

Implementing Weighted Productmethod In Determining Qualified Lesungcoffee

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Abstract

One of the technological advances is the technology in information through the internet. The impact of advances in internet technology has now penetrated the business world and one of which is the coffee business. Lesung coffee is 100% original coffee without a mixture of chemicals, which is processed by pounding using traditional Lesung tools. This results in uniqueness in the coffee and has a strong aroma. However, in determining the quality of Lesung Coffee, PT. Hafizh Lesung Blessings still uses the manual method, namely by touching the texture of the coffee and smelling the coffee aroma. This is not hygienic and the quality is not guaranteed. To overcome these problems, a system was built by applying the Weighted Product method. The Weighted Product method is considered appropriate to overcome the existing problems because it is able to select the best alternative from a number of alternatives and its advantages in weighting techniques. The results of this study were in the form of a web-based application of the application of the Weighted Product Method in Determining the quality of Lesung Coffee. The results of the weighted product ranking method were determined by the highest value as the final decision of the system.

Keywords

Implementation, Weighted Product, Lesung Coffee

1. Introduction

Advances in information technology which growing rapidly have affected humans in various aspects of life. This motivates people to be faster and easier to obtain, both in doing work and fulfilling their needs. One of the current technological advances is the presence of the internet. With the internet as an information provider, it is easier for the public, especially customers, to find and get various information needed. Even the impact of technological advances has also penetrated the business world, one of them is the coffee business.

Coffee was one of the plantation commodities which had a fairly high selling value among other plantation crops (Julian, Jap, and Dedi n.d.). Processed coffee products in Indonesia consist of instant coffee and ground coffee. Ground coffee is the coffee that has been processed and finely grounded into small grains. There are various kinds of ground coffee, starting from Gayo Powder Coffee, Luwak Coffee Powder, and Lesung Coffee Powder. Lesung coffee is coffee that is processed by pounding it into ground coffee using traditional Lesung tools.

Many coffee fans are scattered in various areas, including in Lubuklinggau City. In Lubuklinggau City itself, many cafes and cottage industries sell coffee, one of which is Hafizh Lesung Blessings home industry factory.

Hafizh Lesung Blessings is a home-based industrial factory selling ground coffee with Arabica and Robusta types of 100% original coffee without a mixture of chemicals, so as to produce coffee that is distinctive and has a strong aroma. However, at this time Hafizh Lesung Blessings does not yet have a system that can determine the quality of lesung coffee, but still uses the manual method by feeling the texture of the coffee and smelling the aroma of the coffee which is less hygienic and unqualified.

In the business world, quality is very important and becomes a reference for customers in choosing each product to be consumed. A company must continue to improve the quality of its products so that the products are produced in accordance with the standards set by the company.

In making the system in this study, the author uses the Weighted Product method in determining the quality of lesung coffee. The Weighted Product method was a popular multi-criteria analysis decision and a multi-criteria decision-making method. (Aini and Agus 2017)

This method uses multiplication to connect the criteria values, where the value of each criterion must first be raised to the power of the relevant criterion weight. This process was the same as the normalization process (Yoga Handoko Agustin and Kurniawan 2015)

2. Literature Review

Method

The methodology used in this study is a scientific activity related to the workings of understanding an object of research in an effort to find answers scientifically and proven true of something being studied (Rosady 2008)

Weighted Product

The Weighted Product method uses the multiplication of attribute ratings, each attribute rating must be raised to the first rank with the weight of the attribute in question (Khairina, Ivando, and Maharani 2016). The steps taken in solving the problem using the Weighted Product method are as follows:

1. Determination of criteria
2. Assessment of the weight of the importance of each criterion
3. Determining the range of values for each criterion
4. Using assessment of each alternative to all attributes by determining the range of values provided which shows how much importance is between the criteria
5. Making a decision matrix (X) from the assessment data for each attribute weight and alternative value
6. Carrying out the normalization process for the weight of the criteria
7. Carrying out the decision matrix normalization (S) process by multiplying the attribute criteria first to the power of the criteria weight. In the weighted product method, the criteria are divided into two categories, namely profit criteria (positive rank criteria), and cost criteria (negative rank criteria).
8. Preferencing (Vi) or ranking each alternative

