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The Decision Support System Uses the Preference Selection Index Method in Determining Healthy Cooperatives

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Abstract

Determining a healthy cooperative is a challenge that requires attention to several key aspects. Effective management, stable finances, active member involvement, and compliance with laws and regulations are key factors to be considered. By paying attention to all these factors and taking appropriate action, the cooperative can achieve optimal health levels and make a significant contribution to its members as well as the surrounding community. This study aims to determine healthy cooperatives using the Preference Selection Index (PSI) method in determining the best healthy cooperatives using the criteria of Capital, Quality of Productive Assets, Management, Efficiency, Liquidity, Independence, and Cooperative Identity so that the results of the best healthy cooperative ranking recommendations will be able to become recommendations for a decision. Based on the results of the calculation of the final value and ranking of the best healthy cooperatives using the PSI method, rank 1 is Koperasi-02 with a final value of 0.10737, rank 2 is Koperasi-01 with a final value of 0.10029, rank 3 is Koperasi-03 with a final value of 0.05223, rank 4 is Koperasi-04 with a final value of 0.0107. The results of testing using blackbox testing that has been carried out obtained the results of the number of answers from respondents have a value of 100% in accordance with testing the functionality of the system using blackbox testing.

Keywords: Decision; Preference Selection Index; Method; Rangking; Recommendations

1. INTRODUCTION

Information Systems are one of the key components in the world of information technology that play an important role in managing, storing, processing, and conveying vital data and information for various organizations and entities[1], [2]. The role of information systems in optimizing operational efficiency and effectiveness, decision making, and innovation in various sectors, from business and government to education and health services[3]. A cooperative is an economic entity that has played a crucial role in advancing people's lives in various countries around the world. However, in the course of its history, cooperatives have also faced various challenges that can interfere with the continuity and health of their operations. The concept of Healthy Cooperatives is becoming increasingly important in this contemporary era, when cooperatives must adapt to dynamic changes in the global economy, regulations, technology, as well as demands for greater social and environmental responsibility. In this context, this article will explore the concepts and elements that form the foundation of healthy cooperatives, including efficient management, sustainable finance, as well as the role of cooperatives in economic and social development. Through a deep understanding of healthy cooperatives, we can explore the potential of cooperatives to continuously contribute to the well-being of communities and promote inclusive economic growth around the world[4]. In this era of globalization, cooperatives are also faced with increasing pressures in terms of business competition, technological changes, and changes in consumer behavior. Therefore, the concept of a healthy cooperative not only covers financial aspects, but also explores adaptability, innovation, and long-term development. Cooperatives are healthy and will help us to appreciate the irreplaceable role played by cooperatives in shaping a better and sustainable future. Determining a healthy cooperative is a challenge that requires attention to several key aspects. Effective management, stable finances, active member involvement, and compliance with laws and regulations are key factors to be considered. In addition, business diversification, education and training for members and management, transparency, accountability, and network and partnership development are also important elements in ensuring the health of cooperatives. By paying attention to all these factors and taking appropriate action, the cooperative can achieve optimal health levels and make a significant contribution to its members as well as the surrounding community.

A Decision Support System (DSS) is a system designed to assist individuals or organizations in the decision-making process. DSS provides tools and methods to collect, analyze, and present relevant information so that decision users can make better, efficient, and informed decisions[5], [6]. The system combines computer technology with management science, statistics, mathematics, and various data analysis techniques to present valuable information to users[7]–[9]. DSS can be used in a variety of contexts, including business, government, health, education, and more. It can assist in different types of decisions, such as strategic planning, resource allocation, product or service selection, market trend identification, and performance evaluation[10], [11]. DSS can be rule-based, model-based, or use artificial intelligence techniques such as machine learning to produce accurate recommendations or predictions[12]. The main advantages of DSS are its ability to process complex and large data, speed up the decision-making process, reduce bias, and provide evidence-based support[13], [14]. With the development of information technology, DSS is increasingly sophisticated and can be integrated with other systems to provide a better understanding of the business environment or specific situations[15], [16]. Thus, DSS is one of the important tools in facing increasingly complex decision-making

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challenges in this ever-changing world. DSS bring a number of important advantages in the context of decision making. First, DSS helps improve the quality of decisions by providing quick and accurate access to relevant data and information. In addition, DSS allows analysis based on diverse criteria, so decision makers can consider various factors in the process. Another advantage is DSS ability to produce consistent and structured results, reducing the potential for decision-making influenced by emotions or biases[17]. In addition, DSS also supports speed in decision making by automating several steps of analysis.

