

# MCDM Using Multi-Attribute Utility Theory and PIPRECIA in Customer Loan Eligibility Recommendations

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**Abstract**—Customer loan eligibility recommendations are an important step in the risk and financial assessment process. To ensure business continuity and customer satisfaction, it is important for financial institutions to consider several key factors. Problems in determining lending include various aspects that include credit risk that is difficult to assess appropriately, insufficient information about potential borrowers, potential fraud that can harm lenders. Regardless, financial institutions must ensure sound risk management and comply with applicable regulations and compliance standards to minimize potential losses and maintain fairness in decision-making related to lending. Cooperatives act as institutions that provide access to loans with more flexible terms than conventional financial institutions. The loan application process involves evaluating the customer's eligibility, which includes an analysis of financial condition, credit history, and repayment capacity. The contribution of this study provides a recommendation for savings and loan cooperatives in lending to customers using a decision support system model. The purpose of this study is to evaluate and compare customer loan feasibility using a combination of Multi-Criteria Decision Making (MCDM) methods, namely Multi-Attribute Utility Theory (MAUT) and Pivot Pairwise Relative Criteria Importance Assessment (PIPRECIA). This study aims to determine the ability of both methods to provide a comprehensive understanding of loan feasibility by considering a number of relevant criteria. The results of the customer loan eligibility rating recommend rank 1 with a final value of 0.5127 obtained by Customer K, rank 2 with a final value of 0.432 obtained by Customer I, and rank 3 with a final value of 0.3559 obtained by Customer F.

**Keywords:** Customer; Loan Eligibility; MAUT; PIPRECIA; Recommendations

## 1. INTRODUCTION

Customer loans to cooperatives are financial facilities that allow cooperative members to get financial support for various purposes such as micro-enterprises, education, health, or other personal needs. Cooperatives act as institutions that provide access to loans with more flexible terms than conventional financial institutions. The loan application process involves evaluating the customer's eligibility, which includes an analysis of financial condition, credit history, and repayment capacity[1]. Cooperatives often provide mentoring and training to their customers to improve their understanding of financial management and business development. Through these loans, cooperatives play a role in advancing the local economy and providing support to its members to achieve their financial goals. Evaluation of customer loan feasibility at cooperatives is an important stage in the lending process that aims to ensure the sustainability and success of the cooperative's business[2]. This assessment involves an in-depth analysis of the customer's financial condition, credit history, and repayment capacity. Other factors such as the purpose of the loan, the type of business, and the growth potential of the business are also taken into consideration. In addition, cooperatives must also check the provisions of loan-related laws and regulations to ensure compliance and security of transactions. Problems in determining lending include various aspects that include credit risk that is difficult to assess appropriately, insufficient information about potential borrowers, potential fraud that can harm lenders. Regardless, financial institutions must ensure sound risk management and comply with applicable regulations and compliance standards to minimize potential losses and maintain fairness in decision-making related to lending. By conducting a careful evaluation, cooperatives can mitigate credit risk, maintain the financial health of cooperatives, and provide appropriate financial support to customers to improve their economic development. One technique in assessing loan feasibility can be using a decision support system.

Decision Support System (DSS) is an information system designed to assist decision makers in analyzing information, planning solutions, and making better decisions [3]–[5]. Through modeling, simulation, and statistical analysis, DSS helps identify trends, risks, and opportunities that might influence decisions[6]. Decision Support Systems have an important role in various sectors, such as business, industry, health, and government, enabling decision makers to make more informed and efficient decisions. DSS continues to evolve and become an irreplaceable tool in supporting decision makers in dealing with the complexity and dynamics of the business and organizational environment. Decision Support Systems (DSS) and Multi-Criteria Decision Making (MCDM) have a close relationship because DSS is often used as a tool or technology to support the implementation of MCDM methods. MCDM is an approach or framework for addressing complex decisions that involve multiple criteria or factors that need to be considered simultaneously [7]. DSS, on the other hand, is an information system that provides technology support and data analysis to aid decision making. MCDM is a systematic approach used to handle complex decision-making processes by considering several criteria or factors simultaneously. The main purpose of MCDM is to assist decision makers in evaluating decision alternatives and selecting optimal solutions based on predefined criteria[8]. The MCDM method involves mathematical and statistical analysis to measure the relative value of each alternative, which is then

used to rank or select the best solution. MCDM is often applied in a variety of contexts, such as business, engineering, environment, and government decision-making, to provide better insights and support more effective decisions[9].