Decision Support System

Decision support system (DSS) is an interactive information system that provides information, modeling and manipulating data. The system is used to assist decision making in semi-structured situations and unstructured situations, where no one knows for sure how decisions are made (Winalda 2016)

Website

Website is a location on the internet that presents a collection of information related to the profile of the site owner, on a page that contains web pages on the internet that function as a medium for delivering information, communication, and transactions (Kusumawati 2013)

From the explanation, it can be interpreted that the Website is a collection of static and dynamic data that forms a series of interconnected hyperlinks as a medium for delivering information, communication, and transactions

3. Methods

It is a qualitative study. Qualitative research usually used formal and impersonal research languages through numbers or statistical data (Rusliwa Somantri 2005). The data in this study are in the form of words, verbal or behavior that are observed through observation, interviews, literature and documentation.

1. Method of collecting data

a. Observation Method

Observations were made by directly observing Hafizh Lesung Blessings Home Industry Factory, which aimed to obtain the necessary information.

b. Interview Method (Interview)

This research was conducted by conducting direct interviews with the Business Owner of Lesung Coffee Powder.

c. Literature Study Method

This data collection method was carried out by examining various literatures related to this research as a reference in the process of preparing research reports.

d. Documentation Method

This method is done by taking and collecting data related to the object of research and discussion of the problems that will be needed in the process of preparing research report.

2. System Development Method

The method used in this research is the *waterfall* method as a system development method. The *waterfall* method provided a systematic or sequential software approach starting from analysis, coding, testing and supporting stages (Cordeaux 1877)

3. System Analysis

To build an information system that can assist in assessing the quality of lesung coffee, the researcher used the Unified Modeling Language (UML) design, the Hypertext Preprocessor (PHP) programming language, the MySQL database and the system testing method using the Blackbox Testing method.

4. Case analysis

In this case study the author will apply the Weighted Product method in determining quality lesung coffee. The criteria to be used are as follows:

Table 1. Assessment Criteria

Criteria	ValueWeight	Cost/Benefit	Code
Types of Coffee	5	Benefit	C1
Aroma	3	Benefit	C2
Flavor	8	Benefit	C3
Roasting	4	Benefit	C4
Price	7	Cost	C5

Sub-criteria will be made from each of these criteria, each variable will be assigned a weighted value in the form of numbers as follows:

Table 2. Weighting of Coffee Types

No	Coffee Type	Value
1	Robusta	3
2	Arabika	5

Table 3. Weighting Aroma

No	Aroma	Value
1	Super Scented	5
2	Scented	3
3	Fairly Scented	1

Table 4. Flavor Weighting

No	Sense of	Value
1	Very Sweet	5
2	Sweet	3
3	Medium	1

Table 5. Weighting of Roasting

No	Roasting	Value
1	Light	5
2	Medium	3
3	Dark	1

Table 6. Price Weighting

No	Price	Value
1	Expensive	5
2	Standard	3
3	Inexpensive	1

From the weighted value determined previously, the preference weighted value obtained is (W = 5,3,8,4,7). From the preference weights, the weight improvement process will be carried out as follows:

$$W1 = \frac{5}{(5+3+8+4+7)} = \frac{5}{27} = 0,185$$

$$W2 = \frac{3}{(5+3+8+4+7)} = \frac{3}{27} = 0,111$$

$$W3 = \frac{8}{(5+3+8+4+7)} = \frac{8}{27} = 0,296$$

$$W4 = \frac{4}{(5+3+8+4+7)} = \frac{4}{27} = 0,148$$

$$W5 = \frac{7}{(5+3+8+4+7)} = \frac{7}{27} = 0,259$$

There are 3 kinds of coffee as alternative criteria, namely:

A1 : Robusta Lesung Coffee

A2 : Arabica Lesung Coffee

A3 : Sumatran Lesung Coffee

Each coffee alternative will be given an assessment for each of the following criteria:

Table 7. Alternative Criteria

Alternative	Criteria				
	C1	C2	C3	C4	C5
A1	3	1	1	3	1
A2	5	3	3	3	3
A3	5	5	3	3	3

This assessment will be counted by the user according to the number of selected alternative candidates.

