Decision Support System Selection Cocoa Seed Using Web-Based AHP Hybrid WP Method

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Abstract— Cocoa Plant (*Theobroma cacao* L) is one of the plantation commodities that has an important role in the Indonesian economy. One of the cocoa-producing regions in Indonesia is East Kalimantan, the expanse of land in KALTIM Province is still a lot that is not optimally cultivated so that if utilized for cocoa crops, it will have a positive impact on the regional economy. The first step that should be taken by cocoa farmers is the need to use superior cocoa planting materials (seeds). But in cocoa seed selection there are still many who use manual systems so that this kind of thing takes a long time and is less efficient, so a system is needed that is the System supporting cocoa seed selection decisions using AHP hybrid WP method based on the web. This aims to make it easier for cocoa farmers to efficiently select cocoa seeds. This study aims to calculate and create a system that can manage cocoa seed selection by applying modeling of hybrid WP AHP method that can be accessed by many people. The method used is the AHP Hybrid WP Method which is the merging of two methods namely the AHP method and the WP method. The AHP method is used to evaluate the weight value of the criteria, while the WP method is used to evaluate alternative values so that the two methods get a ranking decision. This application can calculate and process cocoa seedlings to produce the best cocoa seed sequence and accessible to many in need.

Keywords—Sistem Pendukung Keputusan, Kakao, Analytical Hierarchy Process, Hybrid, Weighted Product

I. INTRODUCTION

Indonesia is one of the agrarian countries that produce a wide variety of products from agriculture and plantations, one of the products of both fields is cocoa. Cocoa(*Theobroma Cacao* L)is a tree-shaped plant native to South America. From seeds, this plant produces a processed product known as chocolate (Robby, 2017).

Cocoa Plant (*Theobroma cacao* L) is one of the plantation commodities that has an important role in the Indonesian economy. One of the cocoa-producing regions in Indonesia is East Kalimantan, the expanse of land in

KALTIM Province is still a lot that is not optimally cultivated so that if utilized for cocoa crops, it will have a positive impact on the regional economy. The first step that should be taken by cocoa farmers is the need to use superior cocoa planting materials (seeds). But in cocoa seed selection there are still many who use manual systems so that this kind of thing takes a long time and is less efficient, so a system is needed that is a System supporting cocoa seed selection decisions using AHP Hybrid WP Based Web Method. This aims to make it easier for cocoa farmers to efficiently select cocoa seeds.

Based on the background that has been presented, then the problems that can be how to calculate and create a System supporting cocoa seed selection decision using the Web-based Hybrid Weighted Product (WP) Analytical Hierarchy Process (AHP) Method and How to apply to model using the AHP Hybrid WP method to solve problems in cocoa seed selection.

Given the problems covered in the extensive research, due to the limitations of the problem, the authors have limitations in researching, i.e. the data used as objects is cocoa seedlings. The criteria used are the height of the plant, the number of leaves, the diameter of the stem, the wet weight, and dry weight. This research uses the modeling of decision support systems using the AHP Hybrid WP method.

The purpose of this research is to calculate and create a decision support system that can manage cocoa seed selection, Apply to the model using AHP Hybrid WP method for cocoa seed selection and Create a decision support system that can be accessed by many parties in need (Fatmawati, 2017).

II. LITERATURE REVIEW

According to Robby (2017) in a study entitled decision supporting system to determine quality cocoa seedlings using simple additive weighting (SAW) method in sinar harapan village, the district discusses how to select quality cocoa seedlings using Borland Delphi7 application, with the method used is simple additive weighting (SAW). The SAW method requires the process of normalizing the decision matrix (X) to a

scale that can be compared to all existing alternative ratings and looking for weighted summation of performance ratings on each alternative on all criteria resulting in a ranking weight value or decision result (Halifathur, 2017).

Supporting the research of (Akhiyar Dkk, 2018) research conducted by (Ardhy, 2018) titled Corn Seed Selection Decision Making System with Analytical Hierarchy Process (AHP) Method at Abadi Jaya East Lampung Shop discusses spk selection of corn seedlings where the method of system development is made using prototyping method using Unified Modelling Language (UML) system development tool consisting of Use Case, Activity Diagrams, Sequence Diagrams, and Class Diagrams that will make it easier to read a system flow to be worked on.

