anggota Primkoppol (Koperasi Polisi). Proses penentuan kelayakan pemberian pinjaman di PRIMKOPPOL POLRES Asahan masih kurang sistematis keterlambatan waktu dalam menentukan keputusan dalam mengelola pemberian dana pinjaman. Untuk itu diperlukan suatu metode yang efisien dan efektif untuk meminimalkan risiko dan memaksimalkan keuntungan bagi koperasi dan anggotanya. Salah satu metode yang dapat digunakan adalah metode Simple Additive Weighting (SAW), yang telah terbukti efektif dalam berbagai konteks pengambilan keputusan. Penelitian ini bertujuan untuk menerapkan metode SAW dalam proses pemberian dana pinjaman bagi anggota Primkoppol, serta untuk meng-evaluasi kinerja metode tersebut dalam memilih penerima pinjaman yang layak dan meng-optimalkan alokasi dana. Proses pemberian dana pinjaman menggunakan metode SAW yang menghitung nilai preferensi relatif bagi setiap calon penerima pinjaman berdasarkan kriteria yang telah ditetapkan. Hasil dari penelitian ini menunjukan bahwa dengan menerapkan metode *Simple Additive Weighting* dari 10 calon pemohon pinjaman, 3 calon berhasil mampu mengajukan pinjaman dengan nilai preferensi > 0,7. sesuai dengan persyaratan. Implementasi metode SAW dalam pemberian dana pinjaman bagi anggota Primkoppol berhasil meningkatkan efisiensi dan keakuratan dalam pemilihan penerima pinjaman.

Kata Kunci : koperasi; simple additive weighting (SAW); sistem pendukung keputusan.

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INTRODUCTION

PRIMKOPPOL (Primary Police Cooperative) Asahan POLRES is a cooperative founded by the Asahan resort police to improve the welfare of its members. This cooperative has a way of working that is similar to cooperatives in general, namely by collecting funds from its members and then giving them back in the form of loans with lower interest than loans from banks[1].

Many credit applicants often complain about the loan process at PRIMKOPPOL POLRES Asahan. They said the process was long and too difficult. This is because the process of determining the eligibility of loans provided by PRIMKOPPOL (Primary Police Cooperative) Asahan Police still does not use a decision support system, or loans are only given to customers who are deemed capable of paying their bills for loan approval based on the trust of the PRIMKOPPOL Asahan POLRES leadership[2].

In determining credit policy, PRIMKOPPOL POLRES Asahan must first formulate credit standards and credit conditions, namely the nature of the customer, the ability to pay credit (capacity), the customer's financial capacity (capital), and the collateral (status) owned by the customer. Data required as credit requirements include loan size, retirement age limit, number of dependents, loan track record, total income and length of loan[3].

For this reason, a solution is needed to the problems faced, by implementing a decision support system that can provide real and objective reviews to prospective borrowers to speed up the loan application process for Asahan POLRES members. The system built is a web-based application using the Simple Additive Weighting (SAW) method[4][5].

The Simple Additive Weighting (SAW) method is a weighted addition approach. The basic principle involves finding the weighted sum of the performance evaluations for each alternative against all existing criteria [6] which then normalizes the decision matrix (x) to a scale proportional to all alternative rankings[7]. The application of this method aims to increase the accuracy of the results in providing recommendations to decision makers. The use of this decision support tool is expected to be able to produce accurate calculations in determining loan provision[4],[8]. So that it can provide the right solution for PRIMKOPPOL POLRES Asahan in determining whether or not it is appropriate for a cooperative member to be given a loan.

Research [2] explains that calculations using 14 criteria using the Simple Additive Weighting (SAW) method are more effective in getting results from granting credit worthiness. In line with research[9],[10] explains that by implementing a decision support system in cooperatives it is easy to make decisions on determining credit worthiness.

METHOD

Implementing the Simple Additive Weighting (SAW) method, it is necessary to normalize the decision matrix (X) into a certain scale that allows comparison between all available alternatives[11]. The steps for solving the problem use the Simple Additive Weighting (SAW) method. [8],[2].