The implementation of MCDM has a positive impact by providing a clear structure in the decision-making process, especially when there are trade-offs or conflicts between criteria. The use of MCDM can help identify solutions that meet a number of criteria in a balanced manner, and thus, increase transparency and accountability in decision processes[10]. The MCDM method also supports a better understanding of diverse stakeholder preferences and priorities. As technology advances, the use of MCDM increasingly involves artificial intelligence algorithms and complex data analysis to improve accuracy and efficiency in the evaluation of decision alternatives[11]. Therefore, MCDM is not only a useful tool in the context of multidimensional decision making, but also plays an important role in improving the quality of decisions in various sectors and levels of complexity. One of the methods in MCDM is Multi-Attribute Utility Theory.

Multi-Attribute Utility Theory (MAUT) is a framework in decision-making theory designed to handle situations in which decision makers must evaluate alternatives based on some criteria or attributes[12]. MAUT blends the utility concept of economics with the concept of preference from psychology, allowing decision makers to express their preferences against a variety of criteria. In MAUT, each attribute is assigned a weight according to its importance, and utility functions are used to describe the decision maker's preference for the possible values of each attribute. Through this process, MAUT can generate ratings for each alternative and assist decision makers in finding the solution that best suits their preferences[13]. With a comprehensive approach to decision-making, MAUT plays an important role in a variety of fields, including economics, management, and decision science. MAUT also takes into account uncertainty and subjective preferences through approaches that allow decision makers to overcome complexities in assessments. The use of utility functions helps gauge the level of satisfaction or benefit provided by each alternative, allowing decision makers to incorporate their preferences consistently[14]. In addition, MAUT provides the flexibility to incorporate qualitative and quantitative information into the evaluation framework, creating a more holistic model. Although MAUT may require significant effort in identifying and obtaining accurate data, it provides an edge in supporting decision-making in complex and multidimensional contexts. By detailing preferences, weights, and utility functions, MAUT becomes an effective tool to assist decision makers in navigating decision-making challenges involving a large number of criteria or factors. Although Multi-Attribute Utility Theory (MAUT) has its advantages, it also has some drawbacks to consider: the difficulty of measuring weights for each criterion is a complex and difficult task[15]. One of the proposed criteria weighting techniques uses the Pivot Pairwise Relative Criteria Importance Assessment (PIPRECIA).

Pivot Pairwise Relative Criteria Importance Assessment (PIPRECIA) is a method in Multi-Criteria Decision Making (MCDM) designed to assess the relative importance between criteria[16]. This method involves determining a pivot criterion that is used as a reference point to compare the importance of each other criterion in pairs. Decision makers are asked to give preference relative to each pair of criteria against the pivot criterion. The results of this pairwise comparison process is used to calculate the relative importance score for each criterion. PIPRECIA provides simplicity in execution and minimizes the number of comparisons that decision makers have to make, while providing significant insight into the priority of criteria in decision-making processes involving multiple criteria[17]. This method can help address redundancy issues and inconsistencies in preferences, resulting in more consistent criterion rankings. By focusing on pairwise comparisons against pivot criteria, PIPRECIA can also reduce the cognitive load on decision makers, making the assessment process more efficient.