The Preference Selection Index (PSI) method is a technique used in multi-criteria decision making to assist decision users in identifying and evaluating alternatives based on preferences or weights given to different criteria[18]. The PSI method is used when decision users have a clear preference for each criterion used in decision making. In an era where decision-making is increasingly complex and diverse, PSI has become an important instrument that assists organizations and individuals in making efficient and informed choices[19]. The PSI method offers a number of significant benefits in decision making. First, it allows decision users to combine their subjective judgments with objective data analysis, creating a solid foundation for better decisions. Second, PSI can be applied in a variety of contexts, including business, investment, product selection, and even in the selection of complex projects[20]. In this way, PSI helps address increasingly complex decision-making challenges and enables organizations and individuals to make more informed and targeted choices. With a deep understanding of PSI, decision users can improve the efficiency, effectiveness, and quality of their decisions in the face of diverse challenges in a dynamic business and social environment[21]. The PSI method is suitable for use in situations where the decision user's preference for the criteria used in decision making is critical, and relevant numerical data are available[22]. This method helps to combine subjective preferences with objective information in multi-criteria decision making.

The Preference Selection Index (PSI) method brings a number of advantages in multi-criteria decision making. This method allows decision makers to combine stakeholder preferences with relevant criteria data, creating a robust framework for prioritizing alternatives based on diverse preferences. The main advantage of PSI is its ability to simplify the complexity of decisions with clear graphs or ranking tables, facilitating understanding and communication between stakeholders. In addition, PSI is flexible, can be used in a variety of contexts, and can easily adapt to changing preferences or criteria values over time. Thus, the PSI method facilitates more informed, transparent, and comprehensive decision-making in various fields, from business to public policy. The Preference Selection Index method has several advantages that make it a good choice in multi-criteria decision making. The Preference Selection Index assists decision makers in balancing various relevant factors to achieve the best solution according to individual preferences and contextual needs.

Related research that becomes the literature in this study includes: this study aims to expand the range of application of the PSI method by identifying the appropriate DNM in combination with the PSI method. Twelve different DNMs are used in combination with the PSI method. These twelve combinations are used interchangeably to solve several problems in different fields[23]. Next research This study shows only the best value among the value levels of the surveyed input parameters. In fact, a value at the level considered the best is not necessarily the best value for that parameter[24]. The PSI method is able to assist in determining the final value of the alternative, then the highest alternative will be the solution. By applying the Preference Selection Index Method, it can speed up the process of determining alternatives in regional development. This research introduces an integrated model of the Preference Selection Index (PSI) and prospect theory as a new way to assess the impact of supply chain sustainability risks based on the five pillars of sustainability. Research has shown that sustainability risk assessment has a strong positive impact on improving company performance[25]. The difference with research conducted with previous research is that the PSI method is carried out to determine healthy cooperatives that were not carried out by previous studies.

This study aims to determine healthy cooperatives using the PSI method in determining the best healthy cooperatives using the criteria of Capital, Quality of Productive Assets, Management, Efficiency, Liquidity, Independence, and Cooperative Identity so that the results of the best healthy cooperative ranking recommendations will be able to become recommendations for a decision.

2. RESEARCH METHODOLOGY

2.1 Stages of Research

Research stages are steps or processes that must be followed by a researcher to design, implement, and evaluate a study. This research stage is a series of systematic and structured steps that become the basis for designing, implementing, and evaluating a scientific study[26]–[28]. The stages of research carried out include identification of research problems, literature review, formulation of objectives, research design, data collection and analysis, and interpretation of results. The stages of research carried out can be seen in Figure 1 below.

Figure 1. Stages of Research

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By understanding and following the correct stages of research, researchers can carry out their research efficiently and produce more meaningful findings and have a positive impact on knowledge development in various fields. Explanation of the stages of research carried out will be explained in the next stage.

