

Decision Support System for Submitting Credit using Analytical Hierarchy Process (AHP) Method Based on Android on Save and Loan Cooperatives Cubg Pasar Kemis Tangerang

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Abstract

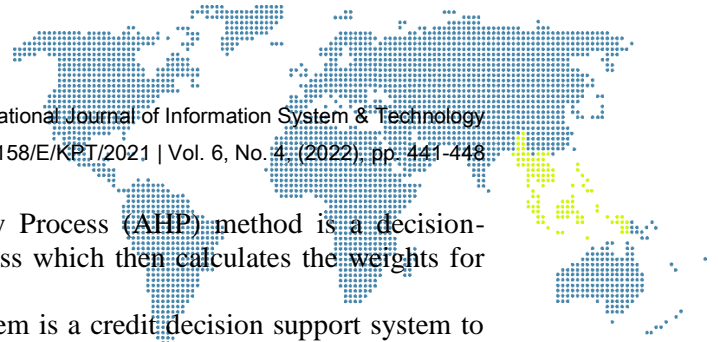
The government provides credit assistance to the community in order to increase income through small and medium enterprises (micro) through cooperatives. The limited funds provided and the large number of creditors require the use of a good and appropriate decision support system. Supporters of credit decisions used in savings and loan cooperatives in Tangerang have not used an accurate method of selecting prospective creditors. Therefore, a faster, more precise and accurate decision-making method is needed. The Analytical Hierarchy Process (AHP) method is a method that uses hierarchical process considerations to calculate the weights on each criterion such as economic conditions, character, capital, capacity, collateral by comparing sub-criteria in determining creditworthiness. This study uses the method of observation, interviews and literature study. Meanwhile, data analysis uses SWOT, system tools use Unified Modeling Language (UML). The results of this study will provide recommendations in the form of a decision-making system that is accurate, fast and easy. The application will be built with Android to support user convenience and speed up transactions.

Keywords: Decision Support System, Filing and Giving Credit, Analytical Hierarchy Process (AHP), Unified Modeling Language.

1. Introduction

The government empowers micro, small and cooperative enterprises to support poverty reduction from 10.96% to 7-8%. in 2019 [1]. The effort was carried out by increasing the income of 40% of the community with various businesses, such as: farmers, fishermen, informal workers and home industries. Meanwhile, in order to accelerate and strengthen the implementation of the KUR program, cooperatives under the financial services authority are involved as distributors of funds [2]. In line with the government's efforts to provide credit to micro-enterprises, cooperatives formed with joint capital for the welfare of their members are also involved in providing credit to small and medium-sized enterprises. Many service programs have been provided to members such as applications or credit, where programs are managed by cooperatives in providing assistance to members for business capital. In lending services, they still use a manual system and for decision making, there are often delays in the process of reporting customer data who apply for and provide credit. Some of the consequences of these problems are inaccurate data, not updating and a long process.

Credit services at cooperatives require a system that is able to solve these problems, especially in determining the creditworthiness of loans, namely a member creditworthiness



decision support system. The Analytical Hierarchy Process (AHP) method is a decision-making method by considering a hierarchical process which then calculates the weights for each criterion in determining creditworthiness. .

The novelty of this designed and developed system is a credit decision support system to assist employees in determining credit-worthy customers quickly so that the opportunity for distribution of funds will be quickly and easily absorbed by members in need. In addition, the results of the calculation of this AHP model will be developed in the form of an Android application so that prospective borrowers can quickly apply for loans supported by business evidence that can be uploaded through the application. This application can also provide quick information in the form of the results of decisions for loan applications that have been sent by cooperative members.

2. Research Methodology

Based on the analysis that has been done, there are several problems faced, namely the credit system currently running at the Pasar Kemis CUBG cooperative still using the manual system, namely credit, as a result there are customers who are disadvantaged, especially in the reporting process of providing invalid customer data. Inaccurate data causes the credit service process to be hampered. Therefore we need a system that can be used to determine the creditworthiness of a loan. Decision Support System is needed in making loan priority decisions. The decision support used by CUBG is based on the results of surveyor surveys and analysis of customer guarantee data submitted not using the right method so that the calculation results are not accurate which results in errors in selecting borrowing customers.

