



AHP Method of Providing Business Capital Assistance To Information Systems Silumajang Village Bumdes Cooperative During The Covid-19 Pandemic

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ABSTRACT

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The application of the ahp method to the information system in cooperatives managed by the Village-Owned Enterprises (Bumdes) of Silumajang Village, has the goal of making it easier for cooperative members to apply for loans, especially during the corona virus (Covid-19) period. In the application of the Analytical Hierarchy Process (AHP) method as a weighting method for this information system, the weighting used is divided into criteria and sub-criteria, given a value for each criterion and sub-criteria and providing recommendations for feasibility to Bumdes management in determining whether or not members are eligible. customers in getting assistance or loans from village-owned cooperatives (bumdes) with the assessment of each criterion and sub-criteria based on the calculation of the Analytical Hierarchy Process (AHP). With the application of this method, it is hoped that it can provide a solution for management in the midst of limited social interaction in making decisions for members or prospective customers of Cooperatives in borrowing business capital.

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1. Introduction

Cooperatives are a form of union that has the aim of doing business with a family spirit that does not only think about themselves, so that every individual who is a member of a cooperative is able to carry out their obligations as members and receive rewards in proportion to their use of the organization.[1] In running a cooperative, cooperation from various parties is needed, both between managers and members. There are often unequal perceptions between managers and members. This results in a decrease in members or customers. The existence of individual interests from various parties makes members feel uncomfortable, both in the application process as a member and in the process of submitting as a customer. [2] Negligence in making decisions and determining recipients of assistance in the form of loans as customers often results in data errors, due to the interests of irresponsible parties in determining prospective customers who receive assistance from the bumdes, especially during the COVID-19 pandemic.[3] Due to the COVID-19 pandemic, which is a variant of the virus that interferes with breathing, the government, through a presidential decree, has implemented large-scale social restrictions to limit citizens' or the public's activities. With these restrictions, people who are sufficient to live by opening businesses or MSMEs are constrained by the small number of transactions that can threaten the continuity of business activities that have been initiated for years. To overcome this problem, a system will be built that will assist managers in the decision-making process when and wherever a manager is located. The builder of this system will use a Decision Support System for Providing Business Capital Assistance using the Analytic Hierarchy Process (AHP) Method in order to provide resources that are detailed, directed, and do not deviate from what has been described from



the background of the problem. It is necessary to define the problem and provide a The limitations of the problem that the author will examine include: [4]

- a. The decision support system created is a tool for managers in determining the feasibility of providing business capital assistance to customers.
- b. The main criteria used in the decision support system consist of the type of micro business, the size of the loan, the length of business and the size of the dependents.
- c. The method used in this study is (AHP) Analytic Hierarchy Process Model.

2. Method

A Decision Support System (DSS) or Decision Support System (DSS) is a system that is able to provide problem solving skills and communication skills for problems with semi-structured and unstructured conditions. This system is used to assist decision making in semi-structured and unstructured situations, where no one knows for sure how decisions should be made. Phases of the Decision Making Process [5]

- a. Phase of Intelligence
- b. Identifying the Issue
- c. Clarification of the Issue
- d. Responsibility for the Problem
- e. The Design Phase
- f. 6th. Choose a principle of choice.
- g. Create alternatives
- h. Measuring Outcomes
- i. 9th. Phase of Selection
- j. Implementation phase
- k. System features and capabilities
- l. 12th. System Benefit
- m. System components

Method of Analytical Hierarchy Process (AHP) Analytical Hierarchy Process (AHP) is a method for solving a complex, unstructured situation by dividing it into several components in a hierarchical arrangement, assigning a subjective value to the relative importance of each variable, and determining which variable has the highest priority to influence the situation's outcome.[6]. The main tool of AHP is a functional hierarchy with the main input being the human perception of priority between one element and another.[7] The existence of a hierarchy makes it possible to break down complex or unstructured problems into sub-problems, then arrange them into a hierarchical form. See Figure 1 in the hierarchical arrangement.