2.2 Identify the Problem

In determining healthy cooperatives based on the results of data collection and interviews conducted, the Lampung Provincial Cooperative and MSME Office has not applied the decision support system method in determining healthy cooperatives, based on the results of needs collection, there are 7 (seven) criteria used in determining healthy cooperatives, namely Capital, Productive Asset Quality, Management, Efficiency, Liquidity, Independence, and Cooperative Identity.

2.3 Study Literature

Literature study is a process of in-depth investigation of written works relevant to a particular topic or subject. This method involves analyzing different types of texts such as books, journal articles, essays, and other literary works to understand the views, themes, and debates related to the topic under study. The main objective of literature study is to gain a deeper understanding of the subject under investigation, identify knowledge vacancies, and build a solid theoretical foundation for advanced research. By investigating existing literature, researchers can broaden their horizons, identify trends, evaluate previous research, and devise a solid framework for their own research.

2.4 Preference Selection Index Method

The stages in the Preference Selection Index (PSI) Method include a series of systematic steps in making multi-criteria decisions[29]. Here are the stages in PSI:

a. Making Decision Matrix
The first stage is to create a matrix based on the information that exists in describing the problem. Each alternative is depicted with a row shape that has information elements from alternatives, and attributes are described by column forms that have information elements from attributes. The decision matrix can be seen in the following equation.

$$X_{ij} = \begin{bmatrix} x_{11} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x & m1 & \cdots & x_{mn} \end{bmatrix} \quad (1)$$

b. Normalization of the Decision Matrix
The stages of decision matrix normalization are used based on the normalization equation, the results of matrix normalization can be seen in equation (2) for the type of benefit criteria, and equation (3) for the type of cost criteria.

$$N_{ij} = \frac{x_{ij}}{xj^{max}} \quad (2)$$

$$N_{ij} = \frac{xj^{min}}{x_{ij}} \quad (3)$$

c. Calculating the Mean Value
The stage calculates the average value (mean) of the matrix normalization that has been carried out in the previous stage. The calculation of the mean value can be seen in the following equation.

$$N = \frac{1}{n}\sum_{i=1}^{n} N_{ij} \quad (4)$$

d. Calculating the Preference Variation Value
This step calculates the value of the preference variation between the values of each attribute calculated using the following equation.

$$\emptyset_j = \sum_{i=1}^{n}\left[N_{ij} - N\right]^2 \quad (5)$$

e. Calculating Values in Preferences
The stages of calculating the value in the preference will be calculated using the following equation.

$$\Omega_{j1} = 1 - \emptyset_j \quad (6)$$

f. Calculating the Weight of Criteria
This stage calculates the weight of the criteria to be calculated using the following equation.

$$W_{j1} = \frac{\Omega_j}{\sum_{j=1}^{n}\Omega_j} \quad (7)$$

g. Calculate the Preference Selection Index
The stages of calculating the Preference Selection Index will be calculated using the following equation.

$$\theta_i = \sum_{j=1}^{n} X_{ij}\, W_j \quad (8)$$

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3. RESULTS AND DISCUSSION

The solution step to overcome the problem of using the PSI method in determining healthy cooperatives is to create an alternative table of existing cooperative data, table 1 of these alternatives can be seen below.

Table 1. Criteria Data

Criteria Code	Criteria Name	Crips	Value	Criteria Type
C1	Capital	>1.000.000.000	100	Cost
		>500.000.000	60	
		<500.000.000	40	
C2	Quality of Productive Assets	>100.000.000	100	Cost
		>50.000.000	60	
		<50.000.000	40	
C3	Management	Good	100	Benefit
		Intermediate	70	
		Poor	20	
C4	Efficiency	Good	100	Benefit
		Intermediate	70	
		Poor	20	
C5	Liquidity	Good	100	Benefit
		Intermediate	70	
		Poor	20	
C6	Independence	Good	100	Benefit
		Intermediate	70	
		Poor	20	
C7	Cooperative Identity	Available	100	Benefit
		Not Available	10	

The criteria used were obtained from the Cooperatives and UMKM Office of Lampung Province in determining healthy cooperatives in Lampung. The assessment data used is data obtained from the Cooperative and UMKM Office to be used in determining existing healthy cooperatives. Furthermore, creating an assessment table of each alternative for each criterion used can be seen in table 2 below.

