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Application of The Fuzzy Promethee Method in Selecting Farmer Groups Verification for Candidates for Receiving Grants Regional Revenues And Expenditures Budget

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Abstract

The Bogor Regency Department of Fisheries and Livestock, in charge of the Breeding and Livestock Cultivation Section, has a work program to assist farmer groups, especially livestock, in acquiring aid funds from the government sourced from the Bogor Regency Regional Revenues and Expenditures Budget (APBD). As a result, the government allocates aid funds from the Regional Revenues and Expenditures Budges (APBD) budget source to aid the community in managing livestock. Based on this, research will be conducted and methods used to determine which livestock farmer groups are eligible for government assistance will be implemented. A Decision Support System (DSS) will be used as a tool to recommend which farmer groups deserve assistance based on predetermined assessment criteria. By using the service, you will be able to provide a more accurate and objective evaluation. Because of its capacity to determine criteria values that contain uncertainty and select the best alternative based on these rankings and alternatives, the Fuzzy-PROMETHEE approach was chosen for handling multi criteria issues.

Keywords: *Decision Support System; APBD; farmer groups; Fuzzy-PROMETHEE*

1. Introduction

Since farm animals are so vital in everyday life, livestock management is essential to meet the demands of livestock that will be consumed by people. The Breeding and Livestock Cultivation of the Bogor Regency Fisheries and Livestock Service is in charge of managing livestock for the Bogor Regency area, especially in the development and cultivation of livestock. There is livestock management in the form of livestock farmer groups, which are made up of various different types of livestock such as chickens, quail, sheep, dairy goats, dairy cows and buffalo, each of which has its own farmer group. As a response, the government state manages funds from Regional Revenues and Expenditures Budget (APBD) fund to help farmer groups develop their livestock production. Based on the author's research and interviews with employees of the Livestock Breeding and Cultivation Section, that are in charge of handling the receipt of Regional Revenues and Expenditures

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Budget (APBD) aid funds for farmer groups who are still using the manual method with Technical Implementation Units (UPT) selection assessments in each are of Bogor Regency, and the uneven distribution of Regional Revenues and Expenditures Budget (APBD) recipients in different farmer groups.

The Fuzzy-PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluation) was used to select farmer group verification for the potential recipients of this Regional Revenues and Expenditures Budget (APBD) aid. This method is used because it can solve multi-criteria problems by introducing fuzzy criteria values into the process of determining set of criteria values that contain uncertainty [1], [2] and the PROMETHEE method will be used to rank the results of the calculations made using this method.

2. Methods

1. **System Development Life Cycle**
   In order to create this system as a research project, the system development life cycle, or SDLC (System Development Life Cycle), the stages of the System Development Life Cycle (SDLC) would be used in research. System design, system implementation, and system operation are all parts of the SDLC [3]. The steps of development and design for this research are as follows:

   (a) Planning
   In this step, a project management plan and other planning papers are created, serving as a foundation for securing the funding required to find a solution. Library research, field studies, and direct observations at the Breeding and Livestock Cultivation Section of the Bogor Regency Fisheries and Livestock Service are the resources needed at this stage to collect the solutions. The next stage is the interview stage and discussion with the staff of the Breeding and Livestock Cultivation Section to collect the required data.

   (b) Analysis
   The software system user requirements are developed through the analysis of the software system user demands. Create a functional requirements document to serve as a guide for developing a decision support system application for the Bogor Regency Fisheries and Livestock Service to determine which farmer groups should receive Regional Revenues and Expenditures Budget (APBD) funds.

   (c) Design
   The system design document now concentrates on components that can carry out the necessary functions, changing detailed requirements into comprehensive requirements. The design work done at this stage is separated into three categories: database administration, model basis, and user interface. It allows the design structure of the Decision Support System (DSS). It also seeks to give information, guide, predict, and direct information consumers to make decisions that have been introduced by disciplines like operations research and management science [4]-[7] in order to support to support and support management in making decisions in semi-structured conditions.

   (d) Implementation
   At this phase, preparation for implementation is carried out, the software is implemented in the production environment (the user environment), and the issues discovered during the integration and testing are resolved.

   (e) Testing
   Systems and applications are tested to make sure they are high-quality and built in compliance with user requirements. The system trial consists of three stages: structural testing, functional testing, and validation testing. Structural testing seeks to ascertain whether the system implementation is the same as the implementation of the design that was made previously. Functional testing then seeks to verify that the functions have been made so that they can operate as expected.