Research related to the feasibility of customer loans was conducted by Nony Ernita Rumahorbo (2021), the COPRAS method is able to solve the problem of providing loans to which farmer groups are eligible to receive loans in accordance with the quota provided from the Samosir Regency Agriculture Office. The result of this study is an application with the final results obtained in the form of ranking the highest value to the lowest value of the COPRAS method so that it can be determined which farmer groups are eligible to receive loans in accordance with the quota provided.[18]. Research, Kusmanto (2022) MOORA method and MOOSRA Method The application of the MOORA method and MOOSRA method is also quite easy to use as a way to select credit recipients because the steps to solve it are quite simple. From several alternatives, it can be seen that the 1st highest alternative is worthy of credit. That is alternative 2 named mujiani the result of the value 245,987 using the MOORA method. Likewise, using the MOOSRA method, Alternative 2 which is the highest rank with a value of 33.2729 [19]. Research, Harefa (2020) researches the Analytical Hierarchy Process (AHP) method used to determine the weight of criteria and the Simple Additive Weighting (SAW) method to find the best alternative in determining prospective customers who are eligible for loans[20]. Research from Sonang (2020) the Topsis method can answer or solve the problems faced by Caritas HKBP Pematangsiantar in determining creditworthiness. The results of the calculation of the case of this study that are eligible for a loan in order are NA2 with a value of 0.6390, NA1 with a value of 0.5737, the third is NA3 with a value of 0.5053, and the last is NA4 with a value of 0.3102. [21]. The difference between the research conducted and the previous research that became a reference is that this study uses a combination of the PIPRECIA weighting method in determining the weight of the criteria used and the MAUT method used in determining the feasibility of lending to cooperative customers. The contribution of this study provides a recommendation for savings and loan cooperatives in lending to customers using a decision support system model.

## 2. RESEARCH METHODOLOGY

### 2.1 Research Stages

Research stages are a series of steps that must be passed by researchers to design, implement, and analyze a study. This stage involves a structured and systematic process, starting from the identification of problems to the presentation of findings. This stage of research helps maintain the accuracy, credibility, and validity of the overall research results. The stages of research carried out are as shown in Figure 1.

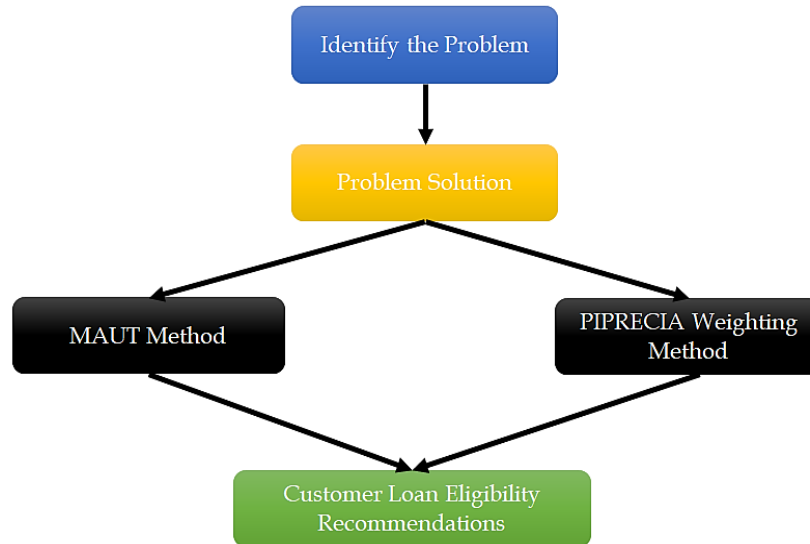


Figure 1. Stages of Research

The research stage in figure 1 involves a series of systematic steps to achieve the objectives that have been set, starting from the identification of problems and solutions to problems using the MAUT and PIPRECIA methods to provide recommendations for customer loan feasibility.

### 2.2 Identify the Problem

Identification of problems in this study involves an introduction to challenges or obstacles that may be faced during the study, as well as determining aspects that require special attention. One potential problem that can be identified is the uncertainty or limitation of data, especially the criteria data used to assess customer loan eligibility are not available completely or accurately.

### 2.3 Problem Solution

The application of Decision Support Systems (DSS) in lending provides innovative solutions to overcome a number of problems that are often associated with this process. Through automatic and fast analysis, SPK can evaluate loan eligibility by considering various factors, including the customer's financial condition, credit history, and loan objectives. By utilizing the Multi-Criteria Decision Making (MCDM) method, DSS provides a holistic and structured view, which allows financial institutions to make more informed and accurate decisions. Risk modeling and the use of predictive models in DSS also help identify potential credit risks, enabling financial institutions to take preventive action. In addition, this system simplifies manual decision making and allows adjustment of lending policies based on customer characteristics. Thus, DSS not only improves process efficiency, but also reduces credit risk and provides more accurate and up-to-date lending decisions.