Table 2. Assessment Data

	C1	C2	C3	C4	C5	C6	C7
Koperasi-01	60	40	70	20	100	70	10
Koperasi-02	100	60	70	20	100	20	10
Koperasi-03	60	40	20	70	70	70	100
Koperasi-04	60	60	70	70	70	70	100

The next process in solving problems in determining healthy cooperatives using the stages of the PSI methods is as follows.

3.1 Preference Selection Index Method

The first step is to make a decision matrix based on alternative assessment data, rows in the matrix represent alternatives, and columns in the matrix indicate existing criteria. Making a decision matrix using equation (1), the result of the decision matrix from the assessment is as follows.

$$X = \begin{bmatrix} x_{1,1} & x_{2,1} & x_{3,1} & x_{4,1} & x_{5,1} & x_{6,1} & x_{7,1} \\ x_{1,2} & x_{2,2} & x_{3,2} & x_{4,2} & x_{5,2} & x_{6,2} & x_{7,2} \\ x_{1,3} & x_{2,3} & x_{3,3} & x_{4,3} & x_{5,3} & x_{6,3} & x_{7,3} \\ x_{1,4} & x_{2,4} & x_{3,4} & x_{4,4} & x_{5,4} & x_{6,5} & x_{7,4} \end{bmatrix}$$

The results of the decision matrix based on the assessment of healthy cooperatives are as follows.

$$X = \begin{bmatrix} 60 & 40 & 70 & 20 & 100 & 70 & 10 \\ 100 & 60 & 70 & 20 & 100 & 20 & 10 \\ 60 & 40 & 20 & 70 & 70 & 70 & 100 \\ 60 & 60 & 70 & 70 & 100 & 70 & 100 \end{bmatrix}$$

The next process after making a decision-making matrix is to calculate a normalized decision matrix based on the benefits and costs of existing criteria. The benefit value is calculated using equation (2) and the cost value is calculated using (3). The results of the calculation of the normalization of the decision matrix are as follows.

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$$N_{1,1} = \frac{x_{1,1}}{\max x_1} = \frac{60}{100} = 0.6 \qquad N_{1,2} = \frac{x_{1,2}}{\max x_1} = \frac{100}{100} = 1$$

$$N_{1,3} = \frac{x_{1,3}}{\max x_1} = \frac{60}{100} = 0.6 \qquad N_{1,4} = \frac{x_{1,4}}{\max x_1} = \frac{60}{100} = 0.6$$

$$N_{2,1} = \frac{x_{2,1}}{\max x_2} = \frac{40}{100} = 0.4 \qquad N_{2,2} = \frac{x_{2,2}}{\max x_2} = \frac{60}{100} = 0.6$$

$$N_{2,3} = \frac{x_{2,3}}{\max x_2} = \frac{40}{100} = 0.4 \qquad N_{2,4} = \frac{x_{2,4}}{\max x_2} = \frac{60}{100} = 0.6$$

$$N_{3,1} = \frac{x_{3,1}}{\max x_3} = \frac{70}{100} = 0.7 \qquad N_{3,2} = \frac{x_{3,2}}{\max x_3} = \frac{70}{100} = 0.7$$

$$N_{3,3} = \frac{x_{3,3}}{\max x_3} = \frac{20}{100} = 0.2 \qquad N_{3,4} = \frac{x_{3,4}}{\max x_3} = \frac{70}{100} = 0.7$$

$$N_{4,1} = \frac{x_{4,1}}{\max x_4} = \frac{20}{100} = 0.2 \qquad N_{4,2} = \frac{x_{4,2}}{\max x_4} = \frac{20}{100} = 0.2$$

$$N_{4,3} = \frac{x_{4,3}}{\max x_4} = \frac{70}{100} = 0.7 \qquad N_{4,4} = \frac{x_{4,4}}{\max x_4} = \frac{70}{100} = 0.7$$

$$N_{5,1} = \frac{x_{5,1}}{\max x_5} = \frac{100}{100} = 1 \qquad N_{5,2} = \frac{x_{5,2}}{\max x_5} = \frac{100}{100} = 1$$

