# Decision Support System Terms of Credit Loans using Analytical Hierarchy Process Method (AHP) (Study Case: LPD Temesi Village)

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***Abstract*- the credit distribution is one of product of crediting of foundation that very helping for the citizens in increasing the economic. Credit matter foundation is one of institution citizen in which focusing economic field villagers that have functions shelter and help people of village dealing the financial. Being the institution of credit matter in villages the citizen can propose or ask loan credit of money with keep showing some criterion that as way in requirement of propose the credit. To make easier selective process and to achieve the result of objective score so it is needed a supporting system in taking decision where it can help to take decision. The steps of analytical hierarchy process (AHP) namely the making of matrix comparison couple criteria by using scale of AHP, determine comparison matrix, determine the value Eigen vector, determine the maximum of Eigen score, determine the consistence index score and ratio, and doing the normalization the value of score Eigen vector. The next, the heavy of score analytical hierarchy process will be timed with the heavy that having given by the taker decision, where the final score is total value that determining who is the candidate of customer who have rightful authority receiving the loan credit.**

**Keywords-*supporting decision system of giving credit matter, analytical hierarchy process (AHP)***

## I. INTRODUCTION

The growing of district of course cannot be free from the role of banking in an effort of giving the service to the citizens. [1] Institution Credit Matter Villages (LPD) is one institution of citizens that move in economics field in the villages. The village credit matters institution (LPD) has role in protection and help citizens in financial cases. Being the village credit matter institution (LPD), the people can be activity in saving, deposited their money or doing the credit matter in loan of money. The group of credit matter, Temesi is one of the institutions of financial dealing which being in Gianyar district. In The village credit matters institution Temesi at analysis of credit matter, citizens use manual way. The manual way is used one by one in proposal document and do counting the score from each document. Manual way that is used need long process, so it is difficult to determine the receiver of credit and difficult in reporting the accepting credit. So it is needed management technical in computer basic to make fast the process managerial data namely by supporting decision system by computer basically. Based on the problem of finding in the village credit matters institution (LPD) Tamesi Prakraman village, proposed to build recommendation system by using credit matter, analytical hierarchy process (AHP). Credit matter, analytical hierarchy process (AHP) is getting difficult to handle unsurely scoring and it has subjective characters.[2] Credit matter, analytical hierarchy process (AHP) uses comparison couple cased, count the scoring and analysis to result relative priority between alternative so it can be determined the credit accepter in the village credit matters institution (LPD) Tamesi Prakraman village

## II. LITERATURE REVIEW

### A. Supporting Decision System

The concept of supporting decision system (SPK) or decision support system (DSS) the first time is stated in beginning 1970s by Michael S. Scott Morton by using the term *management decision system*. [3] Decision support system is part from information computer basically (including knowledge basic system (knowledge management) that used to support the decision in organization or company. It can be said as computer system that manages the data becomes information to take decision from the semi-structure.

### *B. Analytical Hierarchy Process*

*Analytical Hierarchy Process* (AHP) is the method in which solve complex unstructured into some component hierarchy, by giving subjective score about the important every variable relatively and decide which variable that have the high priority to influence the result in that situation. Analytical hierarchy process (AHP) has many advantages in explaining the determine decision. One of them is describing about all sides dealing to the determine decision. [4]

### C. Credit

In Greek, the word credit etymology "*credere*" meant as is believed. It means that the giver credit is believe to the accepters, that credit is distributed by using assumption that it

can be returned as the appointment. While for the accepters of credit mean that being accepting the believing, so they (accepters) have duties return to payment back the loan based on the period time.[5]

## III. METHODOLOGY

This research is done in one of the bank of credit matters institution LPD Tamesi Prakraman village namely by having aim to help analysis side credit to determine the givers credit. In determining the accepters the researchers use supporting decision system by using analytical hierarchy process AHP. In this supporting decision system of giving credit to the village credit matters institution (LPD) has seven process or ways that be done, namely,

1. Determine the credit criterion
2. Counting the heavy criterion with analytical hierarchy process AHP
3. Entry the proposers data
4. Decide the measuring of parameter
5. Timing the measuring of parameter with analytical hierarchy process AHP
6. Determine the accepter credit based on the result from timing periods

A. Interview

Information is gotten directly to the researching place by using interview to as like part credit analysis dealing to giving of credit process for the candidate of accepting credit customers.