2.1. Credit

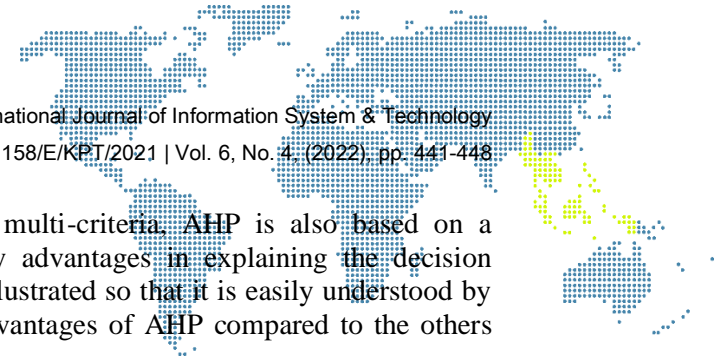
Loans or loans are productive assets that are very reliable because they are the main income from the Bank. And so it has an obligation to repay the loan according to the time period [4], loans or loans provided are one of the most dominant bank instruments in using their funds. Loans are productive assets that are very reliable because they are [5], ". Decision Support Systems are a set of model-based procedures for processing and assessment data to help managers make decisions [4].

2.2. UML

Bambang Hariyanto in his book entitled Object-oriented system engineering is a graphical language for documenting, specifying, and building software systems[13]. UML is object-oriented, applies many levels of abstraction, does not depend on the development process, does not depend on language and technology, the integration of several notations in various methodologies, the joint effort of many parties, supported by tools integrated through XML (XMI). UML is managed by OMG (object management group). UML is a modeling language for specifying, visualizing, constructing and documenting system artifacts. UML (Unified Modeling Language) is the standard language used to write software blueprints. UML can be used to visualize, specify, build, and document artifacts from software systems [6].

2.3. AHP (Analytical Hierarchy Process)

Analytical Hierarchy Process Method is a functional hierarchy with the main input of human perception. With hierarchy, a complex and unstructured problem is solved by one of the frequently used decision-making models[7]. AHP is used with the aim of arranging the priorities of various alternatives or pilke in these groups arranged into a hierarchical form. Analytical Hierarchy Process (AHP) is one method to help compose a priority of various choices using several criteria (multi criteria). Because of its multi-criteria nature, AHP is



quite widely used in 6 priorities. Besides being multi-criteria, AHP is also based on a structured and logical process[8]. AHP has many advantages in explaining the decision making process. One of them is to be graphically illustrated so that it is easily understood by all parties involved in decision making[9]. The advantages of AHP compared to the others are:

- a) Hierarchical structure, as the consistency of the criteria chosen, to the most sub-criteria[10].
- b) Calculating the validity up to the tolerance limit of inconsistencies in various criteria and alternatives chosen by decision makers[11].
- c) Taking into account durability or resistance to output analysis is sensitive to decision making. Quantitative scales 1 to 9 in the assessment of the comparison of the importance of one element to another.

2.4. Method

The research method carried out in this study is to collect data about the situation directly, and analyze the situation in order to obtain a final result that is useful for the study[10]. Data collection techniques used to search for or collect data and process the information needed are methods of observation, interviews and literature. The analysis technique uses the SWOT analysis method.

2.5. Element Weight Calculation

Mathematical formulation in the AHP model is carried out using a matrix [12]. Comparisons are made based on decision-making policies by assessing the importance of one element to another. Pairwise comparison process, starting from the top-level hierarchy, is intended to select criteria, for example x, then the elements to be compared are taken, for example x1, x2, and x3. The composition of the elements being compared will be seen in table 1 of the matrix below:

Table 1. Example of a paired comparison matrix

	x1	x2	x3
x1	1		
x2		1	
x3			1

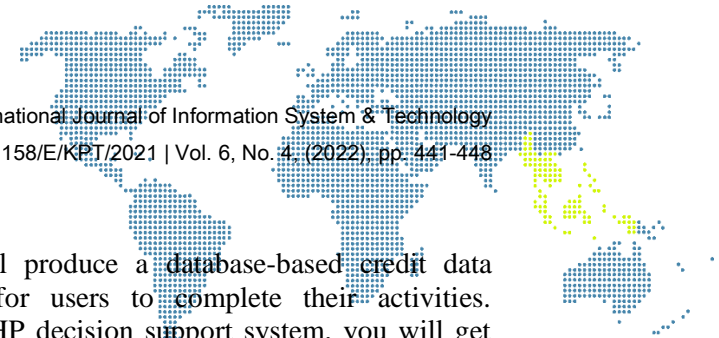
If an element is compared with itself, it is given a value of 1. So in this AHP, alternative assessments can be carried out using the direct method, namely the method used to enter quantitative data. in general these values come from previous analysis or from experience and detailed understanding of the decision problem. If the decision maker has experience or a good understanding of the problem at hand, he can immediately enter the weighting of each alternative.