The initial step is to determine alternatives (AI), determine the criteria that will be used as a reference in CI decision

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making, assess the suitability rating of each alternative for each criterion, determine the priority or importance weight (W) using the formula:

$$w=[w_1, w_2, w_3 \dots w_j] \qquad (1)$$

Then create a table of suitability ranking levels of each alternative for each criterion, the results of each alternative and criteria are formed and a decision matrix formula (X) is created from the similarity ranking.

$$X=\begin{bmatrix} x_{11} & x_{12} & x_{1n} \\ x_{21} & x_{22} & x_{2n} \\ x_{m1} & x_{m2} & x_{m3} \end{bmatrix} \qquad (2)$$

Create a normalization calculation formula (rij) from decision matrices (X):

$$r_{ij}=\begin{cases} \frac{X_{ij}}{\text{Max } X_{ij}} & \text{benefit} \\ \frac{\text{Min } X_{ij}}{X_{ij}} & \text{cost} \end{cases} \qquad (3)$$

Generates Values (R) or normalized matrices from normalized counts (rij):

$$R=\begin{bmatrix} R_{11} & R_{12} & R_{1j} \\ R_{21} & R_{22} & R_{2j} \\ R_{i1} & R_{i2} & R_{ij} \end{bmatrix} \qquad (4)$$

The final result of the preference value (Vi) is obtained from the sum of the multiplication of row elements normalized matrix (R) with weights preferences (W) corresponding column elements matrix (W). Generate Vi values showing indications Ai value is the right criterion.

$$V_i = \sum_{j=1}^{n} W_j \, r_{ij} \qquad (5)$$

Description:

Vi: Series for each alternative
Wj: Predetermined weight
Rij: Matrix normalization value

If the Vi value is greater, it means that alternative Ai is more selected. Analysis of data requirements for a decision support system to determine the eligibility of recipients of loan funds at PRIMKOPPOL POLRES Asahan. First, prepare data containing 6 basic criteria in determining the eligibility of recipients of loan funds at PRIMKOPPOL POLRES Asahan.

Table 1. Criteria Data

No	Criteria Assessed	Type	Criteria Code
1	Loan Amount	Benefit	C1
2	Retirement Age Limit	Cost	C2
3	The number of dependents	Cost	C3
4	Loan Track Record	Benefit	C4
5	Total Income	Benefit	C5
6	Length of Loan	Benefit	C6

Next, the criteria data is given a weight value (w) based on the importance scale of the factors that have been determined.

Table 2. Criteria Importance Weight Value Data

Code	Criteria	Type	Value Weight
C1	Loan Amount	benefit	0.25
C2	Retirement Age Limit	Cost	0.20
C3	The number of dependents	Cost	0.20
C4	Loan Track Record	Benefit	0.15
C5	Total Income	Benefit	0.10
C6	Length of Loan	Benefit	0.10

The next step, the data for each criterion will be given a value/weight according to the priority scale.

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Table 3. Loan Amount Criteria

Criteria	Scale	Value Weight
C1	> Rp. 50.000.000,-	5
	30.000.000 – 50. 000.000	4
	20.000.000 – 30.000.000	3
	5.000.000 – 20.000.000	2
	< 5.000,000	1

Table 4. Retirement Age Limit Criteria

Criteria	Scale	Value Weight
C2	18 – 28 Tahun	5
	28 – 34 Tahun	4
	34 – 42 Tahun	3
	42 – 55 Tahun	2
	55 Tahun	1

Table 5. Criteria for Number of Dependents

Criteria	Scale	Value Weight
C3	< 2 people	5
	3 people	4
	4 people	3
	5 people	2
	> 6 people	1

Table 6. Loan Track Record Criteria

Criteria	Scale	Value Weight
C4	Very good	5
	Good	4
	Enough	3
	Bad	2
	Very bad	1

Table 7. Criteria for Amount of Income

Criteria	Scale	Value Weight
C5	> 6 million per month	5
	5.000.000 – 6.000.000	4
	4.000.000 – 6.000.000	3
	2.000.000 – 4.000.000	2
	< 2 million per month	1

Table 8. Length of Loan Criteria

Criteria	Scale	Value Weight
C6	> 24 months	5
	18 - 24 months	4
	12 - 18 months	3
	6 - 12 bmonths	2
	< 6 months	1

After carrying out calculations using formula 4, the matrix R is obtained Normalizing the X matrix into the R matrix, for Loan Amount Calculation.