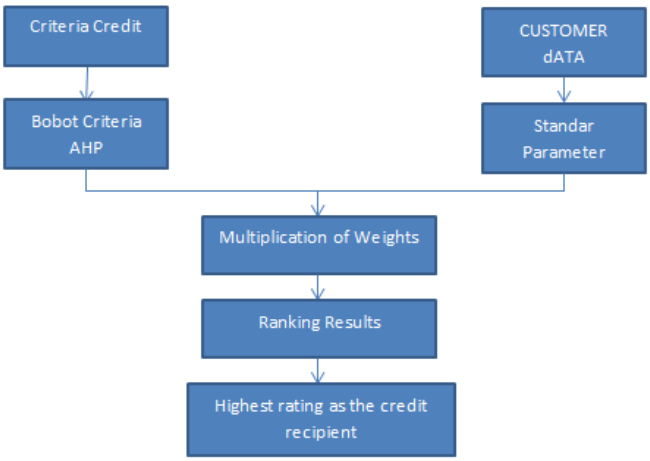
B. Related Review Literature

Study related review literature uses some references, namely by look for the literatures dealing to support this research. These related review literatures are dealing to journal. The information was gotten from literature study about the definition supporting decision, definition credit and the planning about supporting decision system.

## IV. CALCULATE ANALYSIS AND RESULT

A. General Description of System

General description of system shows that how the route works from the system that want to make, being seven process or routes that must be done, namely, determine criteria of credit, the consideration of heavy criteria with analytical hierarchy, entry the data of requesters, decide the parameter of heavy and times between the heavy from criteria analytical hierarchy process (AHP) with measuring parameter. From the result timing between two heavy so they will get guessing or level and based on the research of levels so it can be gotten the alternative from the proposers or requesters that have the highest levels and then they are proposed after that they will get receiving credit.




Picture 1 General Description System

B. Discussion Planning of Analytical hierarchy process (AHP) Here with the steps in counting with the AHP method in which use some methods in this research.

1. Determining the criterion these are needed on the system of recommendation for the candidate of receivers of credit.

TABLE 1 the comparison couple matrix

| Criteria | A1 | A2 | A3 | A4 | A5 | A6 |
|---|---|---|---|---|---|---|
| A1 | | | | | | |
| A2 | | | | | | |
| A3 | | | | | | |
| A4 | | | | | | |
| A5 | | | | | | |
| A6 | | | | | | |

Adverb:

A1 : Number of credit
A2 : Guarantee
A3 : Number income each month
A4 : Status of Institution .
A5 : Aim loading
A6 : Period time

2. Making the couple matrix is suitable with the criterion that has decided before. Based on the result of research in village credit matter institution (LPD) Temesi Prakraman village on the comparison couple matrix can be fill as below.

TABLE 2 The filling comparison matrix

| Criteria | A1 | A2 | A3 | A4 | A5 | A6 |
|---|---|---|---|---|---|---|
| A1 | 1 | 2 | 2 | 2 | 3 | 3 |
| A2 | 0.50 | 1 | 1 | 2 | 3 | 4 |
| A3 | 0.50 | 1 | 1 | 2 | 3 | 4 |
| A4 | 0.50 | 0.50 | 0.50 | 1 | 2 | 2 |
| A5 | 0.33 | 0.33 | 0.33 | 0.50 | 1 | 2 |
| A6 | 0.33 | 0.25 | 0.25 | 0.50 | 0.50 | 1 |

Number 1 on row A1 and column A1 describe the level of the same interest between the number of credit with the number while the number 2 in the second column on column A2 and line A1 shows that the quality rather more important if it is compared to the A1.
Numeral 0.50 in column A1 line A2 is result of counting 1/column A2 line A1. The other numeral is gotten by using the same ways. After doing fill of matrix compare of couple so the next steps about number of matrix in each column is first time to be change into numeral of decimal.

TABLE 3 Result of Matrix Counting

| Criteria | A1 | A2 | A3 | A4 | A5 | A6 |
|---|---|---|---|---|---|---|
| A1 | 1.00 | 2.00 | 2.00 | 2.00 | 3.00 | 3.00 |
| A2 | 0.50 | 1.00 | 1.00 | 2.00 | 3.00 | 4.00 |
| A3 | 0.50 | 1.00 | 1.00 | 2.00 | 3.00 | 4.00 |
| A4 | 0.50 | 0.50 | 0.50 | 1.00 | 2.00 | 2.00 |
| A5 | 0.33 | 0.33 | 0.33 | 0.50 | 1.00 | 2.00 |
| A6 | 0.33 | 0.25 | 0.25 | 0.50 | 0.50 | 1.00 |
| Total | 3.16 | 5.08 | 5.08 | 9.00 | 12.50 | 16.00 |

Numeral on the table 3 had changed into decimal form. The scoring in the total line is the result of the number from each column.

3. Doing normalization data by divided the score in each element in matrix that has couple to the total score in each column.