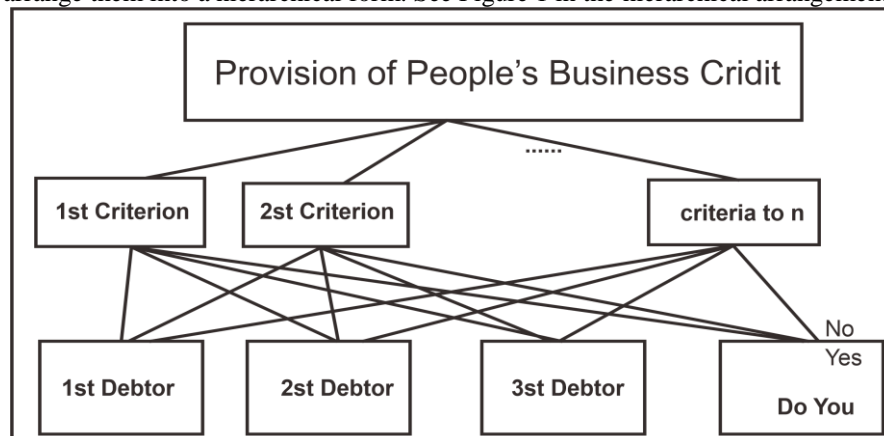


Fig 1. Hierarchical Structure of AHP in SPK Loans

If the multi-criteria problem has been modeled into a hierarchical form as shown in Figure 1, then the next step is to start the comparison stage in pairs to determine the value of the weights per criterion. This paired comparison stage will be used to find/calculate the weight of the criteria and the value of the

alternative weights for the assessment criteria.[8] while according to the time for giving the assessment using a Comparison Scale of 1-9, namely [9]:

- a. Equally Important
- b. Approaching A Little Is More Important Than
- c. Significantly more important than
- d. Approaching Is More Crucial Than
- e. More Significant Than
- f. Approaching Is Critical From
- g. Important From
- h. Approaching the Absolute From
- i. Extremely Important From

If the value of the weighting of the criteria has been obtained, the next step is to check the consistency of the pairwise comparison matrix. If the value is above 0.1, then pairwise comparisons must be made again until a value is less than or equal to 0.1 (consistent).

3. Results and Analysis

Calculation of AHP To start calculating the AHP is to determine the problem, criteria and sub-criteria, as well as alternative choices.[10] The problem is determining the recipient of business capital assistance at Bumdes, while the criteria used are: micro business, loan size, dependents and length of business. As for the sub-criteria in the form of identification or KTP, securities in the form of a vehicle book, and monthly income. The arrangement is described in a hierarchical form, as shown in the image below.

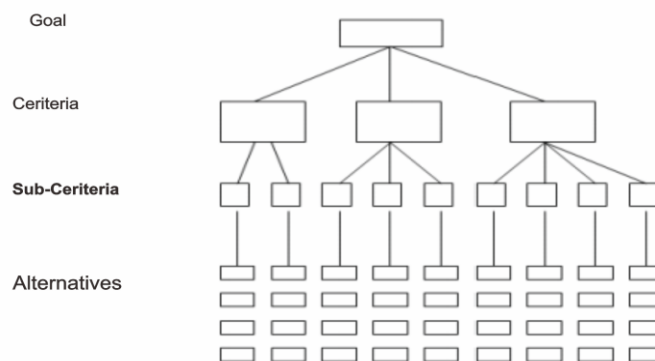


Fig 2. Hierarchical structure

Assessment criteria and alternatives. Criteria and alternatives were assessed through pairwise comparisons. With a scale value of 1 to 9, which is the best scale for expressing expert opinion.[11] The value and definition of qualitative opinion from the comparison scale according to Saaty, which has been stated previously. [4] [12] Comparisons are made based on the decision maker's policy by assessing the importance of one element to another. Starting from the top level of the hierarchy aimed at selecting criteria, such as micro-enterprises, then taking the elements to be compared, such as micro-enterprises, loan size, dependents, Then the process of compiling each element to be compared will look like in the matrix table below :

Table 1
Paired matrix

	Micro business	Loan amount	Depe ndents
Micro business	1	3	4
Loan amount	1/3	1	2
Depende nts	1/4	1/2	1



To determine the value between each element, a ratio of 1 to 9 is used. [4] as in the previous discussion. If one element is compared to itself, then it is given a value of 1. And if the element itself is compared to other elements, it will get a certain value. Then the other element is compared to the element itself, which is the opposite.[13] after the value in the criteria ranking in the form of a priority vector is obtained.[14] The next step is to convert the Pairwise Comparison matrix to decimal form and then add up each column. The next step is to convert the Pairwise Comparison matrix to decimal form and then add up each column.

