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SELECTING THE BEST COW SEEDS USING THE MOORA METHOD

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ABSTRACT

The choice of cattle breeds that have been done so far by breeders is by trial and error. This of course will affect the results obtained by breeders are less than optimal. In order for the selection of good quality cattle to be carried out and produce maximum results, the selection of cows is carried out using the Multi Objective Optimization method technology on the basis of ratio analysis (MOORA), the MOORA method is easy to understand when distinguishing subjective parts and giving weight to decisions with several attribute decision. the method can determine the objectives of the contiguous criteria. MOORA refers to a ratio system in which each response of an alternative to a goal is compared to a denominator, which represents all alternatives regarding that goal. The results of the calculation using the MOORA method, the best alternative is selected, namely A4 with a result of 0.321406995. By using this method, it is hoped that the rearing process of cattle breeds can be carried out in a short time and with maximum results.

INTRODUCTION

The increase in population has been accompanied by an increase in the consumption of animal protein from livestock [1] One of the livestock that has increased consumption is beef, which mostly comes from smallholder farms. From the susenas data collected by BPS, the average consumption of beef for Indonesians in 2017 is estimated at 3.00 kg / capita / year. BPS projection results state the total population of Indonesia in 2017 is 261.36 million people. If multiplied, the national demand for beef in 2017 will reach 784 thousand tons. Meanwhile, beef production in 2017 is estimated at 532 thousand tons [2]. Therefore, to meet the demand for beef, an additional supply of beef is required by importing it. In order to welcome the government's program of self-sufficiency in beef, the government is optimistic that in 2026 it can achieve beef self-sufficiency. The success of the beef cattle rearing business begins by selecting superior beef cattle breeds and also maintaining them. By selecting the right beef cattle, it will increase the profit for the coals of farmers, namely in terms of rearing time, feed costs, maintenance costs and so on. In this case, the breeders experience problems, namely determining quality cow breeds. Cattle farmers still use trial and error which is

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only seen from the weight and price of the seeds themselves. Like the breeders in the village of Sidodadi, Kisaran, from the results of the interviews that the researchers conducted on their farms, they still practice the traditional way of selecting cow breeds. This occurs because of limited knowledge in determining the criteria for selecting beef cattle. So that the results are still not optimal. The technology used is the MOORA method. It is hoped that the use of the Decision Support System will provide breeders with qualified knowledge to support selecting the best cattle breeds.

METHOD

Decision Support System

Decision Support System (SPK) or known as Decision Support System (DSS), is a further development of a computerized Management Information System that is designed so that it is interactive with the user [1]. SPK allows users to make decisions more quickly and carefully [2] . The purpose and objectives of the SPK, namely to support decision-makers choosing alternative decisions that are the result of processing information obtained / available using decision-making models and to solve problems that are structured, semi-structured and unstructured [3]

MOORA Method Concept

The Multi-Objective Optimization Method On The Base Of Ratio Analysis (MOORA) is a method introduced by Brauers and Zavadkas. This method is used for multi-criteria retrieval by [4][5][6]. The MOORA method is easy to understand when distinguishing subjective parts and gives weight to decisions with several decision attributes. The level of accuracy in this method is quite good because it can determine the objectives of the contiguous criteria.) or costly. The stages in the MOORA method as [7], namely:

1. Create a Decision Matrix.

$$X = \begin{bmatrix} X_{11} & X_{12} & . & X_{1n} \\ X_{21} & X_{22} & . & X_{2n} \\ . & . & . & . \\ X_{m1} & X_{m2} & . & X_{mn} \end{bmatrix} \quad (1)$$

2. Normalizing the Decision Matrix

$$Xij=XIj/\sqrt{[\sum_{i=1}^{m} X_{ij}^2]} \quad (2)$$

3. Optimize attributes

$$yi = \sum_{j=1}^{g} X_{ij}^* - \sum_{j=g}^{n} + X_{ij}^* \quad (3)$$

4. In some cases, some attributes are more important than others. To pay more attention to attributes, it can be multiplied to give maximum results, then the matrix value times the weight.

