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# Desicion Support System of Land Suitability for Corn Seed Varieties

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***Abstrak***

*Pengambilan keputusan pemilihan lahan pertanian yang sesuai merupakan salah satu kunci keberhasilan budidaya jagung. Pemilihan lahan pertanian masih ditentukan berdasarkan pengalaman petani yang tidak memiliki dasar perhitungan yang kuat, sehingga berpotensi penurunan hasil produksi, seperti yang terjadi pada tahun 2023 produksi jagung pipilan kering menurun sebesar 12,5% dari tahun sebelumnya. Mengatasi permasalahan pemilihan lahan pertanian diperlukan suatu sistem yang dapat menganalisis kesesuaian lahan pertanian dengan varietas bibit jagung berdasarkan data dan fakta. Dalam penelitian ini mengembangkan Sistem Pendukung Keputusan (SPK) untuk menganalisis lahan yang sesuai dengan syarat tumbuh varietas jagung dengan menggunakan metode Analytical Hierarchy Process (AHP) untuk menghitung bobot prioritas kriteria penilaian dan metode Profile Matching (PM) untuk menghitung rangking lahan pertanian terbaik berdasarkan nilai gap syarat tumbuh varietas bibit jagung. Penelitian ini menggunakan data 22 kecamatan di Kabupaten Blitar sebagai alternatif dan 5 jenis varietas sebagai profil ideal. Hasil rangking penelitian ini lahan terbaik untuk varietas V1, V2, V3, dan V4 adalah Kecamatan Sanankulon, sedangkan varietas V5 adalah Kecamatan Doko. Evaluasi sistem pendukung keputusan dilakukan dengan kuesioner yang dinilai oleh 15 ahli sebagai responden, dengan hasil uji validitas menunjukkan koefisien "Strong" dan hasil uji reliabilitas memberikan nilai alpha 0,8019 dengan tingkat konsistensi "Good."*

***Kata Kunci*** *— Sistem Pendukung Keputusan, Kesesuaian Lahan, Analytical Hierarchi Process (AHP), Profile Matchings*

***Abstract***

*Decision making in selecting suitable agricultural land is a key factor for the success of corn cultivation. The selection of agricultural land is still largely based on the experience of farmers, which lacks a strong analytical foundation, this can lead to a decrease in production as the evidenced in 2023, the dry corn kernel production decline by 12,5% compared to the previous year. To address the problem of land selection, a system is needed that can analyze the suitability of agricultural land for different corn seed varieties based on data and facts. This research develops a Decision Support System (DSS) to analyze land suitability for corn varieties by using the Analytical Hierarchy Process (AHP) method to calculate the priority weights of each evaluation criterion, and the Profile Matching (PM) method to rank agricultural lands based on the gap values of the growth requirements for each corn seed variety. The research uses data from 22 sub-districts in Blitar Regency as alternatives and 5 types of corn varieties as ideal profiles. The ranking results of this research indicate that the best agricultural land for varieties V1, V2, V3, and V4 is in Sanankulon Sub-district, while for variety V5, it is in Doko Sub-district. The evaluation of the decision support system was carried out using a questionnaire assessed by 15 experts as respondents. The validity test results showed a "Strong" coefficient, and the reliability test yielded a Cronbach's alpha of 0.8019, indicating a "Good" level of consistency.*

***Keywords*** *— Decision Support System, Land Suitability, Analytical Hierarchy Process (AHP), Profile Matching*

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## 1. INTRODUCTION

Corn is one of the essential commodities for the population in Indonesia. In addition to being a staple food, corn is also crucial as livestock feed [1]. The national corn production in 2023 was 14.46 million tons of dry kernels, which is a 12.5% decrease compared to the corn production in 2022 [2]. To increase corn production each year, it is essential to consider the type of seed and the suitability of agricultural land, as an incompatible seed variety or land type can significantly affect harvest success. The determination of the seed variety used by farmers is generally still done manually, by directly surveying the location, and based on experience or recommendations from agricultural companies. The corn commodity has many varieties, each with specific growth requirements, advantages, and disadvantages, which leads to different land suitability requirements. Thus, there is a lack of research that delves into the land suitability for corn seed varieties. The wrong choice of corn seed variety for a particular piece of land can result in low harvest yields. Therefore, there is a need to develop a system to assess the feasibility of agricultural land to evaluate its suitability and enhance agricultural production [3].