From research conducted by Ardhy (2018), Agustawati (2014) conducted a study entitled system supporting the election decision of The Farmer Group of Palm Seed Recipients Using Weighted Product Method. This research discusses the Decision Support System by applying the Weighted product method where each criterion that has a benefit or cost value with different weight values so that in doing the calculation of the matrix there is a positive and negative value to then be calculated to the stage of ranking so that by the application of this method the Plantation Office will be younger to set the farmer group that is entitled to receive grants for palm oil seed and fertilizer assistance.

A. Decision Support System

According to Maria (2018) a decision support system is an interactive system that supports decisions in the decision-making process through alternatives obtained from the results of data processing, information and model design.

According to (Maria, 2018) The characteristics of the Decision Support System that can be determined based on the definition stipulated:

- Support the decision-making process, focus on management by perception
- The human interface/machine where the user retains control of the decision-making process
- Supports decision-making to address structured, semi-structural and unstructured issues
- Have the capacity of dialogue to obtain information according to the needs
- Has integrated subsystems in such a way that it can function as a unit of items
- Requires a comprehensive data structure that can serve the information needs of all levels of management.

B. Metode Analytical Hierarchy Process (AHP)

The AHP method is a framework for effective decision-making on complex issues by simplifying and accelerating the decision-making process by solving the issue into its section, organizing these parts or variables in a hierarchy, giving a numerical value to subjective

considerations about the importance of each variable and synthesizing these various considerations to establish which variables have the highest priority and act to influence outcomes in those situations. The problems at AHP are decomposed into a hierarchy of criteria and alternatives. The hierarchy of problem-solving into the criteria and the alternatives performed can be seen in picture 1.

Picture 1. AHP method problem solving hierarchy

Criteria and alternatives are done by comparison in pairs, for various issues, a scale of 1 to 9 is the best scale for expressing opinions. The value of the qualitative opinion definition of the comparative scale.

The scale can be viewed using the analysis table as shown in table 1.

Table 1. The value of the qualitative opinion definition of the comparative scale

Intensity Interests	Description
1	Both elements are just as important
3	One element is slightly more important than the other
5	One element is more important than the other
7	One element is clearly more absolutely important than the other
9	One element is absolutely essential than the other
2,4,6,8	Values between two adjacent considerations

C. Weighted Product (WP) Method

The basic concept of the WP method is to look for weighted multiplication of performance ratings on each alternative on all attributes. The WP method uses multiplication to link attribute ratings, where the rating of each attribute must be ranked first with the corresponding attribute weight (Kusumadewi, et al. 2016). This process is the same as the normalization process. The WP method can help to make decisions but calculations using this WP method only produce the largest value to be selected as the best alternative. The calculation will be by following per under accordance with this method if the selected alternative meets the specified criteria. WP method is more efficient because the time needed in the calculation is shorter.

The WP method is an infinite set of alternative decisions described in several terms of decision criteria. Calculation of weight criteria "W" is the rank of positive value for profit attribute and negative value for cost attribute (cost). This process of A_i is given as follows (1)

$$S_i = \prod_{j=1}^n x_{ij} w_j ; \quad (1)$$

with $i=1,2,\dots,m$

Dimana $\sum_{j=1}^n w_j = 1$. w_j is a rank of positive or negative value. The relative preference of each alternative, given as (2)

$$V_i = \frac{\prod_{j=1}^n x_{ij} w_j}{\prod_{j=1}^n (x_{ij}) w_j} \quad (2)$$

with $i=1,2,\dots,n$

D. The Cocoa Plant

The Cocoa plant (*Theobroma Cacao* L) is a type of plant that is cultivated and can grow in tropical areas. The natural place of the genus *Theobroma* is in the tropical part with a lot of rainfall, high humidity levels, and shade. In these conditions, *Theobroma cacao* often bears fruit and produces seeds (Kristanto, 2015)

According to (Melati, 2016) cocoa has systematics based on the properties of fruit and seeds as the basis of classification in the taxonomic system. Here's the systemic cocoa plant.