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RESULT AND DISCUSSION

In analyzing this problem, the process of selecting the best beef cattle breeds will be discussed using the Multi-Objective Optimization method on the Base of Ratio Analysis (MOORA). The first step taken to start the calculation using the MOORA method is to determine the assessment criteria. The predetermined assessment criteria are listed in table 1.

Table 1. Defining Criteria

Criteria	Information	Weight	advantage
C1	Gumba's height	0.15	Benefit
C2	Chest Width	0.15	Benefit
C3	Cow condition	0.1	Benefit
C4	Weight gain	0.15	Benefit
C5	Resistant to disease	0.1	Cost
C6	Body length	0.15	Benefit
C7	Resistance to climate	0.1	Benefit
C8	Weight up to / kg	0.1	Benefit

Table 2. Match Rating

	C1	C2	C3	C4	C5	C6	C7	C8
A1	4	4	5	5	5	5	3	4
A2	5	4	3	4	5	3	5	3
A3	4	4	5	4	5	3	5	4
A4	4	4	3	5	3	5	3	5
A5	4	4	5	4	5	3	5	3
A6	3	3	3	4	5	3	3	2
A7	3	5	5	4	3	3	5	2
A8	3	3	3	3	5	2	5	2
A9	3	3	3	3	5	1	5	2

1. Determine the value of the decision X matrix taken from the compatibility table

$$X = \begin{vmatrix} 4 & 4 & 5 & 5 & 5 & 5 & 3 & 4 \\ 5 & 4 & 3 & 4 & 5 & 3 & 5 & 3 \\ 4 & 4 & 5 & 4 & 5 & 3 & 5 & 4 \\ 4 & 4 & 3 & 5 & 3 & 5 & 3 & 5 \\ 4 & 4 & 5 & 4 & 5 & 3 & 5 & 3 \\ 3 & 3 & 3 & 4 & 5 & 3 & 3 & 2 \\ 3 & 5 & 5 & 4 & 3 & 3 & 5 & 2 \\ 3 & 3 & 3 & 3 & 5 & 2 & 5 & 2 \\ 3 & 3 & 3 & 3 & 5 & 1 & 5 & 2 \end{vmatrix}$$

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Normalizing the decision X matrix is calculated from the weight-suitability rating value for each criterion

$$C1 = \sqrt{4^2 + 5^2 + 4^2 + 4^2 + 4^2 + 3^2 + 3^2 + 3^2 + 3^2}$$
$$= \sqrt{125}$$
$$= 11.180$$

A_{11} = 4 / 11.180 = 0.3577
A_{12} = 5 / 11.180 = 0.4472
A_{13} = 4 / 11.180 = 0.3577
A_{14} = 4 / 11.180 = 0.3577
A_{15} = 4 / 11.180 = 0.3577
A_{16} = 3 / 11.180 = 0.2683
A_{17} = 3 / 11.180 = 0.2683
A_{18} = 3 / 11.180 = 0.2683
A_{19} = 3 / 11.180 = 0.2683

Hasil dari perhitungan diatas adalah dapat dilihat pada matrix Xij sebagai berikut :