Based on this issue, in this research a decision support system was developed that can help farmers in selecting the right corn seed varieties based on the criteria of the land to be planted. Decision Support System (DSS) is a computer-based system created to aid decision-makers in addressing semi-structured problems. It is capable of collecting, processing, and providing computer-based information to improve the quality of decisions [4]. Decision-making based on human perspective carries the risk of errors, especially when the decision pertains to crucial matters such as business decisions, corporate policies, financial planning, and medical diagnoses, which could lead to significant risks. Problems arise when an effort to determine a solution fails to meet the goals and expected outcomes, leading to incorrect solutions, ineffectiveness, and inefficiency [5].

The development of the DSS in this research uses Analytical Hierarchy Process (AHP) method for weighting and Profile Matching method to calculate the gap value for each parameter and determine the ranking of agricultural land. Furthermore, to evaluate the system, an evaluation questionnaire was conducted, assessed by respondents who are experts in their fields. To evaluate the questionnaire was then tested using the Pearson correlation method, followed by a reliability test using the Cronbach alpha method. The validity and reliability tests are employed to assess the accuracy of the items in the questionnaire with the content or material being measured, focusing on how well the measurement tool can provide appropriate measurements, ensuring that the developed decision support system is consistent for repeated use under the same conditions [6]. The goal of DSS is to support in making decisions about selecting the most suitable land for planting a particular corn seed variety.

The growth requirements of the corn seed variety used as evaluation criteria in this research consist of three main factors: Climate, Topography, and Soil. Each of these criteria includes parameters such as climate parameters like temperature, humidity, rainfall, and solar radiation duration; topography parameters like elevation, slope, and drainage; and soil parameters like pH, soil moisture, soil texture, and soil type. In addition, other factors such as the presence of nutrients in the soil, water availability, and local microclimate conditions may also influence corn growth, although they are not always primary criteria in land suitability evaluation. This research focuses on the development of a decision support system to assist in selecting agricultural land that meets the growth requirements of corn plants using AHP method for weighting and PM method for calculating gap values for each parameter. By assigning priority weights to the main factors and calculating land suitability, the success of this system heavily relies on the quality of the data used, as well as validity and reliability tests to ensure accuracy and consistency across different field conditions. Thus, farmers will have a basis for selecting agricultural land that meets the growth requirements of the corn seed variety to be planted, with the expectation of significantly improving crop yields.

## 2. METHODS

### *2.1 Problem Analysis*

Corn commodity has many varieties, each with specific growth requirements, advantages, and disadvantages, leading to varying land suitability needs. Choosing agricultural land that does not align with the growth requirements of the corn variety to be planted will result in reduced productivity and suboptimal harvest potential. Based on the analysis of this issue, a system is needed to assess the suitability of agricultural land for the specific corn seed variety to be planted, considering data and facts gathered directly from the field. This system will provide a more accurate foundation for selecting land suitable for corn cultivation. Therefore, the selection of agricultural land is not merely based on subjective considerations but on robust calculations derived from available data, assisting farmers in applying the most appropriate corn seed variety to land that meets its growth requirements.

### *2.2 Data Collection*

The data employed in this research includes data on 5 types of corn seed varieties, namely V1, V2, V3, V4, and V5, as ideal profiles, and data from 22 subdistricts in Blitar Regency as alternative data. All the data used in this research were obtained from PT Syngenta Seed Indonesia in the Blitar area.

The evaluation criteria are based on the growth requirements of each corn seed variety to be planted. In this research, the growth requirements of corn plants consist of 3 main factors: climate, topography, and soil factors [7]. The determining factors are based on their impact and influence on the plants. The climate factor is placed as the main factor because temperature, humidity, rainfall, and sunlight have a direct impact and influence on the environmental conditions and plant growth. Futhermore, topography, which includes elevation, slope, and drainage, affects water distribution, temperature, and the risk of erosion, which can influence soil quality and the stability of plant growth. The soil factor, which includes pH, soil moisture, soil type, and soil texture, consists of elements that can be managed and improved using tractors, fertilizers, and pesticides. The evaluation criteria used are shown in **Table 1**.