   (f) Utilization of the System
   At this point, users and system maintainers can use the newly established system by

adding features, enhancing it, and improving it, as well as fixing any issues that may have arisen. The parties may, however, agree to skip this step and declare the process finished once the system has been implemented. Therefore, the parties involved will be responsible for this phase.

2. **PROMETHEE**
PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluation) belonging to the family of MCDA (Multi-Criteria Decision Analysis). L'Ingéniérie de la Décision [6], created by J.P Brans in 1982, was presented at a symposium at Université Laval, Québec, Canada. The six ranking categories used to categorize this method up until 1994 were PROMETHEE 1 (partial ranking), PROMETHEE II (whole ranking), PROMETHEE III (ranking by interval), PROMETHEE IV (for continuous cases), PROMETHEE V (MCDA which includes segmentation boundaries), and PROMETHEE VI (representation of the human brain) [6]. The mathematical characteristics and simplicity of this method's use are what make it successful in a variety of fields [8]-[11].

An alternative set of $M := a_1, a_2, ..., a_n$ to be ranked and an optimized set of $F := f_1, f_2, ..., f_k$ criteria are the foundation of the PROMETHEE [4]. To determine the value of the dominance intensity of alternative aa_i over a_j, pairwise comparisons between a_i and a_m are made using the provisions of $P_j(d_j)$ where $d_j = f_j(a_i) - f_j(a_m), P_k$ is a preference function on the $-j$, and $f_j(a_i)$ is the alternative evaluation score of a a_i criterion f_j.

Six criteria functions are presented in the PROMETHEE technique [6], and they are depicted in Figure 1. However not perfect, this works in some situations.

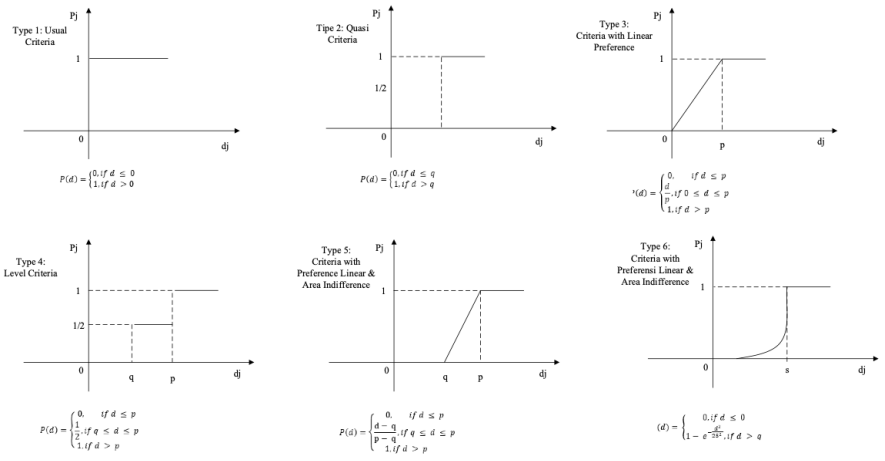

Figure 1. Function Preferences at PROMETHEE Method

The calculation utilizing the PROMETHEE technique can be applied as soon as the evaluation score $f_J(a_J)$ the preference function $P_J(d_J)$ on $i = 1, 2, 3, ..., n$ and j= $1, 2, 3, \ldots, k$, as well as the weight of each criterion w_j, are determined [6]. The formula can be used to search for intensity value of the alternative's dominant connection to the alternative a_i on all a_m criteria:

$$\pi(a_i, a_m) = \sum_{i=1}^{k} w_j \times f_j(a_i, a_m)$$

The leaving flow $\phi^+(a_i)$ value, which express how high the alternative a_i intensity value alternative $\phi^+(a_i)$ intensity value outperforms other alternatives, and the entering flow a_i which express how high the alternative intensity value is outperformed by other alternatives, are sought in PROMETHEE I (partial ranking) [12], [13]. The formulas for the value of

leaving flow $\phi^+(a_i)$ and value of entering flow $\phi^-(a_i)$ are as follows:

$$\phi^+(a_i) = \frac{1}{n-1}\sum_{x=1,x\neq i}^{n}\pi(a_i,a_x)$$
$$\phi^-(a_i) = \frac{1}{n-1}\sum_{x=1,x\neq i}^{n}\pi(a_x,a_i)$$

The information in PROMETHEE I shows that the better an alternative is, the higher its leaving flow value, conversely, the better it is, the lower its entering flow value.