Determining the value of the vector S as follows:

$$S1 = (3^{0,185}) (1^{0,111}) (1^{0,296}) (3^{0,148}) (1^{-0,259}) = 1.442$$

$$S2 = (5^{0,185}) (3^{0,111}) (3^{0,296}) (3^{0,148}) (3^{-0,259}) = 3.297$$

$$S3 = (5^{0,185}) (5^{0,111}) (3^{0,296}) (3^{0,148}) (3^{-0,259}) = 3.490$$

Determine the value of the vector V is as follows:

$$V1 = \frac{1.442}{1.442+3.297+3.490} = \frac{1.442}{8.230} = 0.175$$

$$V2 = \frac{3.297}{1.442+3.297+3.490} = \frac{3.297}{8.230} = 0.400$$

$$V3 = \frac{3.490}{1.442+3.297+3.490} = \frac{3.490}{8.230} = 0.424$$

The results of the ranking of the V vector values are as follows:

Rank 1: 0.424

Rank 2: 0.400

Rank 3: 0.175

The greatest value is in V3, so alternative A3 is the alternative chosen as the best coffee. In other words, Sumatran Lesung Coffee has the best quality that is worth choosing

4. Results and Discussion

4.1 Results

Based on the results of the design towards the Application of the Weighted Product Method in Determining Qualified Lesung Coffee at PT. Hafizh Lesung Blessings, a website is obtained as the result that can be used to assess the quality of coffee sold by PT. Hafizh Lesung Blessings which can be accessed by computer devices so that the quality ranking can be known based on the assessment of the User.

The current system running on PT. Hafizh Lesung Blessing to determine the quality of coffee only depends on verbal comments from visitors or buyers and no proper computerized system is provided to determine or rank the product.

The system made is provided in the form of a web-based application so that it can be used and applied to ease PT. Hafizh Lesung Blessings in conducting data collection and knowing the rankings and data can be seen from several computer technology devices using web media.

4.2 Discussion

In discussing the implementation of Weighted Product Method in determining the quality of lesung coffee at PT. Hafizh Lesung Blessings, an explanation of the function of the interaction between the system and the user will be provided. Then, it will also be discussed about the test results from the Website Application of the Weighted Product Method in determining the quality of lesung coffee at PT. Hafizh Lesung Blessings for every unit in this system. Discussion of the interface or interaction between the user and the system for the application of the Weighted Product Method in determining the quality of lesung Coffee at PT. Hafizh Lesung Blessings includes:

Login Page

The Login page is the first display in the Application of the Weighted Product Method in determining the quality of lesung coffee at PT. Hafizh Lesung Blessings. This page serves the display of the users, where in this page, admins, visitors and leaders act as the supervisors. If the username and password are typed correctly, the system will display the nextpage

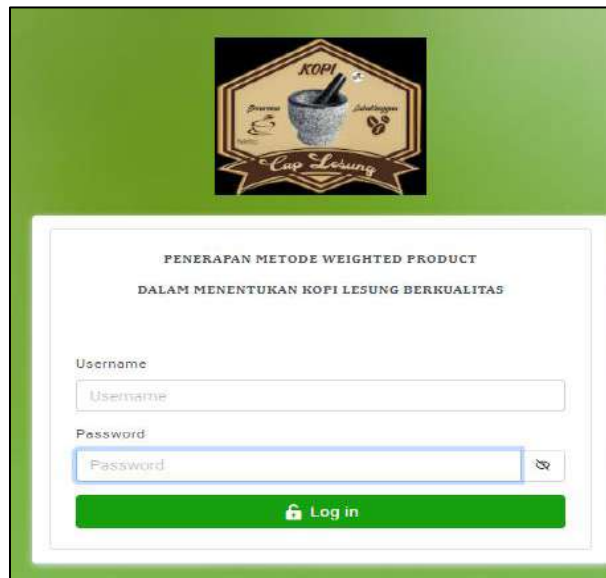


Figure 1. Login Page Display

Homepage

The Home page is the initial display after the Username and password for the admin are input, the Home Page contains menus that can be used by the admin to perform data processing.