### 2.4 PIPRECIA Method and MAUT Method

The PIPRECIA method provides the ability to model the complexity of preferences and detail the relative importance between criteria, giving it a more accurate and contextual weight. The stages of weighting calculation using PIPRECIA are establishing relative significance values using the following equation.

$$S_j = \begin{cases} 1 & \text{if } c_j > c_1 \\ 1 & \text{if } c_j = c_1 \\ 1 & \text{if } c_j < c_1 \end{cases} \quad (1)$$

$S_j$  is the relative significance value,  $C_j$  is the initial value of the criterion weight.

Next set the value of the coefficient using the following equation.

$$K_j = \begin{cases} 1 & \text{if } j = 1 \\ 2 - S_j & \text{if } j > 1 \end{cases} \quad (2)$$

$K_j$  is the value of the relative coefficient.

Next calculate the weight using the following equation.

$$Q_j = \begin{cases} 1 & \text{if } j = 1 \\ \frac{1}{K_j} & \text{if } j > 1 \end{cases} \quad (3)$$

$Q_j$  is the relative weight value.

Finally, calculate the relative final weight of the criterion using the following equation.

$$W_j = \frac{Q_j}{\sum_{k=1}^n Q_k} \quad (4)$$

$W_j$  is the weighted value of the criterion.

Multi-Attribute Utility Theory (MAUT) is a method of multi-criteria decision making that integrates utility preferences and values from various criteria to evaluate alternatives and select the most optimal solution. The first stage in the MAUT method is to make a decision matrix using the following equation.

$$X = \begin{bmatrix} x_{i1} & \cdots & x_{in} \\ \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mn} \end{bmatrix} \quad (5)$$

The next stage normalizes the decision matrix that has been made so that it will produce a normalization matrix, a formula for normalizing as in the following equation.

$$r_{ij}^* = \frac{x_{ij} - \min(x_{ij})}{\max x_{ij} - \min(x_{ij})} \quad (6)$$

$$r_{ij}^* = 1 + \frac{\min(x_{ij}) - x_{ij}}{\max x_{ij} - \min(x_{ij})} \quad (7)$$

The equation above has 2 types of equations for the type of benefit criteria calculated using equation (6), and the type of cost criteria calculated using equation (7). The next stage in the MAUT method is to calculate the utility value with the following equation.

$$u_{ij} = \frac{e^{(r_{ij}^*)^2} - 1}{1.71} \quad (8)$$

The final stage calculates the final value of the utility with the following equation.

$$u_{(x)} = \sum_{j=1}^n u_{ij} * w_j \quad (9)$$

### 2.5 Customer Loan Eligibility Recommendations

The results of the evaluation of loan feasibility using Multi-Attribute Utility Theory (MAUT) and PIPRECIA, recommendations can be given to guide decisions related to lending to customers. These recommendations help financial institutions to optimize lending decisions by considering customer needs, reducing credit risk, and maintaining institutional financial sustainability.

## 3. RESULT AND DISCUSSION

Multi-criteria decision making in customer loan eligibility recommendations involves the integration of two methods, namely Multi-Attribute Utility Theory (MAUT) and Pivot Pairwise Relative Criteria Importance Assessment (PIPRECIA). First of all, PIPRECIA is used to determine the pivot criterion on which relative comparison is the focus. By asking decision makers to give preference to pairs of criteria over pivot criteria, PIPRECIA helps set criteria priorities in a simpler and more efficient way. Furthermore, Multi-Attribute Utility Theory is used to identify and assess loan eligibility criteria, such as financial condition, credit history, and repayment capacity. By assigning weight and utility functions to each criterion, MAUT allows measurement of the level of preference and importance of each factor. The integration of these two methods creates a comprehensive approach in evaluating loan feasibility, enabling. Based on the identification of the problem the criteria to be used as in table 1.