The net flow $\phi(a_i)$ evaluation value in PROMETHEE II (whole ranking) is generated by deducting the leaving flow value $\phi^+(a_i)$ from the entering flow value $\phi^-(a_i)$. The better an option is, the higher its net flow value is [6]. Formulated in the following direction:

$$\phi(a_i) = \phi^+(a_i) - \phi^-(a_i)$$

3. **Fuzzy-PROMETHEE**
The Fuzzy-PROMETHEE method will be discussed. It was created by J. Geldermann, et al. [4], [13] and expand the PROMETHEE method by taking into account inputs that incoorporate uncertainty information that is modelled with fuzzy numbers [5]. Alternative evaluation scores against a criterion are not the only places where fuzzy numbers are used $(fjj(a_i)$, and also the weight evaluation score assigned to each criterion (w_j) [15]. The fuzzy trapezoidal interval model that J.Geldermann, et al. used for describe fuzzy numbers takes the following from:

$$M = (m_{1,m_u,\alpha,\beta})_{LR} \tag{1}$$

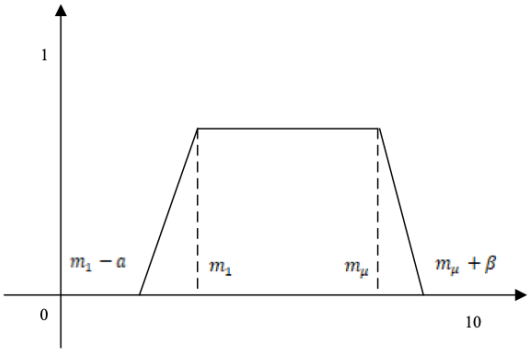

Figure 2. Curve Representation Fuzzy Trapezoidal Interval

With the interval $[m_l, m_u]$ $where\alpha$ and β operating as the lower and upper bounds of numbers containing certainty from various sets of variables [16]-[18], where m_l danm_u where and are the left and right distribution of the fuzzy trapezium interval. Several algebraic procedures used in the fuzzy trapezium interval model are defined as follows [4]:

Addition:

$$M \oplus N = (m_l, m_u, \alpha, \beta)_{LR} \oplus (n_l, n_u, \gamma, \delta)_{LR} \tag{2}$$
$$= (m_l + n_l, m_u + n_u, a + \beta, \gamma + \delta)_{LR} \tag{3}$$

Inverse:

$$-M = -(m_l, m_u, \alpha, \beta)_{LR} = (-m_l - m_u, \beta, \alpha)_{LR} \tag{4}$$

Reduction:

$$M \ominus N = (m_l, m_u, \alpha, \beta)_{LR} \ominus (n_l, n_u, \gamma, \delta)_{LR} \tag{5}$$
$$= (m_l - n_l, m_u - n_u, a + \beta, \gamma + \delta)_{LR} \tag{6}$$

Multiplication:

$$M \otimes N = (m_l, m_u, \alpha, \beta)_{LR} \ominus (n_l, n_u, \gamma, \delta)_{LR} \quad (7)$$
$$\approx (m_l \times n_l, m_u \times n_u, m_l\gamma + n_l a - a\gamma, m_u\beta + \beta\delta)_{LR} \quad (8)$$

The process for calculation in this approach are similar to those in the prior PROMETHEE method, but some information needs to be taken into consideration:

(a) Evaluation score $f_j(a_i)$ along $i = 1, 2, .., k$ and $j = 1, 2, .., k$ undefined in the form of fuzzy trapezium interval $f_j(a_i) = (m_l, m_u, \alpha, \beta)_{LR}$

(b) Evaluation score vector weights each criterion (where does not have to be a form of normalization $\sum_{j=1}^{k} w_j = 1$ defined in form fuzzy trapezium interval $w = [w_1, w_2, ..., w_k]$ with $w_k = (m_l^{w_k}, m_u^{w_k}, \alpha^{w_k}, \beta^{w_k})$

(c) The description of calculation value of the degree of preference $P_j(d_i)$ as follows:

$$P_j(d_i) = P_j\left(f_j(a_i) \ominus f_j(a_m)\right) \quad (9)$$
$$= ((m_l, m_u, \alpha, \beta)_{LR}) \quad (10)$$
$$= \left(m_l^{P_j}, m_u^{P_j}, \alpha^{P_j}, \beta^{P_j}\right)_{LR} \quad (11)$$