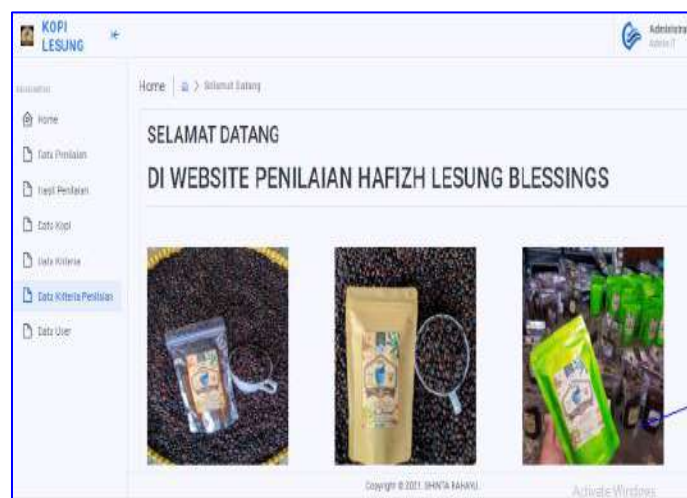


Figure 2. Display of Home Page in Admin

Assessment Data Page

The assessment data page is the display of the input results from the value given by the user or visitor who has been given the access by the admin to conduct an assessment of product quality on the assessment data page. The admin can perform data processing including add, edit, delete, display the amount of data and search for data which has been inputted by the admin.

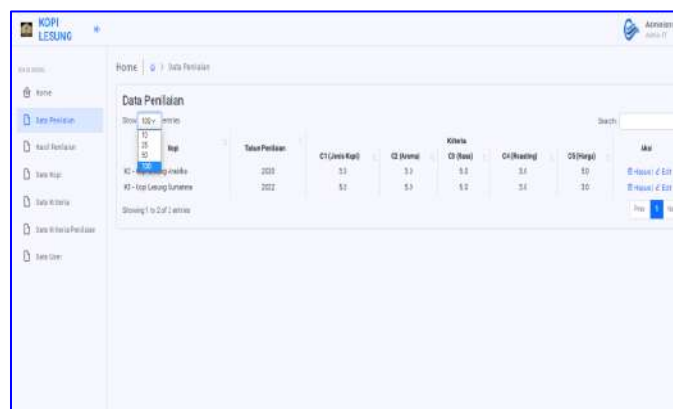


Kopi	Tahun Penilaian	C1 (Jenis Kopi)	C2 (Jumlah)	C3 (Rasa)	C4 (Bau)	C5 (Harga)	Aksi
K1 - Kopi Luwak Indonesia	2021	1.0	1.0	1.0	1.0	1.0	Edit Hapus
K2 - Kopi Luwak Amerika	2021	1.0	1.0	1.0	1.0	1.0	Edit Hapus
K3 - Kopi Luwak Belanda	2021	1.0	1.0	1.0	1.0	1.0	Edit Hapus

Figure 3. Appraisal Data Page Display

Appraisal Data Show Page

Appraisal data show page is a page where the system can display the amount of data you want to display in the assessment data table.