Division : Spermatophyta
 Subdivision : Angiospermae
 Class : Dicotyledoneae
 Subclass : Dialypetalae
 Race : Malvales
 Tribe : Sterculiaceae
 Genus : *Theobroma*
 Species : *Theobroma Cacao* L.

According to (Yuanita and Robi, 2018), there are three types of cocoa:

1. Cocoa Criollo

This type produces good quality cocoa beans called *Mulia cocoa* (*Edel Cacao*) ,has the following characteristics:

- Growth is less strong and production is relatively low, hairy quality shoots
- Slow fruiting time
- Somewhat sensitive to pest attacks and diseases
- Rough/ thin fruit peel and easy to slice
- Fruit is longer than ferostero type
- There are 10 grooves located intermittently, 50 000 deep and 5 shallow grooves
- The tip of the common fruit is blunt, slightly bent and has no neck bottle
- Each fruit contains 30-40 seeds of a slightly round and round shape
- The endosperma is white
- The process of chewing is faster and the taste is not so bitter
- The color of the fruit is light purple red and when it is old cook becomes orange
- Examples of Criollo types are DR 1, DR 2 and DR 38

2. Cocoa Forestero

Forestero types generally include quality cocoa or cocoa poured / cocoa lindak / Bulk cacao.

The characteristics of cocoa forestero are:

- Strong plant growth and higher production
- Early fruiting time
- Generally reproduced with a hybrid toy
- Relatively more resistant to pest attacks and diseases
- The skin of the fruit is a bit hard but the surface is smooth
- The grooves on the fruit skin are rather deep
- There has a neck bottle and there don't have
- Endospermanya is dark purple and flat shaped
- The old contiguation process
- More bitter seed taste
- Black fruit skin mainly derived from Amazona and red
- Examples of ferostero types are 1 CS, Sca and GC

3. Cocoa Trinitario

Types of trinitarios resulting from criollo and ferostero cross-breeds

Trinitario type can be distinguished into 4 groups

- Angoleta and its features: outer form approaches Criollo, Rough outer skin, without Neck Bottle, rooted, deep, round seeds superior quality and endosperm / seeds are purple.
- Cundeamor with characteristics: the shape of fruit such as Angolate, rough fruit skin, without bottle neck, not deep-threaded, flat seeds, the quality of there is moderate and there is superior and endosperm is dark purple.
- Amelonado with characteristics: round shape of eggs, slightly smooth skin, there has a bottle neck there is no, the groove is clear, the seeds are sagging, the quality is medium and there is superior, endosperm is purple.
- Calaca cillo with characteristics: short and round fruit, smooth and slippery skin, no bottle neck, shallow fruit grooves, spherical seeds and bitter taste, endosperm purple color.

E. Web

Web or www (world wide web) alone is an interconnected system in a hypertext document that contains a variety of information, whether written, images, sound, video, and other multimedia information and can be accessed through a device called a web browser. To translate a document in hypertext into an understandable document form, the web browser via the web client will read the web page stored on a web server through a protocol commonly called Http or Hypertext Transfer Protocol (Morita et al .2013)

F. Hypertext Processor (PHP)

According to Junirianto (2018), PHP is the most widely used programming language for creating

a website. And until recently many web-based applications were created using the PHP programming language. The version suggested by Laravel is 4.3.10.

PHP is a server-side script programming language designed for web development. Where this PHP stands for Hypertext Preprocessor is used as a script to create a website. Also besides PHP is also used in addition to other programming languages such as HTML programming languages and java scripts.

G. XAMPP

XAMPP stands for Apache, MySQL, PHP and Perl while the letter "X" is intended as a software that can be run on four main OS namely Windows, Macintosh, Linux and Solaris. So that XAMPP will meet all the requirements requested by Laravel. Thus no longer need to install apache, MySQL and php.

As software that acts as a web server like real hosting of course involves many important parts of XAMPP. For those who are already accustomed to using this software will certainly not be familiar with the terms httdocs, phpmyadmin and Control Panel. Both on the original web server and XAMPP software also use it.