**Table 1.** Data on Eligibility Criteria for Customer Lending

Criteria	Type	Initial Weight of Criteria
Income	Cost	1
Customer's Financial Condition	Cost	1
Credit History	Benefit	0.8

Criteria	Type	Initial Weight of Criteria
Guarantee	Benefit	0.4
Large Loans	Cost	1
Period	Benefit	0.8

Table 1 is the criteria used in determining loan eligibility, these criteria are obtained from the XYZ Cooperative in determining lending to customers in the cooperative.

### 3.1 Customer Assessment Data

Customer assessment data is a collection of information analyzed to evaluate the adequacy and feasibility of a customer in obtaining a loan. The collection and analysis of customer assessment data is the main foundation in the decision-making process for financial institutions or cooperatives, helping them identify customers who are eligible for loans and determine terms and conditions that are in accordance with the customer's risk profile and needs. The sustainability and accuracy of information in customer assessment data is key in ensuring a sustainable and fair lending process. The following is the data from the assessment of customers obtained from cooperatives as in table 2.

Table 2. Customer Assessment Data

Customer	Income	Customer's Financial Condition	Credit History	Guarantee	Large Loans	Period
Customer F	8000000	3	5	3	15000000	12
Customer G	6500000	2	4	2	25000000	24
Customer H	7000000	3	3	2	20000000	12
Customer I	7500000	2	4	1	18000000	36
Customer J	9000000	3	3	3	10000000	18
Customer K	9500000	2	5	2	12000000	24
Customer L	7750000	3	3	3	19500000	36
Customer M	5500000	3	4	3	22500000	24

Table 2 is the assessment data obtained from cooperatives based on loan application data made by customers, this data is used for analysis with the MAUT method in determining the feasibility and priority of lending to customers. The customer's financial condition is obtained from an assessment from a company that assesses customer finances based on savings and loans data available at the cooperative.

### 3.2 Criteria Weighting Using PIPRECIA Method

The PIPRECIA method is an approach used in weighting criteria in multi-criteria decision making., the application of the PIPRECIA method provides convenience in evaluating the relative importance between criteria with a focus on pivot criteria. In this way, it helps to obtain a more objective weight of criteria and provides clearer insight into the factors that most influence decisions in a multi-criteria context. The stages of weighting criteria using the PIPRECIA method are determining relative significance using equation (1), Determining the value of the coefficient using equation (2), Calculating weight using equation (3), calculation results as in table 3.

Table 3. Weighting Criteria Using the PIPRECIA

Criteria	$S_j$	$K_j$	$Q_j$
Income	1	1	1
Customer's Financial Condition	1	1	1
Credit History	0.8	1.2	0.833
Guarantee	0.4	1.6	0.625
Large Loans	1	1	1
Period	0.8	1.2	0.833
			5.291

Finally, calculate the relative final weight of each criterion using equation (4), the result of calculating the final weight of each criterion is as follows.

$$W_1 = \frac{Q_1}{\sum_{k=1}^n Q_k} = \frac{1}{5.291} = 0.189$$

$$W_2 = \frac{Q_2}{\sum_{k=1}^n Q_k} = \frac{1}{5.291} = 0.189$$

$$W_3 = \frac{Q_3}{\sum_{k=1}^n Q_k} = \frac{0.833}{5.291} = 0.157$$

$$W_4 = \frac{Q_4}{\sum_{k=1}^n Q_k} = \frac{0.625}{5.291} = 0.119$$

$$W_5 = \frac{Q_5}{\sum_{k=1}^n Q_k} = \frac{1}{5.291} = 0.189$$

$$W_6 = \frac{Q_3}{\sum_{k=1}^n Q_k} = \frac{0.833}{5.291} = 0.157$$

From the calculation of the final value of each criterion weight, the weight of the criteria to be used in the calculation of the feasibility assessment of lending using the MAUT method.