Table 1 Kriteria Penilaian

| | |
|---|---|
| **1. Climate Factor** | |
| 1 | Temperature (°C) |
| 2 | Rainfall (mm/year) |
| 3 | Humidity (%) |
| 4 | Radiation (jam) |
| **2. Topography Factor** | |
| 1 | Elevation (mdpl) |
| 2 | Slope (°) |
| 3 | Drainage |
| **3. Soil Factor** | |
| 1 | pH |
| 2 | Soil Moisture (%) |
| 3 | Soil Type |
| 4 | Soil Texture |

### *2.3 Decision Support System Architecture*

The decision support system is developed using a combination of the AHP and Profile Matching methods, where the AHP method is used for determining the priority weights of each criteria, and the Profile Matching method is utilized to calculate the ranking. The decision support system consists of several stages, starting with the first stage, where the user fills out the evaluation criteria input form, followed by the user completing the pairwise comparison matrix according to the criteria entered. Next, the priority weights are calculated according to the values in the pairwise comparison matrix. Once the priority weights are confirmed to be consistent with a Consistency Ratio (CR) value of ≤ 0.1, the calculation proceeds to the Profile Matching stage. In the Profile Matching calculation stage, the user inputs the ideal profile and alternative values according to the evaluation criteria, and the system calculates the ranking of the alternatives. Finally, all calculation data are saved for future use, such as for data changes or the addition of criteria and alternatives. Additionally, the system is equipped with features that allow the user to verify and update inputs based on changes in conditions or preferences over time. This ensures that the system remains relevant and can provide more accurate and updated decisions. The architecture of the DSS is shown in **Figure 1**.

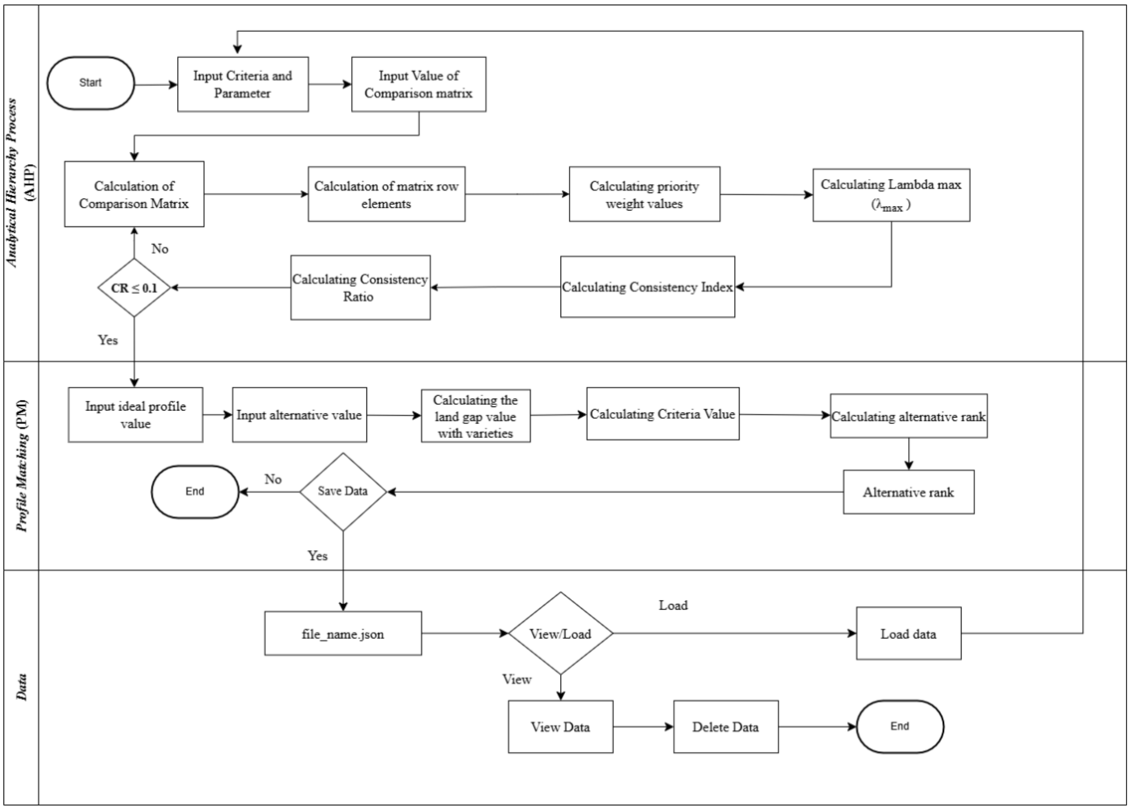


Figure 1 Decision support system architecture

*2.2 Analytical Hierarcy Process (AHP) Method*

The AHP method is applied to assign the weight values in a decision support system. It can be implemented to solve complex problems, such as selecting alternatives, setting priorities, and determining needs [8]. AHP involves several stages, starting with setting the goal and selecting alternatives, followed by creating a pairwise comparison matrix among the criteria and parameters defined, and finally calculating the consistency ratio of the matrix [9]. In the pairwise comparison matrix, the matrix values are given on a scale of 1 to 9, which is the optimal scale for evaluating relative importance. The steps in AHP calculation begin with forming the comparison matrix, calculating the n-th root of the matrix element products, determining the weights, and calculating the consistency ratio [10]. The AHP calculation starts with constructing the pairwise comparison matrix as shown in **Table 2** and is followed by calculations as shown in **equation (1)** to **(6)**.