TABEL 4 The couple matrix Renormalization

| Criteria | A1 | A2 | A3 | A4 | A5 | A6 |
|---|---|---|---|---|---|---|
| A1 | 0.3157 | 0.3934 | 0.3934 | 0.25 | 0.24 | 0.1875 |
| A2 | 0.1578 | 0.1967 | 0.1967 | 0.25 | 0.24 | 0.25 |
| A3 | 0.1578 | 0.1967 | 0.1967 | 0.25 | 0.24 | 0.25 |
| A4 | 0.1578 | 0.0983 | 0.0983 | 0.125 | 0.16 | 0.125 |
| A5 | 0.1052 | 0.0655 | 0.0655 | 0.0625 | 0.08 | 0.125 |
| A6 | 0.1052 | 0.0491 | 0.0491 | 0.0625 | 0.04 | 0.0625 |

Numeral that there are in table 4 is the result dividing from each element in matrix at table 3 is divided by the total score in each column in table 3.

4. Look for the Eigen vector normalization by using the pattern: the number the row is divided by the number criteria.

TABLE 5 the comparison Matrix with Eigen Vector

| Criteria | A1 | A2 | A3 | A4 | A5 | A6 | EV |
|---|---|---|---|---|---|---|---|
| A1 | 0.3157 | 0.3934 | 0.3934 | 0.25 | 0.24 | 0.1875 | 0.2967 |
| A2 | 0.1578 | 0.1967 | 0.196 | 0.25 | 0.24 | 0.25 | 0.2152 |
| A3 | 0.1578 | 0.1967 | 0.196 | 0.25 | 0.24 | 0.25 | 0.2152 |
| A4 | 0.1578 | 0.0983 | 0.098 | 0.125 | 0.16 | 0.125 | 0.1274 |
| A5 | 0.1052 | 0.0655 | 0.0655 | 0.0625 | 0.08 | 0.125 | 0.084 |
| A6 | 0.1052 | 0.0491 | 0.0491 | 0.0625 | 0.04 | 0.062 | 0.0614 |

The numeral that are in column EV (Eigen Value) is the priority score in each criteria that as the result from number for each in rows then divided to the number of criteria in the supporting decision system to the givers credit in LPD at Temasi village which the criteria is used (6) point.

5. Look for the maximal Eigen by using pattern column: the number column in matrix comparison then it is timed to the element vector normalization.

TABLE 6 Comparison matrix couple to Maximum Eigen

| Criteria | A1 | A2 | A3 | A4 | A5 | A6 | EV |
|---|---|---|---|---|---|---|---|
| A1 | 0.3157 | 0.3934 | 0.3934 | 0.25 | 0.24 | 0.1875 | 0.2967 |
| A2 | 0.1578 | 0.1967 | 0.196 | 0.25 | 0.24 | 0.25 | 0.2152 |
| A3 | 0.1578 | 0.1967 | 0.196 | 0.25 | 0.24 | 0.25 | 0.2152 |
| A4 | 0.1578 | 0.0983 | 0.098 | 0.125 | 0.16 | 0.125 | 0.1274 |
| A5 | 0.1052 | 0.0655 | 0.0655 | 0.0625 | 0.08 | 0.125 | 0.084 |
| A6 | 0.1052 | 0.0491 | 0.0491 | 0.0625 | 0.04 | 0.0625 | 0.0614 |
| Amount | 3.16 | 5.08 | 5.08 | 9.00 | 12.5 | 16.00 | |
| Eigen Value Max (λmax) | | | | | | | 6.179 |

Numeral 6.179 is the maximum score that as result from times from the number column with each score that found in column EV (Eigen vector). Scoring 6.179 is the maximum value in each supporting decision system giving the credit loan to LPD at Temesi village.

TABLE 7 Criterion Priority Score

1. Counting (CI) Consistency Index = (( λmax )-n)/n-1)
   (CI) = (6.174-6)/5
   = 0.0348
2. Counting (CR) Consistency Ratio = CI/IR IR = 1.24 (Matrix
   = 0.0389/1.24
   = 0.0280

| Criteria | Prioritas Criteria |
|---|---|
| Number of credit | 0.2967 |
| Guarantee | 0.2152 |
| Number income each month | 0.2152 |
| Status of Institution | 0.1274 |
| Aim loading | 0.084 |
| Period time | 0.0614 |

Numeral in table 7 describes the priority score from each criterion that used as hint or reference to select for the giving credit in LPD Temesi village.

Counting value *Consistency Index* and *Consistency Ratio*

Comparison value or score couple in the criterion matrix is said consistent if *Consistency ratio*<= 0.1, If the *Consistency ratio* >0.1 so it needs to be reply again in counting till approximately *Consistency ratio*<= 0.1.

## V. CONCLUSION

1. Analyzing of analytical hierarchy process (AHP) shows the result same as the counting manually, so it is hoped this system can help the person or leaders to take decision in choosing the candidate customers who proper to get credit loan.
2. The result of counting program is said valid if the criterion of result is not over consistency scores.
3. Management data is not used again in using sheaf system in hard copy, but it is saved in data based form.

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