Table 2

Matrix Pairwise Comparison			
	Micro business	Loan amount	Dependents
Micro business	1	3	4
Loan amount	0,333333	1	2
Long effort	0,2	1	2
Dependents	0,2	0,5	1
Sum	1,783333	5,5	9

The next step is to divide each element and column by the number of each related column, Column Element Division Table.

Table 3

Column Elements			
	Micro business	Loan amount	Dependents
Micro business	0,55918	0,5	0,4
Loan amount	0,186393	0,1	0,2
Dependents	0,139795	0,09	0,1

The next step is to perform calculations to get the normalized Eigenvector value. namely, by adding up each row and then dividing it by the value of the number of criteria. The number of criteria is 4.

Table 4

Eigen Vector				
	Micro business	Loan amount	Dependents	Eigen
Micro business	0,55918	0,5454	0,444	0,553
Loan amount	0,186393	0,1818	0,222	0,180
Dependents	0,139795	0,1909	0,111	0,102

The next step is the calculation of the comparison consistency value. The goal is to find out the consistency of the values obtained. Using the formula Calculating the Consistency Index (CI) $CI = (\lambda_{max} - n) / (n - 1) = 0.039$ Consistency Ratio = CI / RI , the RI value for $n = 3$ is 0.90 (RI) $CR = CI / RI = 0.0 / 0.9 = 0.0$ Because $CR < 0.1$, the weighting value can be said to be consistent. Next, perform the calculation of the micro business sub-criteria, see Figure 7 eigen vector to get the ranking of each alternative by calculating the eigen vector of each existing criteria and sub-criteria. So that the calculation results can be seen in the calculation results table.

Table 5

Calculation Results				
	Micro business	Loan amount	Dependents	Result
Customer Name	2	3	3	0,7
Customer Name	1	1	1	0,3
Customer Name	1	1	1	0,6

Program Testing In testing the use of the AHP method on the Bumdes information system in providing business capital assistance during the Covid-19 pandemic, this was done by using criteria and sub-criteria that had been inputted into the database system. The selected criteria and sub-criteria will be compared with a scale of 1-9 to determine the order of the highest priority. As in picture 3.

Fig 3. Selection of priority criteria

The first is to determine the choice of criteria, which is the choice used to determine priority in comparison. For the comparison of these criteria, each criterion is compared and scored using a scale formula of 1-9 to obtain the results of the comparison criteria assessment, namely $CR > 0.5$. If the CR value is > 0.5 , then the assessment can be continued. To express the calculation of the CR value in the form of a program as shown in Figure 4.

```

<tr>
<td><?php echo $data['idpinjaman']; ?></td>
<td><?php echo $data['nama']; ?></td>
<td><?php echo $data['bpinjaman']; ?></td>
<td><?php echo $data['p']; $p= $data['p']; ?> </td>
<td><?php echo $data['jenis usaha']; ?></td>
<td><?php echo $data['u']; $o= $data['o']; ?></td>
<td><?php echo $data['blamausaha']; ?></td>
<td><?php echo $data['l']; $j= $data['j']; ?></td>
<td><?php echo $data['btanggungan']; ?></td>
<td><?php echo $data['t']; $t= $data['t']; ?></td>
<td><?php echo $data['status']; ?></td>
<td>
<?
<?
$Hasil = $p * 0.553936408 * 0.553936408 + $u * 0.180941765 *
0.180941765 + $t * 0.102120466 * 0.102120466 ;
echo number_format($Hasil,3);
?>
</td>
<td>
<?
if ($Hasil < 0.5 )
{
echo'tidak layak';
}
if ($Hasil >= 0.5 )
{
echo'layak';
}
?>

```

Fig 4. CR value calculation script



4. Conclusion

Based on the description in the previous chapter regarding the use of the AHP method for providing BUMDes business assistance during the COVID-19 pandemic, the following conclusions can be drawn: The use of the AHP method to determine the highest criteria is very dependent on assigning a weight value to the criteria and sub-criteria that will produce the highest priority value.

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