Table 2 Comparison Matrix

| Criteria | C1 | C2 | ..... | Cn |
|---|---|---|---|---|
| C1 | 1 | $a_{1,2}$ | ..... | $a_{1,n}$ |
| C2 | $\frac{1}{a_{1,2}}$ | 1 | ..... | $a_{2,n}$ |
| ..... | ..... | ..... | 1 | ..... |
| Cn | $\frac{1}{a_{1,n}}$ | $\frac{1}{a_{2,n}}$ | ..... | 1 |

1. Calculate Multiply the elements of each row from comparison matriks by following **equation (1)** and **(2).**

$$M_i = \prod_{j=1}^{n} b_{i,j} \quad (1)$$

$$\overline{W_i} = \sqrt[n]{M_i} \quad (2)$$

2. Calculate the weight by following **equation (3).**

$$W_i = \overline{W_i} \,/\, \sum_{i=1}^{n} \overline{W_i} \quad (3)$$

3. Calculate consistency value by following **equation (4) to (6),** if CR ≤ 0,1 then it is declared consistent.

$$\lambda_{max} = \sum_{i=1}^{n} \left( \frac{(AW)i}{nW_i} \right) \quad (4)$$

$$CI = \frac{\lambda_{max} - n}{n-1} \quad (5)$$

$$CR = \frac{CI}{RI} \quad (6)$$

*2. 3 Profile Matching Method*

The technique employed in DSS to match an input variables with the ideal variables within the system is called the Profile Matching method [11]. It is a series of processes that compare the ideal profile for a position with the candidate's profile. The smaller the difference in values, the higher the score. The stages include calculating the gap value, calculating the criteria value, and calculating the ranking, the steps in Profile Matching calculation are shown in **equation (7) to (10).**

1. Calculate gap value

$$gap = NA - NT \quad (7)$$

Interpolate gap value for interval data

$$y = y_1 + \frac{x - x_1}{x_2 - x_1}(y_2 - y_1) \quad (8)$$

According to the data, it was found that the corn seed variety data consists of interval values, so the gap value calculation process uses interpolation is shown in **Table 3**.

Table 3 Interpolation of Interval Value

***Interpolation of interval data numeric***

$$X' = \begin{cases} 5, & if\ n_{min} \le x \le n_{max}\ (Ideal\ profile) \\ 1 + \dfrac{x - (n_{min} - n_{min})}{n_{min} - (n_{min} - n_{min})}(5 - 1), & if\ (n_{min} - n_{min}) \le x < n_{min}\ (Min\ tolerance) \\ 5 + \dfrac{x - n_{max}}{(n_{min} + n_{max}) - n_{max}}(1 - 5), & if\ n_{max} +< x \le (n_{min} + n_{max}) \text{(Max tolerance)} \\ 1, & if\ x > (n_{min} + n_{max}) \text{(Over tolerance)} \end{cases}$$

***Interpolation of interval data text***

$$X' = \begin{cases} 5, & if\ \text{x} = \text{profil ideal} \\ 1, & if\ \text{x} \ne \text{profil ideal} \end{cases}$$

2. Calculate criteria value (NK)

$$NK = \sum(\text{SK} * \text{x}) \quad (9)$$

3. Calculate rank

$$\text{Rangking} = (x_n \text{ x NK1}) + (x_n \text{ x NK2}) + \dots + (x_n \text{ x NKn}) \quad (10)$$

*2.4 Evaluation*

The evaluation method in this research uses a questionnaire filled out by respondents consisting of Managers, Supervisors, and Agronomy Experts from PT. Syngenta Seed Indonesia. The questionnaire contains 7 questions along with 1 development suggestion, and it underwent content validity testing to measure the accuracy of the question items with the content or material being measured, and validation focusing on how well the measurement tool can provide appropriate measurements [12].