Priority Determination (Priority Synthesis) The synthesis of the assessment results is the final stage of the AHP. However, basically this synthesis is the sum of the weights obtained by each choice on each criterion after the weighting of these criteria is carried out. In general, the option values are as follows:

$$ibop = \dots \dots \dots (1) \sum_{j=1}^n a_{ij} b_j \quad (1)$$

$$ibop = \text{value} / \text{weight for choice to I} \quad (2)$$

The formula can also be presented in table form. To make things easier, it is assumed that there are four criteria with four choices.



3. Result and Discussion

Making a credit decision support system will produce a database-based credit data management application that makes it easier for users to complete their activities. Furthermore, with the application based on the AHP decision support system, you will get added value in the form of: time efficiency in processing data for submitting and granting credit to customers, information accuracy and verification results that can be accounted for. With a fast credit approval process, it allows a larger quota of customers who apply for credit so that government funds for MSME assistance can be quickly absorbed. To see the strengths, weaknesses, opportunities and threats, the following is presented in the form of a swot table:

Table 2. SWOT Analysis

Strength	Weakness
Human resources with qualifications in the field of information is good enough	The use of Information Technology for administrative purposes in cooperatives is not optimal
Integrated computer network and internet-connected printers are available to support performance	Customer data validation takes more time and effort.
The leadership, namely the Board of Directors plays an active role in controlling the flow of credit applications.	Update data does not have an automatic backup system so data can be lost or damaged.
Available internet connection in the form of LAN and WLAN	
Opportunity	Threat
Technological developments are quite rapid which allows better system improvements for data processing purposes	Many companies have used an Android-based computerized system with easy access and real time.
Access to credit promotion information and applications can be done quickly	The threat of crackers that can damage the system.
With information technology, the number of customers applying for credit will increase	There is negative competition between companies and
The performance process can increase	The threat of weather conditions such as floods and being struck by lightning

The following is the proposed system procedure described using UML (Unified Modeling Language) at CUBG Pasar Kemis:

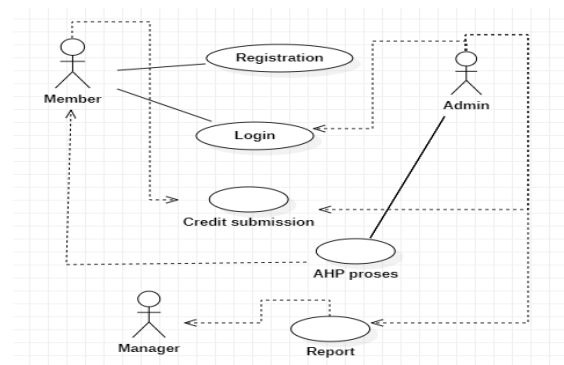
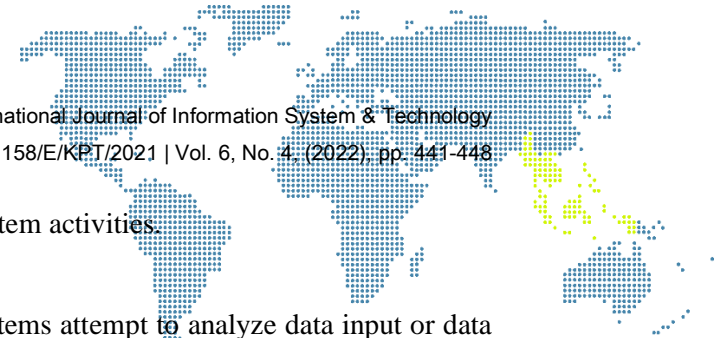


Figure 1. Use Case Diagram

Based on image 1 Use Case Diagram of the credit submission system proposed today, there are:



- a) 1 system that includes credit application system activities.
- b) 2 actor who performs it in the system.

Decision support and credit decision support systems attempt to analyze data input or data flow systematically, process or transform data, store data, produce information and there is an analysis form for AHP (Analytic Hierarchy Process) assessment of criteria and calculations. System design is used for functional improvements that can be achieved through the use of computerized information systems.