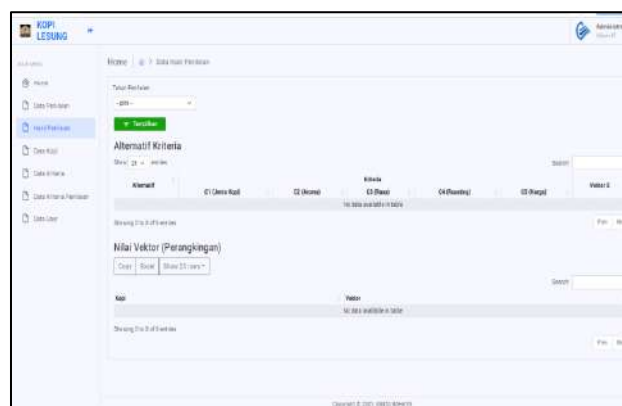


Kopi	Tahun Penilaian	C1 (Jenis Kopi)	C2 (Jumlah)	C3 (Rasa)	C4 (Bau)	C5 (Harga)	Aksi
K1 - Kopi Luwak Indonesia	2021	1.0	1.0	1.0	1.0	1.0	Edit Hapus
K2 - Kopi Luwak Amerika	2021	1.0	1.0	1.0	1.0	1.0	Edit Hapus

Figure 4. Show Assessment Data Page Display

Assessment Results Data Page

The assessment data page is the display of the calculation as a result of the value data given by the user or visitor on the quality of the product. On the assessment results data page, the admin can perform data processing including displaying the data based on the year of assessment and excel format, Show, Search, and Copy, and Data.



Kriteria	C1 (Jenis Kopi)	C2 (Jumlah)	C3 (Rasa)	C4 (Bau)	C5 (Harga)	Nilai Vektor (Perangkingan)
K1 - Kopi Luwak Indonesia	1.0	1.0	1.0	1.0	1.0	1.0
K2 - Kopi Luwak Amerika	1.0	1.0	1.0	1.0	1.0	1.0

Figure 5. Display of Assessment Results Data Pages

Page Display Showing Assessment Result Data

The page display showing assessment result data is a page display that can display the calculated data from the value data that has been inputted by the assessor which has been entered previously. By selecting the year of assessment and clicking the show menu, the system will display the desired data.

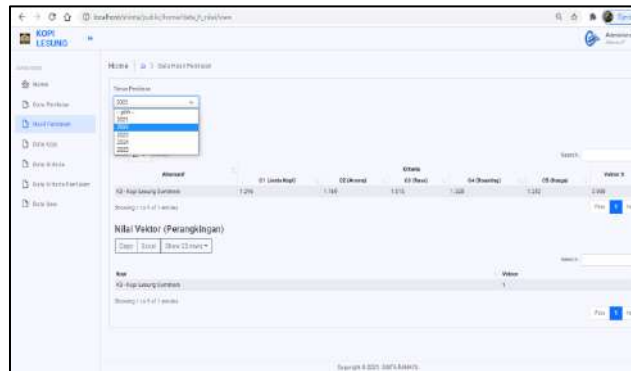


Figure 6. Page Display Showing Assessment Result Data

Page Display Assessment Result Data Search

Search data page of the assessment results is a system that can display certain data that you want to display from the data table of the assessment results. By writing the desired identity, the system will display the desired data



Figure 7. Display of the Search Data Results Assessment Page

Copy and Excel Pages of Assessment Result Data

Copy and Excel page of assessment data is a system page that can duplicate data and can display data in Microsoft Excel format

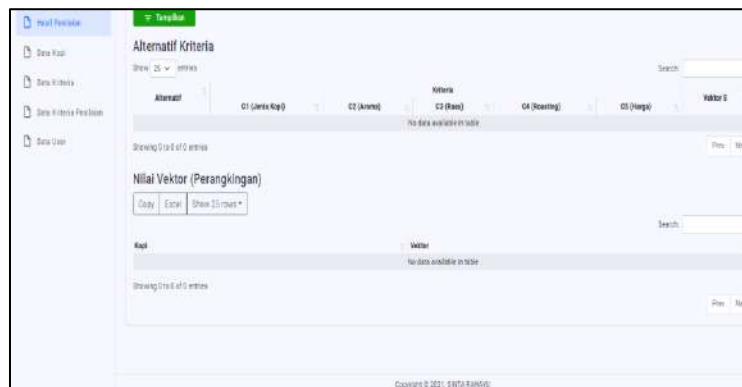


Figure 8. Copy and Excel Page Display of Assessment Result Data

Coffee Data Page

Coffee data page is a page on the system that is used to add, edit, and delete coffee data including the coffee code, coffee name, and the origin of the coffee