*2.4.1 Pearson Correlation Method*

Validity testing ensures that the questionnaire is relevant and represents all aspects of the variable to be measured. This method is performed by calculating the coefficient and correlation for each question with the total number of questions, then each correlation coefficient is tested for its significance level with r-table, if the computed r value exceeds the table r value, it is deemed valid. [13]. The Pearson correlation calculation (Pearson's product moment coefficient of correlation) is shown in **equation (11).**

$$r_{xy} = \frac{\text{n}(\sum x_i y_i) - (\sum x_i)(\sum y_i)}{\sqrt{(n(\sum {x_i}^2) - (\sum x_i)^2)}\sqrt{(n(\sum {y_i}^2) - (\sum y_i)^2)}} \quad (11)$$

The range of the Pearson correlation coefficient values is used to assess the strength of the correlation based on the relationship interval, from very weak to very strong. The range of the Pearson correlation coefficient is shown in **Table 4.**

Table 4 Range of Pearson Correlation Coefficients

| Koefisien | Level |
|---|---|
| 0,00 – 0,199 | Very weak |
| 0,20 – 0,399 | Weak |
| 0,40 – 0,599 | Moderate |
| 0,60 – 0,799 | Strong |
| 0,80 – 1,000 | Very Strong |

*2.4.2 Alpha Cronbach Method*

This method is one of the techniques used in the questionnaire to measure how well the items correlate with each other and assess the same concept [14]. The Cronbach's alpha calculation is shown in **equation (12).**

$$\alpha = \left(\frac{k}{k-1}\right)\left\{1 - \frac{\Sigma s^2{}_y}{s^2{}_x}\right\} \tag{12}$$

To calculate the variance value for each item ($s^2y$), it is shown in **equation (13).**

$$s^2{}_y = \frac{\sum(x_i - \bar{x})^2}{n-1} \tag{13}$$

To calculate the variance value for all items ($s^2x$), it is shown in **equation (14).**

$$s^2{}_y = \frac{\sum(x_i - \bar{x})^2}{n-1} \tag{14}$$

Internal consistency is used to assess how consistent the evaluation questionnaire is, with the criterion that if the α value is ≥ 0.7, the evaluation questionnaire is considered consistent and acceptable. Internal consistency is shown in **Table 5.**

Table 5 Internal Consistency

| α | Internal Consistency |
|---|---|
| ≥ 0,90 | Excellent |
| 0,80 - 0,89 | Good |
| 0,70 ≤ α < 0,79 | Acceptable |
| 0,60 – 0,69 | Questionable |
| 0,50 – 0,59 | Poor |
| < 0,50 | Unacceptable |

## 3. RESULTS AND DISCUSSION

This research can be divided into several stages. The first stage involves gathering and processing data according to the requirements of each evaluation parameter, covering various important variables that affect land suitability. The second stage is the weighting of parameters and sub-parameters using the AHP method, which allows for more objective prioritization based on pairwise comparison results. The third stage is the calculation of agricultural land rankings based on corn seed varieties using the profile matching method, integrating field data with corn growth criteria. Finally, in the last stage, the decision support system is evaluated with a validity test using the Pearson correlation method and reliability using the Cronbach alpha method. This evaluation process aims to ensure that the developed system can provide accurate, consistent, and reliable results under various conditions.

*3.1 User Interface Desicion Support System*

This decision support system features a user interface designed to facilitate users in inputting data, storing data, and reusing previously calculated results [15]. The interface of the DSS is shown in **Figure 2.**