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Table 9. Normalized Values

Code	Employee	C1	C2	C3	C4	C5	C6
A1	Zulhajri	1	1	0.5	1	1	1
A2	Fajar Setiawan	0.8	0.5	0.67	0.8	0.8	0.4
A3	Agus Leo Matondang	0.6	0.4	0.4	0.8	0.8	0.8
A4	Pandapotan Sitorus	0.8	0.5	1	0.4	0.8	1
A5	Marthin Judi Dolok Saribu	0.6	1	0.5	0.6	0.6	0.6
A6	Asnah Rohani Hasibuan	0.6	1	0.67	0.2	0.6	1
A7	Aminullah Siregar	0.4	0.4	1	1	0.4	0.4
A8	Irianto Surbakti	0.6	0.5	0.4	0.6	0.4	0.6
A9	Bachrum Syahputra	0.8	0.1	1	0.6	0.4	0.6
A10	Rudi Hairlan	0.4	0.6	0.4	0.4	0.4	0.8

Table 9 show the result of the normalization of the R matrix for each criterion for each alternative, then continued. To determine the Preference value (V), it is obtained from adding up the normalization results of the alternatives multiplied by each criterion.

The next stage is to give the value of each alternative to each of the criteria for prospective borrower members who will be selected according to the provisions of whether or not a member of the cooperative is worthy of making a loan by applying the SAW method based on a preference value scale. If the preference value is > 0.7 then the member is worthy of getting a loan and > 0.7 then the member not eligible for a loan.

RESULTS AND DISCUSSION

Analysis of data requirements for a decision support system to determine the eligibility of recipients of loan funds at PRIMKOPPOL POLRES Asahan, namely acquisition of questionnaire data, collection of data on prospective customers who apply for loans at PRIMKOPPOL POLRES Asahan, this data contains 6 basic criteria in determining the eligibility of recipients of loan funds at PRIMKOPPOL POLRES Asahan and data on 10 prospective customers who were sampled in determining the eligibility of recipients of loan funds that had been approved by PRIMKOPPOL POLRES Asahan.

In table 10 show the results of the suitability rating for each alternative for each criterion, the data will then be transformed into matrix X. Then normalize matrix X into matrix R with equation (3) to form a decision matrix.

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Table 10. Alternative Analysis Data

Code	Employee	C1	C2	C3	C4	C5	C6
A1	Zulhajri	60.000.000	52 years old	3 people	Very good	6.200.000	30 month
A2	Fajar Setiawan	35.000.000	32 years old	4 people	Good	5.400.000	10 month
A3	Agus Leo Matondang	25.000.000	26 years old	2 people	Good	5.200.000	20 month
A4	Pandapotan Sitorus	40.000.000	29 years old	5 people	Bad	5.300.000	40 month
A5	Marthin Judi Dolok Saribu	30.000.000	48 years old	3 people	Enough	4.400.000	15 month
A6	Asnah Rohani Hasibuan	20.000.000	43 years old	4 people	Very bad	4.100.000	25 month
A7	Aminullah Siregar	10.000.000	26 years old	5 people	Very good	3.400.000	12 month
A8	Irianto Surbakti	25.000.000	31 years old	2 people	Enough	3.400.000	18 month
A9	Bachrum Syahputra	45.000.000	43 years old	4 people	Good	2.400.000	16 month
A10	Rudi Hair-lan	16.000.000	36 years old	1 people	Bad	2.400.000	19 month

Table 11. Alternative Values for Each Criteria

Code	Employee	C1	C2	C3	C4	C5	C6
A1	Zulhajri	5	2	4	5	5	5
A2	Fajar Setiawan	4	4	3	4	4	2
A3	Agus Leo Matondang	3	5	5	4	4	4
A4	Pandapotan Sitorus	4	4	2	2	4	5
A5	Marthin Judi Dolok Saribu	3	2	4	3	3	3
A6	Asnah Rohani Hasibuan	3	2	3	1	3	5
A7	Aminullah Siregar	2	5	2	5	2	2
A8	Irianto Surbakti	3	4	5	3	2	3
A9	Bachrum Syahputra	4	2	2	3	2	3
A10	Rudi Hairlan	2	3	5	2	2	4