a) Display of Registration Page

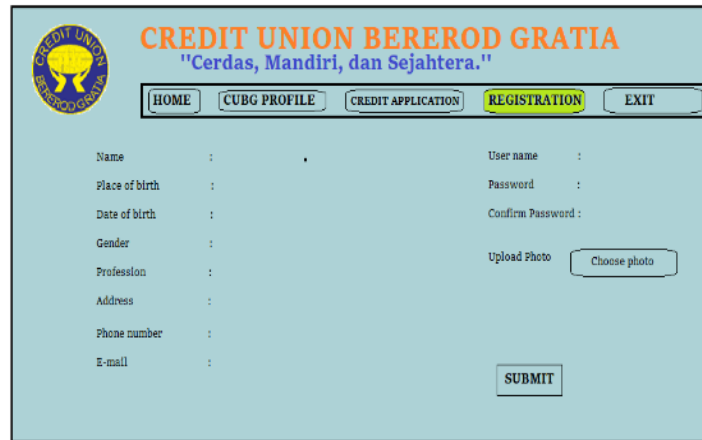


Figure 2. Display of the Registration Page

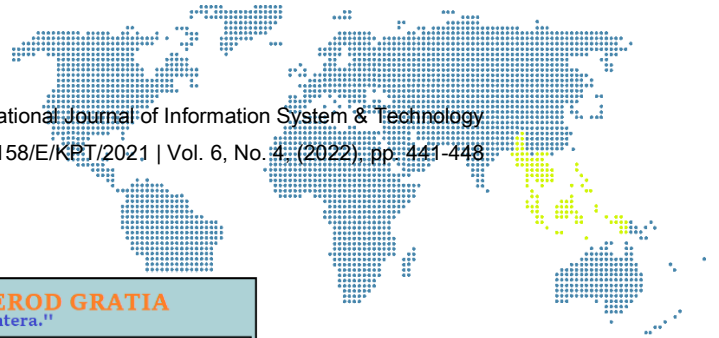
In Figure 2, the registration page for a prospective customer registering, especially filling out all available formats on the page column and functioning as the creation of a prospective customer account if you want to log in.

b) Login Page View



Figure 3. Login page view

In figure 3 describes the login page of a prospective customer to do the step into the credit application form. In this login system only customers who have registered account registration and passwords are listed so that the security level is maintained and irresponsible people will not be able to enter the system.



c) Display of Credit Request Form Page

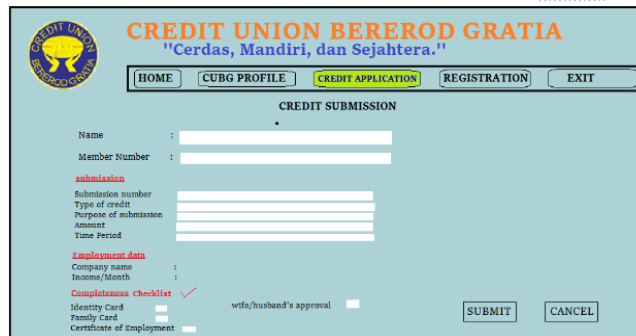


Figure 4. Display of Credit Request Form Page.

In Figure 4, explain the page of the credit application form for a prospective customer by filling out the form available on the web. In this credit application form system, only prospective customers have registered through the previous account registration and password.

d) Display Credit Submission Status Page

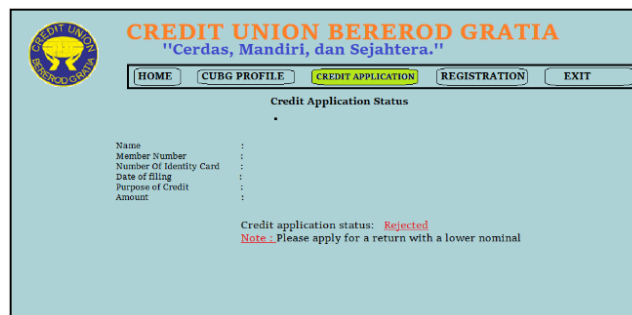


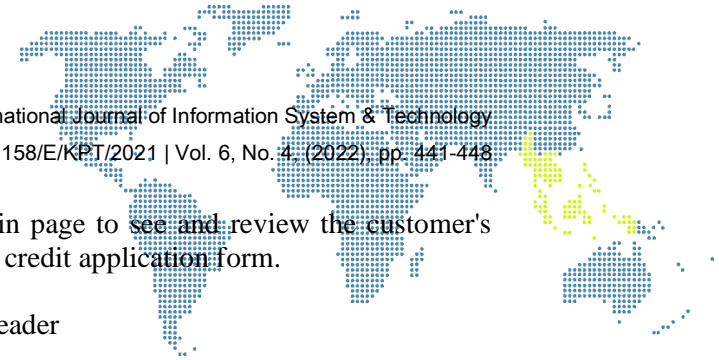
Figure 5. Display of Credit Submission Status Pages