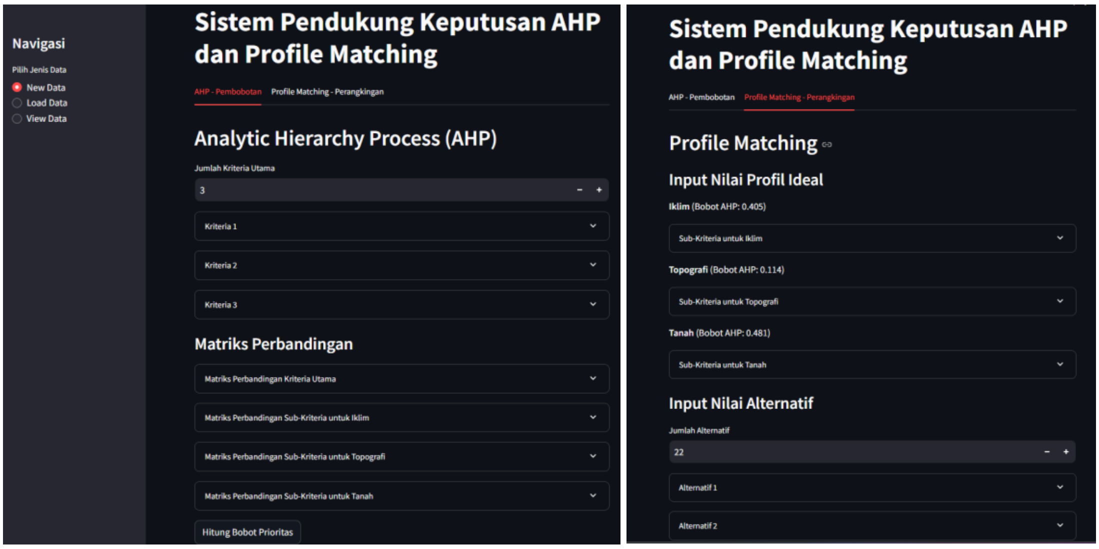

Figure 2 Decision Support System User Interface

*3.2 Result of Calculate Analytical Hierarchy Process (AHP) Method*

AHP weight calculation is performed to obtain priority weights for each criteria and parameter based on an analysis of the comparative scale of importance, ensuring that the weights are not only consistent but also accurately reflect real-world conditions. The AHP weight calculation process begins with the construction of a comparison matrix, followed by the computation of matrix element values, the determination of priority weights, and the evaluation of consistency. In this stage, consistency is assessed by calculating the Consistency Ratio (CR), where a CR $\leq$ 0.1 indicates that the weights are consistent and acceptable. Thus, this process ensures that the weights assigned to each evaluation parameter are not only valid but also suitable for providing more objective and precise decisions. The results of the AHP calculations in this research are shown in **Table 6 to 9**.

Table 6 AHP Priority Weights Main Criteria

| Criteria | Climate | Topography | Soil | Wi |
|---|---|---|---|---|
| Climate | 1 | 3 | 1 | 0,405 |
| Topography | 0,333 | 1 | 0,2 | 0,114 |
| Soil | 1 | 5 | 1 | 0,481 |
| **λ max** | **CI** | **RI** | **CR** | **Consistency** |
| 3,029 | 0,0145 | 0,58 | 0,025 | Consistent |

Table 7 AHP Priority Weight for Climate Sub-criteria

| Climate Sub-criteria | Temp | Rainfall | Humidity | Radiation | Wi |
|---|---|---|---|---|---|
| Temp | 1 | 0,333 | 5 | 1 | 0,212 |
| Rainfall | 3 | 1 | 7 | 3 | 0,525 |
| Humidity | 0,2 | 0,143 | 1 | 0,2 | 0,051 |
| Rainfall | 1 | 0,333 | 5 | 1 | 0,212 |
| **λ max** | **CI** | **RI** | **CR** | **Consistency** | |
| 4,073 | 0,024 | 0,9 | 0,027 | Consistent | |

Table 8 AHP Priority Weight Topography Sub-criteria

| Topography Sub-criteria | Elevation | Slope | Drainage | Wi |
|---|---|---|---|---|
| Elevation | 1 | 5 | 1 | 0,48064 |
| Slope | 0,2 | 1 | 0,333 | 0,113972 |
| Drainage | 1 | 3 | 1 | 0,405388 |
| **λ max** | **CI** | **RI** | **CR** | **Consistency** |
| 3,0291 | 0,0145 | 0,58 | 0,0251 | Consistent |

Table 9 AHP Priority Weight Sub-criteria for Land

| Soil Sub-criteria | pH | Soil Moisture | Soil Type | Soil Texture | Wi |
|---|---|---|---|---|---|
| pH | 1 | 3 | 1 | 5 | 0,381 |
| Soil Moisture | 0,333 | 1 | 0,2 | 1 | 0,098 |
| Soil Type | 1 | 5 | 1 | 5 | 0,433 |
| Soil Texture | 0,2 | 1 | 0,2 | 1 | 0,087 |
| **λ max** | **CI** | **RI** | **CR** | **Consistency** | |
| 4,033 | 0,0109 | 0,9 | 0,0121 | Consistent | |

*3.3 Result of Calculate Profile Matching Method*

profile matching method begins by calculating the gap value between the ideal profile and the candidate profile, which is the first step in determining how closely the agricultural land conditions align with the desired ideal profile. Following this, the criteria values for each parameter affecting land suitability, such as temperature, humidity, soil pH, and other relevant factors for corn growth, are calculated. These criteria values are used to assess how closely a piece of land matches the ideal conditions required for a specific corn seed variety. The final step is the ranking calculation, where agricultural lands are ranked according to the outcomes of the gap values and the calculated criteria values. The results displayed in the profile matching calculation in this research are the top 3 rankings from 22 agricultural lands based on each corn seed variety, which are shown in **Table 10 to 15**.