H. Unified Modeling Language (UML)

According to Hendini (2016) in windu gata and grace research (2013) Unified Modeling Language (UML) is a standard specification language used to document, specify and design software. UML is a methodology in developing object-oriented systems and is also a tool to support system development.

I. Hypertext Markup Language (HTML)

According to Hidayatullah and Kawistara (2014) HTML is the standard language used to display web pages.

The functions of HTML are:

- Set the view of the *webpage* and its contents.
- Create a table on a *webpage*.
- Publish *web pages online*
- Create a *form* that can be used to handle registration and transactions via the *web*.
- Add objects such as imagery, audio, video, animation, java applet in *web pages*.
- Displays the image area (*canvas*) in the *browser*.

III. RESEARCH METHODS

This research discusses data retrieval techniques and calculation of cocoa seed selection based on the method used, namely ahp hybrid WP method.

A. Research Procedures

In this research procedure explains the description of the flow of a study conducted from the early stages to the final stage of the study, by looking at the results of the research through applications or systems that have been designed and created. The research procedure can be seen at the following points:

- Identify problems and systems
- Data collection

- Data and system analysis
- System design
- Program creation
- Program testing
- Results of the decision

B. Research Method Flow

In the flow of this method describes a workflow implementing two methods combined (*hybrid*) in which each method has a different but interconnected task, the first method is the AHP method performs a comparison on each criterion resulting in the weight value of each criterion, while the second method is the WP method of evaluating each alternative by calculating the weight value on each alternate resulting in a *vector* value (S) then calculating the value of the alternate preference and generating the rank value. The flow of this method explains how the decision-making process starts from the early stages of research to the final stage of research and produces an absolute decision. Here's the flow of the research method can be seen in Picture 2.

Picture 2. Method Flow Drawing

C. System Design

System design is the next stage after system analysis, get a clear picture of what is done in the system analysis, then continue to think about how to form the system. System design is a phase where design skills are required for computer elements that will use the system, namely the selection of computer equipment and programs for the new system (Rossa, 2018).

1. Use case diagram system

is an activity or also an ongoing interaction between actors and the system. in this study describes user interaction with the system / application of selecting

cocoa seeds in sequence. following is the use case design in this system can be seen in the following picture 3.

Picture 3. Use Case Diagram image

For an explanation of the flow of the use case above can be seen in table 2

Table 2. Use Case Diagram Explanatory Table

Actor	Use Case Name	Description of Use Case
Users	Login	The user first signs in to the app
Users	Data Input Criteria	User bias adds input data criteria
Users	Alternative Data Input	Biased users add Alternative data input
Users	Criterion Analysis	The system analyzes the criteria and then generates a weight value on each criterion
Users	Alternative Analysis	The system analyzes alternatives with data on each criterion so that it can produce the value of each alternative that accumulates from the largest value to the smallest value
Users	Ranking	Users are biased to see the results of cocoa seed selection assessment scoring

1. Entity Relationship Diagram (ERD)

This ERD design is a relationship between one table and another that is sealing related. The erd design can be seen in picture 4.

Picture 4. Entity Relationship Diagram (ERD)

D. Cocoa Seed Criteria

The criteria for good cocoa seeds can be seen in table 3.

Table 3. Cocoa Seed Criteria Table

No	Cocoa Plant Parts	Morphological Characteristics	Attributbut
1	Seed Height	The observed characteristic is how high the seedlings are	Benefit
2	Leaves	The observed characteristic is the number of leaves on the seedlings	Benefit
3	Stem	The observed characteristics are how much diameter of the stem on each seedling is	Benefit
4	Wet Weight	The observed characteristics are how much wet weight each seedling is	Benefit
5	Dry Weight	The observed characteristic is how much dry weight each plant has	Benefit

E. Method Stages

1. Calculation of AHP method

- Here is the calculation of matrix comparison criteria

	C1	C2	C3	C4	C5
C1	1	2	3	4	5
C2	1/2	1	2	3	4
C3	1/3	1/2	1	2	3
C4	1/4	1/3	1/2	1	2
C5	1/5	1/4	1/3	1/2	1

- So from the matrix compared above in can be the result as in the matrix below.