$$N_{5,3} = \frac{x_{5,3}}{\max x_5} = \frac{70}{100} = 0.7 \qquad N_{5,4} = \frac{x_{5,4}}{\max x_5} = \frac{70}{100} = 0.7$$

$$N_{6,1} = \frac{x_{6,1}}{\max x_6} = \frac{70}{100} = 0.7 \qquad N_{6,2} = \frac{x_{6,2}}{\max x_6} = \frac{20}{100} = 0.2$$

$$N_{6,3} = \frac{x_{6,3}}{\max x_6} = \frac{70}{100} = 0.7 \qquad N_{6,4} = \frac{x_{6,4}}{\max x_6} = \frac{70}{100} = 0.7$$

$$N_{7,1} = \frac{x_{7,1}}{\max x_7} = \frac{10}{100} = 0.1 \qquad N_{7,2} = \frac{x_{7,2}}{\max x_7} = \frac{10}{100} = 0.1$$

$$N_{7,3} = \frac{x_{7,3}}{\max x_7} = \frac{100}{100} = 1 \qquad N_{7,4} = \frac{x_{7,4}}{\max x_7} = \frac{100}{100} = 1$$

The next stage performs the calculation of the mean value of the matrix for each existing criterion. The result of calculating the mean value (4) is

$$N_1 = \frac{1}{7} \times 3.7 = 0.529$$
$$N_2 = \frac{1}{7} \times 3.8 = 0.543$$
$$N_3 = \frac{1}{7} \times 4.3 = 0.614$$
$$N_4 = \frac{1}{7} \times 5 = 0.714$$

The next stage calculates the value of the preference variation for each criterion. The following is the result of calculating the power on the preference variation value matrix (5). The result of calculating the value of preference variation is as follows.

$$\emptyset_{n_{1,1}} = (0.6 - 0.529)^2 = 0.26726 \qquad \emptyset_{n_{1,2}} = (1 - 0.543)^2 = 0.20898$$
$$\emptyset_{n_{1,3}} = (0.6 - 0.614)^2 = 0.0002 \qquad \emptyset_{n_{1,4}} = (0.6 - 0.714)^2 = 0.01306$$

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$\emptyset_{n_{2,1}} = (0.67 - 0.529)^2 = 0.01664$
$\emptyset_{n_{2,2}} = (1 - 0.543)^2 = 0.00325$
$\emptyset_{n_{2,3}} = (0.67 - 0.614)^2 = 0.0458$
$\emptyset_{n_{2,4}} = (0.67 - 0.714)^2 = 0.013$
$\emptyset_{n_{3,1}} = (1 - 0.529)^2 = 0.02924$
$\emptyset_{n_{3,2}} = (1 - 0.543)^2 = 0.02465$
$\emptyset_{n_{3,3}} = (0.29 - 0.6145)^2 = 0.1714$
$\emptyset_{n_{3,4}} = (1 - 0.714)^2 = 0.0002$
$\emptyset_{n_{4,1}} = (0.29 - 0.529)^2 = 0.10824$
$\emptyset_{n_{4,2}} = (0.29 - 0.543)^2 = 0.11765$
$\emptyset_{n_{4,3}} = (1 - 0.614)^2 = 0.0074$
$\emptyset_{n_{4,4}} = (1 - 0.714)^2 = 0.0002$
$\emptyset_{n_{5,1}} = (1 - 0.529)^2 = 0.22184$
$\emptyset_{n_{5,2}} = (1 - 0.543)^2 = 0.20885$
$\emptyset_{n_{5,3}} = (0.7 - 0.614)^2 = 0.0074$
$\emptyset_{n_{5,4}} = (0.7 - 0.714)^2 = 0.0002$
$\emptyset_{n_{6,1}} = (1 - 0.529)^2 = 0.02924$
$\emptyset_{n_{6,2}} = (0.29 - 0.543)^2 = 0.11765$
$\emptyset_{n_{6,3}} = (1 - 0.614)^2 = 0.0074$
$\emptyset_{n_{6,4}} = (1 - 0.714)^2 = 0.0002$
$\emptyset_{n_{7,1}} = (0.1 - 0.529)2 = 0.18404$
$\emptyset_{n_{7,2}} = (0.1 - 0.543)^2 = 0.19625$
$\emptyset_{n_{7,3}} = (1 - 0.614)^2 = 0.149$
$\emptyset_{n_{7,4}} = (1 - 0.714)^2 = 0.0818$

The next stage calculates the value in preference for each criterion. The following is the result of calculating the value in preference (6) on the preference variation value matrix.