Table 10 The highest ranking of 3th varieties is for the V1 variety

| Alternatif | Gap Value | | | | | | | | | | | Criteria Value | | | Final Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temp | Rainfal | Humidity | Radiation | Elevation | Slope | Drainage | pH | Soil Moisture | Soil Type | Soil Texture | Climate | Topo | Soil | |
| Sanankulon | 5 | 5 | 5 | 5 | 2,696 | 5 | 5 | 5 | 4,6267 | 1 | 5 | 5 | 3,892 | 3,229 | 4,022 |
| Doko | 5 | 1 | 5 | 5 | 3,792 | 5 | 5 | 5 | 3,64 | 5 | 5 | 2,899 | 4,419 | 4,866 | 4,017 |
| Selopuro | 5 | 5 | 5 | 5 | 2,536 | 5 | 5 | 5 | 4,6267 | 1 | 5 | 5 | 3,815 | 3,229 | 4,014 |

Table 11 The highest ranking of 3th varieties is for the V2 variety

| Alternative | Gap Value | | | | | | | | | | | Criteria Value | | | Final Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temp | Rainfal | Humidity | Radiation | Elevation | Slope | Drainage | pH | Soil Moisture | Soil Type | Soil Texture | Climate | Topo | Soil | |
| Sanankulon | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Srengat | 5 | 3,5296 | 5 | 5 | 5 | 5 | 1 | 5 | 5 | 5 | 5 | 4,227 | 3,378 | 5 | 4,502 |
| Udanawu | 5 | 3,5296 | 5 | 5 | 5 | 5 | 1 | 5 | 5 | 5 | 5 | 4,227 | 3,378 | 5 | 4,502 |

Table 12 The highest ranking of 3th varieties is for the V3 and V4 variety

| Alternative | Gap Value | | | | | | | | | | | Criteria Value | | | Final Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temp | Rainfal | Humidity | Radiation | Elevation | Slope | Drainage | pH | Soil Moisture | Soil Type | Soil Texture | Climate | Topo | Soil | |
| Sanankulon | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4,626 | 5 | 5 | 5 | 5 | 4,963 | 4,982 |
| Srengat | 5 | 3,5296 | 5 | 5 | 5 | 5 | 1 | 5 | 4,16 | 5 | 5 | 4,227 | 3,378 | 4,917 | 4,462 |
| Udanawu | 5 | 3,5296 | 5 | 5 | 5 | 5 | 1 | 5 | 4,16 | 5 | 5 | 4,227 | 3,378 | 4,917 | 4,462 |

Table 13 The highest ranking of 3th varieties is for the V5 variety

| Alternative | Gap Value | | | | | | | | | | | Criteria Value | | | Final Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temp | Rainfal | Humidity | Radiation | Elevation | Slope | Drainage | pH | Soil Moisture | Soil Type | Soil Texture | Climate | Topo | Soil | |
| Doko | 5 | 1 | 5 | 5 | 4,49 | 5 | 5 | 5 | 3,64 | 5 | 5 | 2,89 | 4,754 | 4,867 | 4,056 |
| Sanankulon | 5 | 5 | 5 | 5 | 3,12 | 5 | 5 | 5 | 4,627 | 1 | 5 | 5 | 4.096 | 3,229 | 4,046 |
| Selopuro | 5 | 5 | 5 | 5 | 2,92 | 5 | 5 | 5 | 4,627 | 1 | 5 | 5 | 4 | 3,229 | 4,035 |

According to the outcomes of the DSS calculation to determine the suitability of land with corn seed varieties, the results obtained 3 land rankings with the best suitability level according to the data used in this research are for the type of variety V1, the results of the 3 best agricultural lands for planting are Sanankulon, Doko, and Selopuro Districts. Furthermore, for the types of varieties V2, V3, and V4, the results of the 3 best agricultural lands for planting are Sanankulon, Srengat, and Udanawu Districts. Then for the type of variety V5, the results of the 3 best agricultural lands are Doko, Sanankulon, and Selopuro Districts.