In Figure 5 describes the page for credit application status for a prospective customer after completing the credit application form. In this credit status submission system, prospective customers wait for the results of the report file on acc or not after being confirmed by account officers and directors.

e) Display of Admin Login



Figure 6. Display of Admin Login



In figure 6 describes the admin and leadership login page to see and review the customer's files that have filled out and complete the file on the credit application form.

f) Page Views at the Account Admin Officer and Leader

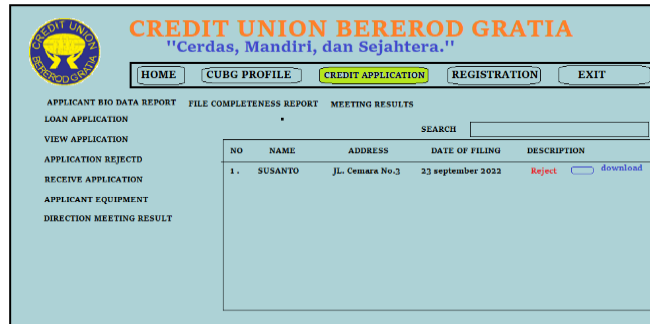


Figure 7. Display page at the Admin Account Officer

In figure 7 describes the page on the admin account officer to see and review the customer's files that have filled out and complete the file on the credit application form. In this system can display customer files that have been uploaded then the admin account officer and the leader conduct a meeting then the filing decision is taken in acc when filling out the complete credit application form then the admin gives information to the customer. But if the submission is rejected there may be some files that have not been completed and then the admin informs the customer to complete the file again.

g) Display Credit Analysis Criteria Grading Form

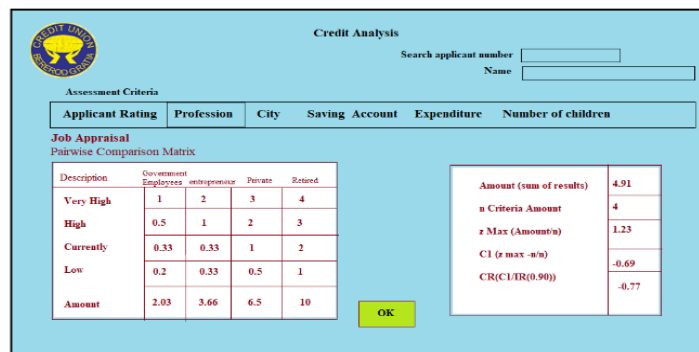
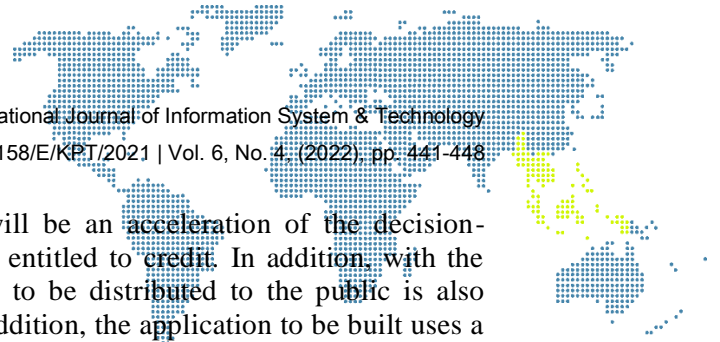


Figure 8. Display of the Credit Provision Grading Criteria Analysis Form

In figure 8 it explains that the assessment criteria for prospective creditor customer data are OK. it can be explained that the credit decision support system uses the AHP method (Analytical Hierarchy Process) which contains the input of the applicant's data in advance and there is an assessment of criteria which will later be used as a reference for credit decisions.

4. Conclusion

This web-based credit application decision support system is designed to assist the government in providing credit information and services to the public. With the AHP model



decision support system, it is hoped that there will be an acceleration of the decision-making process to determine which customers are entitled to credit. In addition, with the acceleration of decisions, the absorption of funds to be distributed to the public is also faster. this will lead to good economic growth. In addition, the application to be built uses a website, xampp as a web server, PHP scripting language, MySQL as a database management system (DBMS) and the AHP (Analytic Hierarchy Process) method. comprehensive by considering the hierarchical process. Furthermore, the calculation of the weight of each criterion such as (economic condition, character, capital, capacity, collateral) is compared with the sub-criteria (good, good enough and less) in determining creditworthiness. The use and utilization of an application support system for submitting decisions and credit using the web-based AHP (Analytic Hierarchy Process) method can make it easier for CUBG Pasar Kemis admin officers to carry out customer financial literacy as well as provide the latest information in CUBG cooperatives.

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