Where

$$m_l^{P_j} = P_j(m_l); m_u^{P_j} = P_j(m_u); \alpha_l^{P_j} = P_j(m_l) - P_j(m_l - a),$$

and

$$\beta_l^{P_j} = P_j(m_u + \beta) - p_j(m_u).$$

(d) The description of calculation domination relations $\pi(a_i, a_m)$ as follows:

$$\pi(a_i, a_m) = \sum_{j=1}^{k} W_j \otimes f_j(a_i, a_m) \quad (12)$$
$$= (m_l^{\pi}, m_u^{\pi}, a^{\pi}, \beta^{\pi})_{LR} \quad (13)$$

Where

$$m_l^{\pi} = \sum_{j=1}^{k} (m_l^{w_j}.m_l^{P_j});$$
$$m_u^{\pi} = \sum_{j=1}^{k} (m_u^{w_j}.m_u^{P_j});$$
$$a_l^{\pi} = \sum_{j=1}^{k} (m_l^{w_j}.a^{P_j} + m_l^{P_j}.a^{w_j} - a^{w_j}.a^{P_j});$$
$$\beta_l^{\pi} = \sum_{j=1}^{k} (m_l^{w_j}.\beta^{P_j} + m_l^{P_j}.\beta^{w_j} - \beta^{w_j}.\beta^{P_j})$$

(e) The values of the fuzzy leaving flow (ϕ^+) and fuzzy entering flow (ϕ^-) for PROMETHEE I are defuzzified and compared. In PROMETHEE II, fuzzy values are combined, defuzzified, and compared/ranked using the CoA (Center of Area) technique. The defuzzification formula's specifics are presented as follows:

$$x_{defuzz} = \frac{\int x.\mu(x)dx}{\int \mu(x)dx} \quad (14)$$
$$= \frac{m_u^2 - m_l^2 + am_l + \beta m_u + (\beta^2 - a^2)/3}{\alpha + \beta + 2m_u - 2m_l}. \quad (15)$$

3. Result and Discussion

3.1 Data Collection

The Department of Fisheries and Livestock, Bogor Regency's observations and interviews with staff and experts in the Breeding and Livestock Cultivation Section provided the data needed to support the study process and the requirement to create apps that would include:

1. What kind of criteria can identify and to choose farmer groups that are eligible for financial assistance?
2. The weight value used to establish each farmer group's evaluation standards.
3. The data obtained from data collection form results and entered into the system as a reference for assessment is used to decide which farmer groups are deserving of assistance.

3.2 Information on the Weights and Criteria's Value

In this study and creation of a Decision Support System (DSS) using the Fuzzy-PROMETHEE method, the division of the value of each weight used is 5 weights, and information on the fuzzy weight value of each assessment weight is shown in Table 1. The results of questionnaires and interviews with Dr.Vet. Sulistyowati, M.Sc. Head of the Breeding and Livestock Cultivation Section, were used to determine the value of the weights on each criterion. For group conditions, the weighting of the assessment criterion is broken down into 20 categories, as shown in Table 1.

Table 1. Description of weights and fuzzy values

WeightsCode	Information	Fuzzy Values
SP	Very important	1
P	Important	0.8
CP	Quite important	0.6
KP	Less important	0.4
TP	Not important	0.2

Table 2. Criteria and weight sub criteria

No	Criteria	Sub Criteria	Value	Weight
1	Group status	Old group and accomplished	4	SP
		Old group	3	
		Beginner group	2	
		A new group is formed	1	
2	Group member residence	Are all in the same neighborhood	4	
		All members are in the same hamlet, however they have distinct neighborhood	3	SP
		Everyone is in a different village. Hamlet/ neighborhood	2	
		All of the members live in the same subdistrict, but in different villages	1	
3	Group member employment	All members of the farmer/breeder group	4	P
		Farmers and breeders make up the majority of a community	3	
		A small number of farmers/breeders are involved	2	
		Members are not all farmer or breeders	1	
4	Livestock ownership	Everybody in the group has livestock	4	CP
		The majority of the members own livestock	3	
		A few people in the group have livestock	2	
		None of the members own livestock	1	
5	Previous farming experience	All experienced members	4	P
		Most experienced members	3	
		Inexperienced	2	
		Not all experienced	1	
6	A knowledge of livestock health	Everybody in the group is aware of the importance of livestock health	4	CP
		The majority of members are aware of the importance of livestock health	3	
		Only a few people are knowledgeable in livestock health	2	
		Everyone doesn't know how to deal with livestock health	1	
7	The drum's ownership	Everybody has a cage	4	SP
		The majority of the members have cages	3	
		Cages are used by a few members	2	
		There are no cages for any of the members	1	
8	Fodder forage land ownership (specifically ruminants)	Forage land is owned by all members	4	CP
		The majority of members have their own foraging area	3	
		Only a few members own forage land	2	
		The foraging area is not owned by all members	1	