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$$X = \begin{pmatrix} 1 & 1 & 0.5 & 1 & 1 & 1 \\ 0.8 & 0.5 & 0.67 & 0.8 & 0.8 & 0.4 \\ 0.6 & 0.4 & 0.4 & 0.8 & 0.8 & 0.8 \\ 0.8 & 0.5 & 1 & 0.4 & 0.8 & 1 \\ 0.6 & 1 & 0.5 & 0.6 & 0.6 & 0.6 \\ 0.6 & 1 & 0.67 & 0.2 & 0.6 & 1 \\ 0.4 & 0.4 & 1 & 1 & 0.4 & 0.4 \\ 0.6 & 0.5 & 0.4 & 0.6 & 0.4 & 0.6 \\ 0.8 & 1 & 1 & 0.6 & 0.4 & 0..6 \\ 0.4 & 0.6 & 0.4 & 0.4 & 0.4 & 0.8 \end{pmatrix}$$

To determine the Preference value (V) it can be calculated by multiplying the W * R matrix where the W value is a presentation of the Criteria Importance weight values in table 2.

V_{A1} = (0.25×1)+(0.20×1)+(0.20×0.5)+ (0.15×1)+(0.10×1)+(0.10×1)
= 0.25+0.2+0.1+0.15+0.10+0.10 = 0.9

So that the value calculation results are obtained, Preference (V) of each alternative (Table 12).

Table 12. Value Calculation Results Preference (V)

Code	Employee	Mark Preference (V)
A1	Zulhajri	0.9
A2	Fajar Setiawan	0.67
A3	Agus Leo Matondang	0.59
A4	Pandapotan Sitorus	0.74
A5	Marthin Judi Dolok Saribu	0.66
A6	Asnah Rohani Hasibuan	0.67
A7	Aminullah Siregar	0.61
A8	Irianto Surbakti	0.52
A9	Bachrum Syahputra	0.79
A10	Rudi Hairlan	0.49

After calculating the preference value (V), the maximum value that represents the best choice is determined. With the provisions of whether or not a member of PRIMKOPPOL Asahan POLRES is eligible. If the preference value is > 0.7 then the member is eligible for a loan and < 0.7 then the member is not eligible for a loan.

Table 13. Recipient Eligibility Results Fund Loans

Code	Employee	Results	Decision
A1	Zulhajri	0.9	Worthy
A9	Bachrum Syahputra	0.79	Worthy
A2	Pandapotan Sitorus	0.74	Worthy

The SAW method can be an effective tool in supporting decision making in providing loan funds to Primkoppol members. Applying this method can improve performance and transparency in cooperative loan management, thereby providing significant benefits for both parties, both the cooperative and its members. Testing on the system can be seen in Image 1.

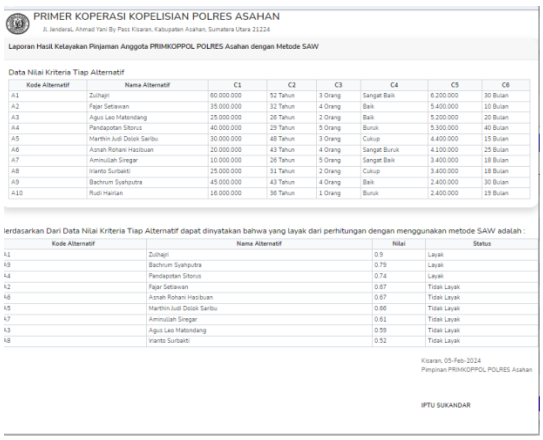

Image 1. Feasibility Result Report Print

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CONCLUSION

The decision support system designed can make it easier for Primkoppol to determine the provision of loan applications for Primkoppol Asahan members. The application of the Simple Additive Weighting method be able to provide solutions based on recommendations for members who are worthy of a loan. With the existence of a decision support system for providing loans, funds can be of better quality and effectiveness.

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