$\Omega_{j1} = 1 - 0.48951 = 0.51049$
$\Omega_{j2} = 1 - 0{,}07868 = 0{,}92132$
$\Omega_{j3} = 1 - 0{,}22548 = 0{,}77452$
$\Omega_{j4} = 1 - 0{,}23348 = 0{,}76652$
$\Omega_{j5} = 1 - 0{,}43828 = 0{,}56172$
$\Omega_{j6} = 1 - 0{,}15448 = 0{,}84552$
$\Omega_{j7} = 1 - 0{,}61108 = 0{,}38892$

Next, calculate the total of all preference values, the result of calculating the total preference values as follows.

$$\sum \Omega_j = (0.51049 + 0.92132 + 0.77452 + 0.76652 + 0.56172 + 0.84552 + 0.38892) = 4.769$$

The next stage is weighting for each of the existing criteria. The following are the results of the calculation of weights for each criterion (7), the results of the calculation of weights for each criterion are as follows.

$$W_1 = \frac{0.51049}{4.769} = 0.107$$
$$W_2 = \frac{0.92132}{4.769} = 0.193$$
$$W_3 = \frac{0.77452}{4.769} = 0.162$$
$$W_4 = \frac{0.76652}{4.769} = 0.161$$
$$W_5 = \frac{0.56172}{1.769} = 0.118$$
$$W_6 = \frac{0.84552}{4.769} = 0.177$$
$$W_7 = \frac{0.38892}{4.769} = 0.082$$

The next stage calculates to obtain the largest index preference value of each available alternative using equation (8). The results of the multiplication calculation between the criteria weight matrix and the alternative normalization results will be presented as follows.

$$\theta_1 = (0.26726 * 0.107) + (0.01664 * 0.193) + (0.02924 * 0.162) + (0.10824 * 0.161) + (0.22184 * 0.118) + (0.02924 * 0.177) + (0.18404 * 0.082) = 0.10029$$
$$\theta_2 = (0.20898 * 0.107) + (0.00325 * 0.193) + (0.02465 * 0.162) + (0.11765 * 0.161) + (0.20885 * 0.118) + (0.11765 * 0.177) + (0.19625 * 0.082) = 0.10737$$

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$$\theta_3 = (0.0002 * 0.107) + (0.0458 * 0.193) + (0.1714 * 0.162) + (0.0074 * 0.161) + (0.0074 * 0.118) + (0.0074 * 0.177) + (0.149 * 0.082) = 0.05223$$

$$\theta_4 = (0.01306 * 0.107) + (0.013 * 0.193) + (0.0002 * 0.162) + (0.0002 * 0.161) + (0.0002 * 0.118) + (0.0002 * 0.177) + (0.0818 * 0.082) = 0.0107$$

The last stage after obtaining the final value of preference of each alternative then makes a ranking of the best healthy cooperative alternatives based on the final score. The results of the ranking of the best healthy cooperatives are shown in table 3.

Table 3. Best Healthy Cooperative Ranking

	Final PSI Score	Rank
Koperasi-02	0.10737	1
Koperasi-01	0.10029	2
Koperasi-03	0.05223	3
Koperasi-04	0.0107	4

Based on the results of the calculation of the final value and ranking of the best healthy cooperatives using the PSI method, rank 1 is Koperasi-02 with a final value of 0.10737, rank 2 is Koperasi-01 with a final value of 0.10029, rank 3 is Koperasi-03 with a final value of 0.05223, rank 4 is Koperasi-04 with a final value of 0.0107.

3.2 Implementation System

The implementation of the Decision Support System or DSS is the process of implementing information technology solutions specifically designed to assist decision making within the organization. These systems combine data, software, and analysis algorithms to provide relevant and supportive information in a better decision-making process. The display of criteria data is a visual representation of the criteria used to evaluate, select, or make decisions in a system or process. The criterion data view allows users to quickly understand the relationship between various factors taken into account and simplifies the decision-making process. With a clear and organized view, stakeholders can more efficiently analyze relevant information and take appropriate steps according to the desired objectives. Display of criteria data as shown in figure 2.