	C1	C2	C3	C4	C5
C1	1	2	3	4	5
C2	0.5	1	2	3	4
C3	0.33	0.5	1	2	3
C4	0.25	0.33	0.5	1	2
C5	0.2	0.25	0.33	0.5	1
	2.28	4.08	6.83	10.5	15

- The comparison matrix pairs the above criteria, looking for the total of each column to normalize its weight value. Normalize values by looking for the value of each weight row divided by the number of each column as in the matrix below.

	C1	C2	C3	C4	C5
C1	1/2.28	0.5/4.08	0.33/6.83	0.25/10.5	5/15
C2	0.5/2.28	1/4.08	0.5/6.83	0.33/10.5	4/15
C3	0.33/2.28	0.5/4.08	1/6.83	0.5/10.5	3/15
C4	0.25/2.28	0.33/4.08	0.5/6.83	1/10.5	2/15
C5	0.2/2.28	0.25/4.08	0.33/6.83	0.5/10.5	1/15

- Matrix weight priority criteria

The following is a matrix for priority weights with an average value (weight value) that can be the

result of the total number of each row divide by the number of criteria.

	C1	C2	C3	C4	C5	Average
C1	0.438	0.49	0.439	0.381	0.333	0.416
C2	0.219	0.245	0.293	0.286	0.267	0.261
C3	0.146	0.112	0.146	0.19	0.2	0.161
C4	0.109	0.082	0.073	0.095	0.133	0.098
C5	0.088	0.061	0.049	0.048	0.067	0.062
	1	1	1	1	1	1

- So it can be the following weight value.
 $W = [0.416, 0.261, 0.161, 0.098, 0.062]$

F. Calculation of WP method

Alternative data is data obtained from retrieving data into the field directly and calculated using the following WP methods table 4.

Table 4. Alternative Value

No	Alternative	C1	C2	C3	C4	C5
1	seeds 1	80	16	5.6	61.5	22
2	Seeds 2	81	17	7.32	76	26.5
3	Seeds 3	67	15	3.96	41.5	15.5
4	Seeds 4	92	23	6.2	78.5	23
5	Seeds 5	83	19	5.69	66	23
6	Seeds 6	71	17	6.72	61.5	21
7	Seeds 7	93	27	6.86	78	26
8	Seeds 8	102	18	7.49	79.5	25.5
9	Seeds 9	95	23	7.22	86.5	28.5
10	Seeds 10	94	28	7.55	95.5	31.5

- As already known the weight value of the calculation result of the AHP method,
 $\sum W = [0.416, 0.261, 0.161, 0.098, 0.062]$

• Vector S Value

Vector value s is the value of each criterion value on each alternate then rank with the criteria weight value.

$$\begin{aligned}
 S1 &= (80^{0.416})(16^{0.261})(5.6^{0.161})(61.5^{0.098})(22^{0.062}) = 30.7524 \\
 S2 &= (81^{0.416})(17^{0.261})(7.32^{0.161})(76^{0.098})(26.5^{0.062}) = 33.8731 \\
 S3 &= (67^{0.416})(15^{0.261})(3.96^{0.161})(41.5^{0.098})(15.5^{0.062}) = 24.7846 \\
 S4 &= (92^{0.416})(23^{0.261})(6.2^{0.161})(78.5^{0.098})(23^{0.062}) = 37.4260 \\
 S5 &= (83^{0.416})(19^{0.261})(5.69^{0.161})(66^{0.098})(23^{0.062}) = 33.0685 \\
 S6 &= (71^{0.416})(17^{0.261})(6.72^{0.161})(61.5^{0.098})(21^{0.062}) = 30.5275 \\
 S7 &= (93^{0.416})(27^{0.261})(6.86^{0.161})(78^{0.098})(26^{0.062}) = 40.1311 \\
 S8 &= (102^{0.416})(18^{0.261})(7.49^{0.161})(79.5^{0.098})(25.5^{0.062}) = 38.0640 \\
 S9 &= (95^{0.416})(23^{0.261})(7.22^{0.161})(86.5^{0.098})(28.5^{0.062}) = 39.7731 \\
 S10 &= (94^{0.416})(28^{0.261})(7.55^{0.161})(95.5^{0.098})(31.5^{0.062}) = 42.6693
 \end{aligned}$$