### *3.4 Evaluation*

The evaluation of the decision support system was conducted using an evaluation questionnaire containing 7 questions with a Likert scale: 5 (highly appropriate), 4 (appropriate), 3 (somewhat appropriate), 2 (not appropriate), and 1 (highly not appropriate).The questionnaire was assessed by 15 respondents from PT Syngenta Seed Indonesia, consisting of 2 managers, 6 field production supervisors, 6 field quality supervisors, and 1 field agronomist. After the questionnaire was evaluated by the respondents, validity testing was performed using Pearson correlation, and reliability testing was conducted using Cronbach's alpha.

#### *3.4.1 Pearson Correlation Method*

The validity test is aimed at measuring how well the questionnaire covers the relevant aspects in evaluating the decision support system for land suitability for corn seeds. Thus, the results from the decision support system should reflect actual field conditions and align with the intended objectives. The Pearson correlation results are shown in **Figure 3.**

| Question | Correlation | r-table | Validation | Coefisien |
|---|---|---|---|---|
| P1 | 0.621034 | 0.514 | valid | Strong |
| P2 | 0.683713 | 0.514 | valid | Strong |
| P3 | 0.732623 | 0.514 | valid | Strong |
| P4 | 0.719936 | 0.514 | valid | Strong |
| P5 | 0.767797 | 0.514 | valid | Strong |
| P6 | 0.615867 | 0.514 | valid | Strong |
| P7 | 0.600533 | 0.514 | valid | Strong |

Figure 3 Result of Pearson Correlation

The evaluation questionnaire is deemed valid since the computed r-value exceeds the the value of r-table at a significance level of 0.05. The overall coefficient intervals fall within the second value range, as shown in **Table 4**, with the coefficients at the "Strong" level.

#### *3.4.2 Alpha Cronbach Method*

Reliability test is conducted to demonstrate that the evaluation questionnaire is stable and shows how consistent the results are when the questionnaire is used repeatedly under the same conditions. The reliability value is considered consistent with a Cronbach's alpha value of $\alpha = 0.8019 > 0.7$. Thus, the evaluation questionnaire reflects a decision support system that is consistent, with internal consistency at the "Good" level. The Cronbach's alpha results are shown in **Figure 4.**

```
Total Item (k): 7
Varians item P1 (s^2y): 0.5999999999999999
Varians item P2 (s^2y): 0.6380952380952383
Varians item P3 (s^2y): 0.780952380952381
Varians item P4 (s^2y): 0.6380952380952382
Varians item P5 (s^2y): 0.6952380952380951
Varians item P6 (s^2y): 0.6857142857142857
Varians item P7 (s^2y): 0.8380952380952381

Total varians item: 4.876190476190476
Varians total (s^2x): 15.6
Cronbach's Alpha: 0.801994301994302
```

Figure 4 Result of Alpha Cronbach

*3.5 Research Findings*

The decision support system developed employs a combination of the Analytical Hierarchy Process (AHP) method to assign priority weights to each evaluation criterion and parameter, and then applies the Profile Matching method to determine the ranking of agricultural land suitable for planting corn seed varieties. This decision support system successfully assigns priority weights to each evaluation criterion and provides the best-ranked agricultural land for planting corn seed varieties. After the decision support system successfully ranks the agricultural land, an evaluation is conducted to assess the feasibility of the developed system using a questionnaire, which was evaluated by 15 respondents. The results indicated that the questionnaire was valid, with the internal coefficient level categorized as "Strong." Furthermore, the reliability test yielded a value of 0.8019, placing the internal consistency level at "Good." Based on these findings, it can be concluded that the decision support system effectively ranks agricultural land based on the suitability for each corn seed variety, thereby helping farmers make decisions regarding the selection of agricultural land for planting the appropriate corn seed variety.

## 4. CONCLUSIONS

Decision support system in this research was utilized to identify suitable agricultural land for corn seed varieties, using the Analytical Hierarchy Process (AHP) method to assign priority weights to the criteria and the Profile Matching method to rank the lands.This system successfully calculates priority weights, consistency, and land rankings based on criteria including climate, topography, and soil factors. The test data used originated from 22 subdistricts in Blitar as alternatives and 5 types of corn varieties as ideal profiles, obtained from PT Syngenta Seed Indonesia in the Blitar area. The results indicate that the system can provide the best-ranked land for each variety: for V1, V2, V3, and V4, the most suitable agricultural land is located in Sanankulon Subdistrict, while for V5, it is in Doko Subdistrict. System evaluation through a questionnaire filled out by 15 experts showed that the system has strong validity and good reliability, with a "Strong" correlation and a reliability value of 0.8019, indicating good internal consistency. This system is considered effective for assisting decision-making in selecting the appropriate agricultural land for corn seed varieties.

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