No	Criteria	Sub Criteria	Value	Weight
9	Availability of animal feed forage (specifically ruminants)	Throughout the year, it is abundant	4	P
		In the wet season, abundant in the dry season, sufficient	3	
		In the wet season, there is enough, but in the dry season, there isn't enough	2	
		Less	1	
10	The feed that was provided (specifically ruminants)	Elephant grass is available in three forms: concentrate processed grass, and elephant grass (silage etc.)	4	P
		Concentrate and elephant grass	3	
		Only elephant grass is used	2	
		Grass land only	1	
11	The feed that was provided (specifically for poultry)	Homemade/manufactured prepare feed	4	SP
		Remaining household garbage and feed that has been made	3	
		Remaining domestic garbage as well as bran/husk	2	
		Garbage that hasn't been disposed of	1	
12	Availability of clean water Throughout the year, it is abundant	4	P	
		In the wet season, abundant in the dry season, sufficient	3	
		Sufficient in the wet season, but lacking in dry season	2	
		Less	1	
13	Environmental conditions	A large amount of agricultural land exists in the rural setting.	4	P
		A rural setting with ample agricultural land	3	
		The residential setting is still farmland	2	
		Resident's residential environment	1	
14	Housing system	Cages for a colony and individual	4	CP
		Colony/cages	3	
		Individual cages that are close together	2	
		Together individual, but widely dispersed cages	1	

No	Criteria	Sub Criteria	Value	Weight
15	Maintenance system (specially for poultry)	There is a play area and the animals are caged	4	P
		Without a play place, they are confined	3	
		Sometimes they're confined, and other times they're on	2	
		Released	1	
16	Financial assistance in the previous	I've never received any aid	4	P
		Have received funds from aid organizations, but not from the government	3	
		Government aid has already been provided, although it has been a long time	2	
		Received government aid funds (this year, last year, or two years ago)	1	
17	Waste disposal	It has been processed, used, and marketed	4	CP
		It's been processed and put to good use	3	
		It is used in the natural form	2	
		It has never been used before	1	
18	Registration on livestock (recording)	The recording is completed entirely, elegantly, and on a regular basis	4	P
		Recorded but incomplete	3	
		It was not recorded	2	
		I have no idea what recording is	1	
19	Marketing in livestock	Registration on livestock (recording)	4	P
		Marketing is simple, but it is reliant on middlemen	3	
		Marketing might be difficult	2	
		Lack the knowledge on livestock marketing	1	
20	Location place of group	In the area of development	4	P
		In relation to the development	3	
		A location outside of the development zone	2	
		Zoonotic disease endemic area	1	

In this study, linguistic weight values that are broken down into five categories-not important, less important, quite important, important, very important are employed. A fuzzy number with a trapezium interval is used to represent the weight value. This weight's purpose is to quantify how seriously a criterion is taken [4]. Table 3 below provides information on the weight value for each criterion.

Table 3. Information of Weights Value

Scale of Importance	$W_k(m_l, m_u, \alpha, \beta)_{LR}$
Not Important (TP)	(0.20;0.20;0.20;0.20)
Less Important (KP)	(0.40;0.40;0.20;0.20)
Quite important (CP)	(0.60;0.60;0.20;0.20)
Important (P)	(0,80;0.80;0.20;0.20)
Very Important (SP)	(1.00;1.00;0.20;0.20)

3.3 Determine the Value of each Criterion

The criteria have value information to support the method used. For example, the criteria for group status are divided into four categories: recently founded, beginner group, old groups, old groups and achievers, with rating system ranging from 0-5.

Where the higher the value, the better the farmer group's group status. With the fuzzy promethea evaluation value as an input in the form of a value of x with a range value of m_l and m_u is x, while α and β worth 1

3.4 Example of a Ranking Case

Verification data of prospective recipients and prospective locations in 2018 who received Regional Revenues and Expenditures Budget (APBD) assistance, totaling 19 farmer group data, has been used to calculate 2 farmer group sample data from 19 farmer group data for manual calculations from 7 data taken from 19 farmer group data, namely Taruna Mugia Mandiri (A1) and Tanjung Sejahtera Tani (A2). Then, based on the previously calculated value information, each alternative is scored, and the results are displayed in Table 4.