• Vector Value V

This vector value is the result of the calculation of each vector s value divided by the total number of vector s values. With formula (3)

$$V = \frac{S}{S1 + S2 + S3 + \dots + Sn} \quad (3)$$

$$\begin{aligned}
 V1 &= \frac{30.7525}{351.2764} = 0.0875 \\
 V2 &= \frac{33.8732}{351.2764} = 0.0964 \\
 V3 &= \frac{24.7991}{351.2764} = 0.0705 \\
 V4 &= \frac{37.4261}{351.2764} = 0.1066 \\
 V5 &= \frac{33.0685}{351.2764} = 0.0941 \\
 V6 &= \frac{30.5275}{351.2764} = 0.0869 \\
 V7 &= \frac{40.1311}{351.2764} = 0.1143 \\
 V8 &= \frac{38.0640}{351.2764} = 0.1084 \\
 V9 &= \frac{39.7731}{351.2764} = 0.1132 \\
 V10 &= \frac{42.6694}{351.2764} = 0.1215
 \end{aligned}$$

• Ranking Results

Furthermore, the ranking calculation results in each alternative in the following table 5.

Table 5. Ranking Table

No	Alternative	Total	Ranking
1	Seeds 10	0.1215	1
2	Seeds 9	0.1132	2
3	Seeds 7	0.1142	3
4	Seeds 8	0.1084	4
5	Seeds 2	0.0964	5
6	Seeds 4	0.0869	6
7	Seeds 5	0.1142	7
8	Seeds 6	0.1084	8
9	Seeds 1	0.0875	9
10	Seeds 3	0.0712	10

IV. RESULTS AND DISCUSSION

A. System Test Results

In this system calculation discusses about the display of Application Support System Cocoa Seed Selection Decision Using *Analytical Hierarchy Process* (AHP) Hybrid *Weighted Products* (WP) method that will be used to process cocoa seed data. Here are some views of the apps you've created.

• Login page

The Login page is the entrance to the bias of accessing the Cocoa Seed Selection Decision

Support System. The login page view can be viewed in picture 5.

Picture 5. Login page

- Home page

The home page is the initial display of the Cacao Seed Selection Decision Support System application, where there are several menus that have different functions. The home page display can be seen in picture 6.

Picture 6. Home page

- Criteria data page

On this criteria page, there is a table containing the criteria data. The data of this criterion will be compared so that the weight value will be obtained. The following page displays the criteria data can be seen in picture 7.

Picture 7. Criteria data page

- Criteria comparison page

On the criteria comparison page, there is a comparison table between the criteria and the values used, namely numbers 1 to 9, where this number will be the comparison value between the criteria. The criteria comparison page can be seen in picture 8 below.

Picture 8. Criteria comparison page

- Alternative data page

On this alternative data page, there is a table that contains alternative data. Where this data will be evaluated to get the weight value for each criterion. Following is a display of alternative data pages can be seen in picture 9.

Picture 9. Alternative data page

- Alternative value page

On this alternative value page there is a table that contains data on the value of each alternative where each alternative has a total value based on the number of existing criteria. The following is the alternative value data in picture 10.

Picture 10. Alternative value page

- Calculation page of the WP method results

The AHP method calculation page is a page that contains the calculated value of the criteria comparison to the calculation of the criteria weight. The page display of the AHP method calculation can be seen in picture 11.