### 3.3 Customer Loan Eligibility Using MAUT Method

Evaluation of customer loan feasibility using the Multi-Attribute Utility Theory (MAUT) Method involves a series of systematic steps to produce optimal decisions. The first stage in the MAUT method is to make a decision matrix using equations (5).

$$X = \begin{bmatrix} 8000000 & 3 & 5 & 3 & 15000000 & 12 \\ 6500000 & 2 & 4 & 2 & 25000000 & 24 \\ 7000000 & 3 & 3 & 2 & 20000000 & 12 \\ 7500000 & 2 & 4 & 1 & 18000000 & 36 \\ 9000000 & 3 & 3 & 3 & 10000000 & 18 \\ 9500000 & 2 & 5 & 2 & 12000000 & 24 \\ 7750000 & 3 & 3 & 3 & 19500000 & 36 \\ 5500000 & 3 & 4 & 3 & 22500000 & 24 \end{bmatrix}$$

The next step is to normalize the decision matrix that has been made so that it will produce a normalization matrix, for the criteria of Income, Customer's Financial Condition, and large Loans calculated using equation (7), for the criteria of Credit History, Guarantee, and Period calculated using equation (6). The calculation results for income criteria are as follows.

$$r_{11}^* = 1 + \frac{5500000 - 8000000}{9500000 - 5500000} = 0.375$$

The overall result of the calculation of matrix normalization is as shown in table 3.

**Table 3.** Matrix Normalization

Customer	Income	Customer's Financial Condition	Credit History	Guarantee	Large Loans	Period
Customer F	0.375	0	1	1	0.6667	0
Customer G	0.75	1	0.5	0.5	0	0.5
Customer H	0.625	0	0	0.5	0.3333	0
Customer I	0.5	1	0.5	0	0.4667	1
Customer J	0.125	0	0	1	1	0.25
Customer K	0	1	1	0.5	0.8667	0.5
Customer L	0.4375	0	0	1	0.3667	1
Customer M	0.375	0	0.5	1	0.6667	0.5

The next stage in the MAUT method is to calculate the utility value with equation (8), the results of calculating the utility value are as follows.

$$u_{11} = \frac{e^{(r_{11}^*)^2} - 1}{1.71} = \frac{0.15099}{1.71} = 0.0883$$

The overall result of the utility value calculation is as shown in table 4.

**Table 4.** Utility Value

Customer	Income	Customer's Financial Condition	Credit History	Guarantee	Large Loans	Period
Customer F	0.0883	0.0000	1.0048	1.0048	0.3273	0.0000
Customer G	0.4416	1.0048	0.1661	0.1661	0.0000	0.1661
Customer H	0.2795	0.0000	0.0000	0.1661	0.0687	0.0000
Customer I	0.1661	1.0048	0.1661	0.0000	0.1423	1.0048
Customer J	0.0092	0.0000	0.0000	1.0048	1.0048	0.0377
Customer K	0.0000	1.0048	1.0048	0.1661	0.6547	0.1661
Customer L	0.1234	0.0000	0.0000	1.0048	0.0842	1.0048
Customer M	0.0883	0.0000	0.1661	1.0048	0.3273	0.1661

The final stage calculates the final value of utility with equation (9) obtained from the multiplication between the weight of the criterion using PIPRECIA and the value of utility, the final value of each alternative utility result as follows.

For the final value of Customer F as follows.

$$u_{(1)} = (0.189 * 0.0883) + (0.189 * 0) + (0.157 * 1.0048) + (0.119 * 1.0048) + (0.189 * 0.3272) + (0.157 * 0) = 0.3559$$

For the final value of Customer G as follows.

$$u_{(2)} = (0.189 * 0.4416) + (0.189 * 1.0048) + (0.157 * 0.1661) + (0.119 * 0.1661) + (0.189 * 0) + (0.157 * 0.1661) = 0.3453$$

For the final value of Customer H as follows.

$$u_{(3)} = (0.189 * 0.2795) + (0.189 * 0) + (0.157 * 0) + (0.119 * 0.1661) + (0.189 * 0.687) + (0.157 * 0) = 0.0856$$

For the final value of Customer I as follows.

$$u_{(4)} = (0.189 * 0.1661) + (0.189 * 1.0048) + (0.157 * 0.1661) + (0.119 * 0) + (0.189 * 0.1423) + (0.157 * 1.0048) = 0.4320$$

For the final value of Customer J as follows.

$$u_{(5)} = (0.189 * 0.0092) + (0.189 * 0) + (0.157 * 0) + (0.119 * 1.0048) + (0.189 * 1.0048) + (0.157 * 0.0377) = 0.3172$$