Table 4. Score each Criteria on Alternative A1 and A2

Group Name	Value Criteria	Score Value
Taruna Mugia Mandiri (A1)	Group status	3
	Group member residence	3
	Group member employment	3
	Livestock ownership	3
	Previous farming experience	3
Taruna Mugia Mandiri (A1)	A knowledge of livestock health	2
	The drum's ownership	2
	Fodder forage land ownership (specifically ruminants)	3
	Availability of animal feed forage (specifically ruminants)	4
	The feed that was provided (specifically ruminants)	1
	The feed that was provided (specially for poultry)	-
	Availability of clean water	3
	Environmental conditions	3
	Housing system	4
	Maintenance system (specially for poultry)	-
	Financial assistance in the previous	2
	Waste disposal	2
	Registration on livestock (recording)	2
	Marketing in livestock	3
	Location place of group	4
Tanjung Sejahtera Tani (A2)	Group status	3
	Group member residence	4
	Group member employment	3
	Livestock ownership	3
	Previous farming experience	3
	A knowledge of livestock health	2
	The drum's ownership	2
	Fodder forage land ownership (specifically ruminants)	2
	Availability of animal feed forage (specifically ruminants)	3
	The feed that was provided (specifically ruminants)	1
	The feed that was provided (specially for poultry)	-
	Availability of clean water	4
	Environmental conditions	4
	Housing system	4
	Maintenance system (specially for poultry)	-
	Financial assistance in the previous	2
	Waste disposal	2
	Registration on livestock (recording)	2
	Marketing in livestock	3
	Location place of group	4

The information from each alternative's evaluation score is then converted into a trapezoidal fuzzy number from using previously calculated information. The shape of the fuzzy number on this criterion in the Taruna Mugia Mandiri farmer group (A1) with a score of 3 is an example of calculating group status $m_l = 3$, $m_u = 3\alpha = 1$ and $\beta = 1$ so that the results are obtained as follows:

$$(m_l, m_u, \alpha, \beta)_{LR} = (3, 3, 1, 1)$$

The fuzzy number form's results are then presented in the form of a basic table for the fuzzy PROMETHEE analysis that has been utilized in the calculations, as shown in Table 6 below

Table 5. Basic data of the analysis Fuzzy PROMETHEE

Criteria Code	Min/Max	Alter A1	Alter A2	Weights code	Type Preferences
C1	Max	(3.3.1.1)	(3.3.1.1)	SP	I
C2	Max	(3.3.1.1)	(4.4.1.1)	SP	I
C3	Max	(3.3.1.1)	(3.3.1.1)	P	I
C4	Max	(3.3.1.1)	(3.3.1.1)	CP	I
C5	Max	(3.3.1.1)	(3.3.1.1)	P	I
C6	Max	(2.2.1.1)	(2.2.1.1)	CP	I
C7	Max	(2.2.1.1)	(2.2.3.1)	SP	I
C8	Max	(3.3.1.1)	(2.2.1.1)	CP	I
C9	Max	(4.4.1.1)	(3.3.1.1)	P	I
C10	Max	(1.1.1.1)	(1.1.1.1)	P	I
C11	Max	-	-	SP	I
C12	Max	(3.3.1.1)	(4.4.1.1)	P	I
C13	Max	(3.3.1.1)	(4.4.1.1)	P	I
C14	Max	(4.4.1.1)	(4.4.1.1)	CP	I
C15	Max	-	-	P	I
C16	Max	(2.2.1.1)	(1.1.1.1)	P	I
C17	Max	(2.2.1.1)	(2.2.1.1)	CP	I
C18	Max	(2.2.1.1)	(1.1.1.1)	P	I
C19	Max	(3.3.1.1)	(4.4.1.1)	P	I
C20	Max	(4.4.1.1)	(4.4.1.1)	P	I

(a) Preference degree calculation
Eq. 17 is used with the type of preference for each criterion previously determined to calculate the degree of preference for this criterion. This preference degree calculation's result.

$$P_j = P_j(f_j(A1) \ominus f_j(A2)) \tag{16}$$
$$= P_j((3,3,1,1) \ominus (3,3,1,1)) \tag{17}$$

$$P_j = \begin{pmatrix} (3-3); P_j(3-3); \\ P_j(3-3) - P_j(3-3-1+1); \\ P_j(3-3+1+1) - P_j(3-3)_{LR} \end{pmatrix} = (0;0;-2;2)_{LR} = (0;0;0;1)_{LR}$$

Figure 3 shows the page that the system has provided to showcase the fundamental Fuzzy-PROMETHEE analysis table.