Perhitungan Dengan Metode AHP Hybrid WP

Mengukur Konsistensi Kriteria (AHP)

Matriks Perbandingan Kriteria

Kode	Tinggi Tanaman	Jumlah Daun	Diameter Batang	Berat Basah	Berat Kering
C01	1	2	3	4	5
C02	0.5	1	2	3	4
C03	0.333	0.5	1	2	3
C04	0.25	0.333	0.5	1	2
C05	0.2	0.25	0.333	0.5	1
Total	2.283	4.083	6.833	10.5	15

Matriks Bobot Prioritas Kriteria

Kode	Tinggi Tanaman	Jumlah Daun	Diameter Batang	Berat Basah	Berat Kering	Prioritas
C01	0.438	0.49	0.439	0.381	0.333	0.416
C02	0.219	0.245	0.293	0.286	0.267	0.262
C03	0.146	0.122	0.146	0.19	0.2	0.161
C04	0.109	0.082	0.073	0.095	0.133	0.099
C05	0.088	0.061	0.049	0.048	0.067	0.062

Consistency Index: 0.017
Ratio Index: 1.12
Consistency Ratio: 0.015 (Konsisten)

Picture 11. Calculation page WP method results

- Calculation page for the value of the vector S and vector V

On this page displays the results of the calculation of vector values S and Vector V values, can be seen in picture 12.

Vektor S & Vektor V

Alternatif	Vektor S	Vektor V
Bibit 1	30.7525	0.0875
Bibit 2	33.8732	0.0964
Bibit 3	24.9991	0.0712
Bibit 4	37.4261	0.1065
Bibit 5	33.0685	0.0941
Bibit 6	30.5275	0.0869
Bibit 7	40.1311	0.1142
Bibit 8	38.0640	0.1004
Bibit 9	39.7731	0.1132
Bibit 10	42.6694	0.1215

Picture 12. Calculation page value vector S and V

- Page ranking results

This page displays the results of the ranking order for each alternative so that the best seeds are obtained. The calculation results page can be seen in picture 13.

Perangkingan

Kode	Nama	Total	Rank
A10	Bibit 10	0.1215	1
A07	Bibit 7	0.1142	2
A09	Bibit 9	0.1132	3
A08	Bibit 8	0.1004	4
A04	Bibit 4	0.1065	5
A02	Bibit 2	0.0964	6
A05	Bibit 5	0.0941	7
A01	Bibit 1	0.0875	8
A06	Bibit 6	0.0869	9
A03	Bibit 3	0.0712	10

Cetak

Picture 13. Page ranking results

- Change password page

The change password page contains a form to enter or change a new password. Change password page can be seen in picture 14.

Pemilihan Bibit Kakao SPK Met...

localhost/apkahwp/index.php?m=password#

SISTEM PENJUKUNG KEPUTUSAN
Pemilihan Bibit Kakao Menggunakan Metode AHP Hybrid WP

Password

Password Lama *

Password Baru *

Konfirmasi Password Baru *

Simpan

Home

Kriteria

Nilai Kriteria

Alternatif

Nilai Alternatif

Perhitungan

User

Ubah Password

Login

Picture 14. Change password page

B. Testing Method

The results of manual analysis of methods and application of methods in the decision support system for selecting cocoa seeds produce accuracy $8/10 \times 100\% = 80\%$ so that the system can be declared feasible for used. Method testing data can be seen in table 6.

Tabel 6. Table Testing

Alternatif	Testing	
	system	Manual
Seed 1	Rank 9	Rank 9
Seed 2	Rank 5	Rank 5
Seed 3	Rank 10	Rank 10
Seed 4	Rank 6	Rank 6
Seed 5	Rank 7	Rank 7
Seed 6	Rank 8	Rank 8
Seed 7	Rank 3	Rank 3
Seed 8	Rank 4	Rank 4
Seed 9	Rank 2	Rank 1
Seed 10	Rank 1	Rank 2

V. CONCLUSION

This application can count and process cocoa seeds to produce the best sequence of cocoa seeds. The system can make decisions by comparing the criteria so as to get a weighted value for each criterion then evaluating each alternative value so that the decision or ranking of the best cocoa seedlings can be obtained. This application can be accessed by many parties who need it.

In this study the criterion that has the highest weight is the criteria for plant height because it has a great influence in determining the best seeds.

Developing the system by adding criteria, adding cost attributes and adding types of cocoa plants. Future researchers can add or multiply alternatives to be studied so that the differences are more visible.

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