For the final value of Customer K as follows.

$$u_{(6)} = (0.189 * 0) + (0.189 * 1.0048) + (0.157 * 1.0048) + (0.119 * 0.1661) + (0.189 * 0.6547) + (0.157 * 0.1661) = 0.5172$$

For the final value of Customer L as follows.

$$u_{(7)} = (0.189 * 0.1234) + (0.189 * 0) + (0.157 * 0) + (0.119 * 1.0048) + (0.189 * 0.0842) + (0.157 * 1.0048) = 0.3166$$

For the final value of Customer M as follows.

$$u_{(8)} = (0.189 * 0.0883) + (0.189 * 0) + (0.157 * 0.1661) + (0.119 * 1.0048) + (0.189 * 0.3273) + (0.157 * 0.1661) = 0.2503$$

The final value calculation results are the results obtained by each alternative based on calculations using a combination of the MAUT Method and PIPRECIA, these results are the final final grades obtained based on the assessment data that has been given.

### 3.4 Customer Loan Eligibility Recommendations

Customer loan eligibility recommendations are an important step in the risk and financial assessment process. To ensure business continuity and customer satisfaction, it is important for financial institutions to consider several key factors. First, a careful evaluation of a customer's credit, including payment history, credit score, and financial stability, should be fundamental in determining whether a customer is worthy of a loan. In addition, it involves analyzing economic sectors and growth projections to anticipate the potential impact on customers' ability to repay loans. Furthermore, the use of analytics and artificial intelligence technologies can provide additional insights to strengthen feasibility decisions. With a holistic approach to risk assessment, customer loan eligibility recommendations can help financial institutions optimize their loan portfolios, reduce credit risk, and strengthen their financial position over the long term. An effective risk management system is also required to mitigate potential risks and protect the interests of financial institutions. In addition, it is important to continuously monitor the customer's financial performance throughout the loan period to ensure continued suitability and feasibility. Awareness of changes in economic and industrial conditions is also important for proper adjustments in lending strategies. With this approach, customer loan eligibility recommendations become not only an instrument to protect the interests of financial institutions, but also as a proactive measure to build sustainable relationships with customers and support overall business growth. The following are the results of customer loan feasibility recommendations using a combination of the MAUT Method and PIPRECIA as in table 4.

**Table 4.** Customer Loan Eligibility Recommendations

Customer	Final Grades of MAUT and PIRPECIA Method	Rank
Customer K	0.5172	1
Customer I	0.432	2
Customer F	0.3559	3
Customer G	0.3453	4
Customer J	0.3172	5
Customer L	0.3166	6

Customer	Final Grades of MAUT and PIRPECIA Method	Rank
Customer M	0.2503	7
Customer H	0.0856	8

The results of the customer loan eligibility ranking recommend rank 1 with a final value of 0.5127 obtained by Customer K, rank 2 with a final value of 0.432 obtained by Customer I, and rank 3 with a final value of 0.3559 obtained by Customer F.

#### 4. CONCLUSION

Customer loan eligibility recommendations are an important step in the risk and financial assessment process. To ensure business continuity and customer satisfaction, it is important for financial institutions to consider several key factors. The purpose of this study is to evaluate and compare customer loan feasibility using a combination of Multi-Criteria Decision Making (MCDM) methods, namely Multi-Attribute Utility Theory (MAUT) and Pivot Pairwise Relative Criteria Importance Assessment (PIPRECIA). PIPRECIA is a method in Multi-Criteria Decision Making (MCDM) designed to assess the relative importance between criteria. This method involves determining pivot criteria which are used as reference points to compare the importance of criteria to each other in pairs. Decision makers are asked to give preference relative to each pair of criteria against the pivot criterion. MAUT is a decision-making theory framework designed to deal with situations where decision makers must evaluate alternatives based on some criteria or attributes. This study aims to determine the ability of both methods to provide a comprehensive understanding of loan eligibility by considering a number of relevant criteria. The results of the customer loan eligibility ranking recommend rank 1 with a final value of 0.5127 obtained by Customer K, rank 2 with a final value of 0.432 obtained by Customer I, and rank 3 with a final value of 0.3559 obtained by Customer F.

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