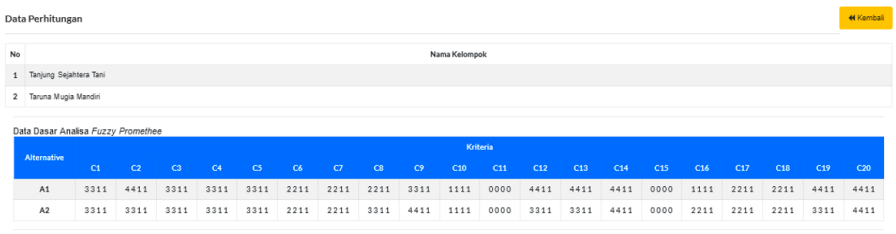

Figure 3. Basic Data Table of Analysis Fuzzy-PROMETHEE what the System Displays

(b) Calculating dominance relations, leaving flow, entering flow, net flow and defuzzied net flow fuzzy-PROMETHEE are among the topics covered in this section show in Table 7 below:

Table 6. Dominance Relations, Leaving Flow, Entering Flow, Defuzzied Net Flow Fuzzy-PROMETHEE

π	$A1$	$A2$	ϕ^+	ϕ_{defuz}	Rank
A1	-	(0.11;0.11;0.07;1.057)	(0.19;0.19;0.05;0.8)	-11.64	2
A2	(0.17;0.17;0.04;0.9)	-	(0.22;0.22;0.05;0.83)	11.78	1
ϕ^-	(0.17;0.17;0.04;0.84)	(0.12;0.12;0.03;0.83)	-		
ϕ	(0.02;0.02;0.09;1.71)	(0.10;0.10;0.09;1.66)			

The numbers for the fuzzy leaving flow and fuzzy entering flow for each alternative are show in Table 7. The better the alternative, the higher the leaving flow value and the lower the entering flow value [4]. The fuzzy net flow value is defuzzified using the CoA method utilized bu the Fuzzy-PROMETHEE method in order to acquire the whole ranking order. Based on the defuzzification value from highest to lowest, the ranking with the best order is determined. Tanjung Sejahtera Tani (A2) was the calculations. is obtained as a recommendation for farmers that qualify for assistance from the regional government. However, the decision maker still has the power to change it if they so want. As seen in Figure 3 and 4, the system has made a page to display the value of the calculation results obtained using the Fuzzy-PROMETHEE method.