3. Optimizing attributes to include weights in normalized searches

$$Xwj = \begin{vmatrix}
0.3577(0.15) & 0.3481(0.15) & 0.4152(0.1) & 0.4110(0.15) & 0.3599(0.1) & 0.5(0.15) & 0.2254(0.1) & 0.4193(0.1) \\
0.4472(0.15) & 0.3481(0.15) & 0.2491(0.1) & 0.3288(0.15) & 0.3599(0.1) & 0.3(0.15) & 0.3758(0.1) & 0.3144(0.1) \\
0.3577(0.15) & 0.3481(0.15) & 0.4152(0.1) & 0.3288(0.15) & 0.3599(0.1) & 0.3(0.15) & 0.3758(0.1) & 0.4193(0.1) \\
0.3577(0.15) & 0.3481(0.15) & 0.2491(0.1) & 0.4110(0.15) & 0.2159(0.1) & 0.5(0.15) & 0.2254(0.1) & 0.5241(0.1) \\
0.3577(0.15) & 0.3481(0.15) & 0.4152(0.1) & 0.3288(0.15) & 0.3599(0.1) & 0.3(0.15) & 0.3758(0.1) & 0.3144(0.1) \\
0.2683(0.15) & 0.2611(0.15) & 0.2491(0.1) & 0.3288(0.15) & 0.3599(0.1) & 0.3(0.15) & 0.2254(0.1) & 0.2096(0.1) \\
0.2683(0.15) & 0.4351(0.15) & 0.4152(0.1) & 0.3288(0.15) & 0.2159(0.1) & 0.3(0.15) & 0.3758(0.1) & 0.2096(0.1) \\
0.2683(0.15) & 0.2611(0.15) & 0.2491(0.1) & 0.2466(0.15) & 0.3599(0.1) & 0.2(0.15) & 0.3758(0.1) & 0.2096(0.1) \\
0.2683(0.15) & 0.2611(0.15) & 0.2491(0.1) & 0.2466(0.15) & 0.3599(0.1) & 0.1(0.15) & 0.3758(0.1) & 0.2096(0.1)
\end{vmatrix}$$

The multiplication result with the criteria weight is as follows:

$$X = \begin{vmatrix}
0.0536 & 0.0522 & 0.0415 & 0.0616 & 0.0359 & 0.0750 & 0.0225 & 0.0419 \\
0.0670 & 0.0522 & 0.0249 & 0.0493 & 0.0359 & 0.0450 & 0.0375 & 0.0314 \\
0.0536 & 0.0522 & 0.0415 & 0.0493 & 0.0359 & 0.0450 & 0.0375 & 0.0419 \\
0.0536 & 0.0522 & 0.0249 & 0.0616 & 0.0215 & 0.0750 & 0.0225 & 0.0524 \\
0.0536 & 0.0522 & 0.0415 & 0.0493 & 0.0359 & 0.0450 & 0.0375 & 0.0314 \\
0.0402 & 0.0391 & 0.0249 & 0.0493 & 0.0359 & 0.0450 & 0.0225 & 0.0209 \\
0.0402 & 0.0652 & 0.0415 & 0.0493 & 0.0215 & 0.0450 & 0.0375 & 0.0209 \\
0.0402 & 0.0391 & 0.0249 & 0.0369 & 0.0359 & 0.0300 & 0.0375 & 0.0209 \\
0.0402 & 0.0391 & 0.0249 & 0.0369 & 0.0359 & 0.0150 & 0.0375 & 0.0209
\end{vmatrix}$$

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Tabel 3. List of Result Yi

Alternative	Maximum (C1+C2+C3+C4+C6+C7+C8)	Minimum (C5)	Yi = Max - Min
A1	0.349010584	0.035990788	0.313019797
A2	0.307920914	0.035990788	0.271930127
A3	0.321713581	0.035990788	0.285722793
A4	0.343001467	0.021594473	0.321406995
A5	0.311113602	0.035990788	0.275122815
A6	0.242399375	0.035990788	0.206408587
A7	0.30015304	0.021594473	0.278558567
A8	0.230102371	0.035990788	0.194111584
A9	0.215102371	0.035990788	0.179111584

Table 4. Ranking of Results

Alternatif	Results	Rangking
A_4	0.321406995	1
A_1	0.313019797	2
A_3	0.285722793	3
A_7	0.278558567	4
A_5	0.275122815	5
A_2	0.271930127	6
A_6	0.206408587	7
A_8	0.194111584	8
A_9	0.179111584	9

From the calculation above, it can be seen that A4 is the best cow seeds with the highest value of 0,321406995

CONCLUSION

The application of Multi Objective Optimization on the Base of Ratio Analysis (MOORA) can be used to determine the weight value of each attribute, followed by a ranking process that will select the best alternative from many alternatives. The application of the MOORA method is quite easy to use as a way of selecting the best beef cattle breeds because the steps are quite simple, the decision support system can solve the problem of selecting the best beef cattle breeders in Sidodadi village.

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