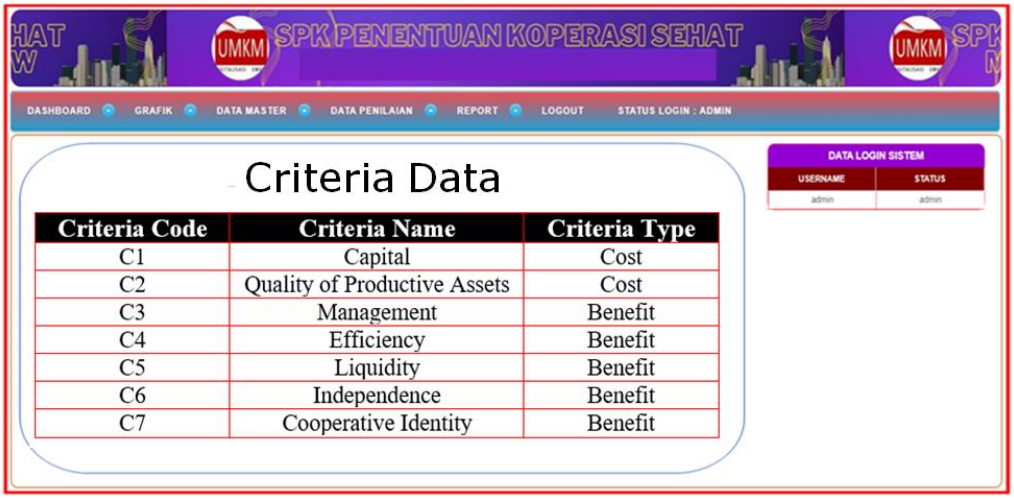

Figure 2. Criteria Data View

The display of ranking data is a visualization that displays the order or ranking of various entities or objects based on certain criteria. The information displayed includes name, final grade, rating. With this view, users can clearly see which ones are the highest priority and which ones have lower performance, making it easier to make decisions and allocate resources efficiently. The display of the ranking application can be seen in figure 3.

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Figure 2. Application Display of Ranking Results Using PSI Method

The application display image above illustrates the final calculation results of the PSI method created using the Laravel Framework, the results between the application and the PSI calculation are no difference.

3.3 Testing System

Black box test results to determine the suitability of functions in the decision support system for determining the best healthy cooperative. Testing of the best healthy cooperative determination system is carried out to system users, namely the Cooperative and MSME Office of Lampung Province to test the applications that have been made, this test is carried out to users, namely staff of the Cooperative and MSME Office of Lampung Province who are tasked with conducting assessments of healthy cooperatives every year carried out by the Lampung Provincial Cooperative and MSME Office. The following are the results of the black box test which contains the application of a decision support system for determining healthy cooperatives with the PSI method in table 4.

Table 4. Blackbox Testing

Test Criteria	Number of Answers	
	Pass	Fail
Login Page	2	0
Cooperative Data Page	4	0
Criteria Aspect Data Page	4	0
Sub Criteria Data Page	4	0
Assessment Data Page	4	0
Add Rating page	4	0
Print Report Page	2	0
Total	**24**	**0**

Based on the results of the recapitulation of the 7 test criteria that have been carried out, the results of the number of answers from respondents are obtained which have a value of 100% in accordance with testing the functionality of the system using blackbox testing.

4. CONCLUSION

The PSI method is used when decision users have a clear preference for each criterion used in decision making. In an era where decision-making is increasingly complex and diverse, PSI has become an important instrument that assists organizations and individuals in making efficient and informed choices. PSI method is suitable for use in situations where the decision user's preference for the criteria used in decision making is critical, and relevant numerical data are available. This study succeeded in determining healthy cooperatives by applying the PSI method in determining the best healthy cooperatives using predetermined criteria. Based on the results of the calculation of the final value and ranking of the best healthy cooperatives using the PSI method, Rank 1 is Koperasi-02 with a final value of 0.10737. The results of testing using blackbox testing that has been carried out obtained the results of the number of answers from respondents have a value of 100% in accordance with testing the functionality of the system using blackbox testing.

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