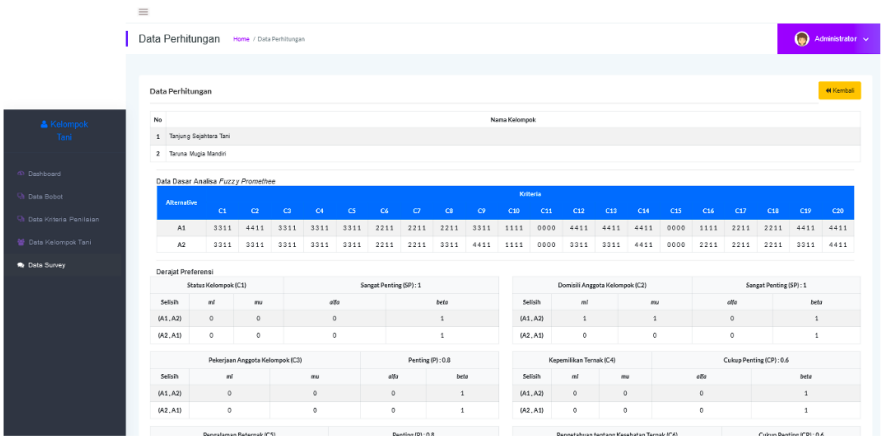

Figure 4. Table of Alternative Preference Degree Values Displayed by the System

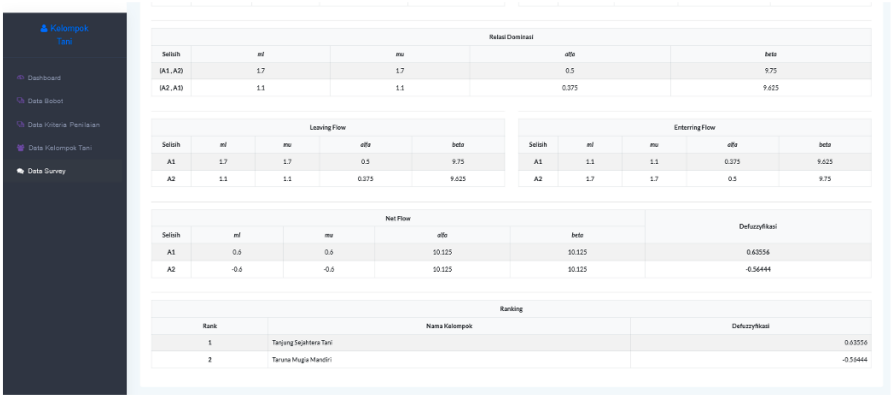

Figure 5. Domination Relations, Leaving Flow, Entering Flow, Net Flow, Defuzzyfied

The system has also supplied a method to print the ranks that are eligible for assistance

in a pdf format, comparable to Figure 6 below, to make this easier to see and assess the effectiveness of farmer groups getting assistance.

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DAFTAR HASIL VERIFIKASI CALON PENERIMA BANTUAN TERNAK DENGAN MENERAPKAN METODE FUZZY PROMETHEE DALAM MENYELEKSI CALON KELOMPOK TANI UNTUK MENERIMA DANA BANTUAN APBD

No	Nama Kelompok	Defuzzyfikasi	Rank
1	Indah	0.49885	1
2	Bina Tani	0.35087	2
3	Sukaresmi Mandiri	0.2927	3
4	Sugih Mukti Pancawati	0.23937	4
5	(KWT) Hibar	0.15065	5
6	Tanjung Sejahtera Tani	0.10085	6
7	Taruna Mugia Mandiri	0.05214	7
8	Kahuripan	0.03438	8
9	Salaka Argo	0.00293	9
10	Cimenteng Jaya	-0.00639	10
11	Ponpres Nurul Iman	-0.00983	11
12	Harapan Jaya II	-0.03061	12
13	Wargi Salira	-0.08068	13
14	(KWT) Cempaka Pasir Muncang	-0.08473	14
15	Barokah Kampung Babakan BTP	-0.10669	15
16	Setia Kaum Tani	-0.10726	16
17	Pangapakan	-0.11465	17
18	Tani Kopses	-0.17597	18
19	Sauyunan II	-0.25183	19

Figure 6. Printouts of Farmer Group Rankings that Deserve Financial Assistance.

4. Conclusion

The research project "Application of the Fuzzy-PROMETHEE Method in Selecting Farmer Groups Verification for Candidates for Receiving Grants Regional Revenues and Expenditures Budget" is supported by Bogor Regency Department of Fisheries and Livestock, in charge of the Breeding and Livestock Cultivation Section and enthusiastically supported by the staff to conduct the analysis in the hopes to make it simpler to identify farmer organizations deserving of help from local government.

5. Acknowledgement

Based on problems highlighted by the Bogor Regency Department of Fisheries and Livestock, particularly the Breeding and Livestock Cultivation Section, for the purpose of selecting applicants for farmer group support. A decision support system was created using the PHP programming language and the XAMPP MySQL database with this web-based system.

It can be finished and improved for research on decision support system in selecting farmer group verification for potential receivers and Receiving Grants Regional Revenues and Expenditures Budget (APBD) assistance using the fuzzy-PROMETHEE method, including the following:

1. Using more mathematical methods.
2. Improving the user interface to get it even more simple.
3. Using a system-based system is easier and much more efficient in future research.

It can be concluded first from design implementation, trial, and discussion outcomes in this study that, first and foremost a decision support system for selecting farmer group verification for prospective receivers of Regional Revenues and Expenditures Budget (APBD) aid funds can be implemented using the fuzzy promethea method. Then, using this method, the staff of Breeding and Livestock Cultivation Section will be able to determine which farmer groups are viable and truly in need of Regional Revenues and Expenditures Budget (APBD) aid funds by ranking data from the system's findings. The Indah farmer group was ranked first in the ranking using the system, with a defuzzification value of 0.42354 and 20 assessment criteria for the group's condition, and the ranking using this system is expected to assist the Bogor Regency Department of Fisheries and Livestock in selecting farmer groups that deserve assistance.

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