Kode Kopi	Nama Kopi	Asal Kopi	Act
K1	Kopi Lesung Robusta	Lubuklinggau	Hapus Edit
K2	Kopi Lesung Arabika	Pager Alen	Hapus Edit
K3	Kopi Lesung Sumatra	Lampung	Hapus Edit

Figure 9. Coffee Data Page Display

Criteria Data Page

The criteria data page is a page on the system that is used to add, edit, and delete assessment criteria data to determine the quality of the coffee. Among them are the names of the criteria, the weight of the benefit/cost, and the code of the criteria

Nama Kriteria	Bobot	Benefit/ Cost	Kode	Act
Jenis Kopi	5	Benefit	C1	Hapus Edit
Aroma	3	Benefit	C2	Hapus Edit
Rasa	3	Benefit	C3	Hapus Edit
Roasting	3	Benefit	C4	Hapus Edit
Harga	7	Cost	C5	Hapus Edit

Figure 10. Criteria Page View

Assessment Criteria Data Page

The assessment criteria data page is a page on the system that is used to add, edit, and delete data about the assessment sub-criteria to determine coffee quality. including code, name of criteria, weights, assessment criteria, and grades.

Kode	Nama Kriteria	Bobot	Kriteria Penilaian	Nilai	Act
C4	Roasting	4	Light	1	[Tambah] [Edit]
C4	Roasting	4	Medium	2	[Tambah] [Edit]
C4	Roasting	4	Dark	3	[Tambah] [Edit]
C8	Rasa	8	Bongot Manis	1	[Tambah] [Edit]
C8	Rasa	8	Manis	2	[Tambah] [Edit]
C8	Rasa	8	Manis	3	[Tambah] [Edit]
C8	Rasa	8	Manis	4	[Tambah] [Edit]
C8	Rasa	8	Manis	5	[Tambah] [Edit]
C8	Rasa	8	Manis	6	[Tambah] [Edit]
C8	Rasa	8	Manis	7	[Tambah] [Edit]
C8	Rasa	8	Manis	8	[Tambah] [Edit]
C8	Rasa	8	Manis	9	[Tambah] [Edit]
C8	Rasa	8	Manis	10	[Tambah] [Edit]
C8	Rasa	8	Manis	11	[Tambah] [Edit]
C8	Rasa	8	Manis	12	[Tambah] [Edit]
C8	Rasa	8	Manis	13	[Tambah] [Edit]
C8	Rasa	8	Manis	14	[Tambah] [Edit]
C8	Rasa	8	Manis	15	[Tambah] [Edit]
C8	Rasa	8	Manis	16	[Tambah] [Edit]
C8	Rasa	8	Manis	17	[Tambah] [Edit]
C8	Rasa	8	Manis	18	[Tambah] [Edit]
C8	Rasa	8	Manis	19	[Tambah] [Edit]
C8	Rasa	8	Manis	20	[Tambah] [Edit]

Figure 11. Rating Criteria Page Display

User Data Page

User data page is a page on the system that is used to add, edit, and delete user data that can interact with the system including username, name, position, and level.

Username	Nama	Jabatan	Level	Act
admin	Administrator	Admin IT	Admin	[Tambah] [Edit]
penilai 1	Penilai 1	Penilai	Penilai	[Tambah] [Edit]
penilai 2	Penilai 2	Penilai	Penilai	[Tambah] [Edit]
penilai 3	Penilai 3	Penilai	Penilai	[Tambah] [Edit]

Figure 12. User Page Display

User Page Visitor Home Page

The visitor's home page is the initial view of the visitor's page after the visitor inputs the username and password in the login system, the visitor's home page contains a menu that can be used to assess the quality of the coffee.



Figure 13. Visitor Home Page Display

Rating Input Page

The assessment input page is a page display where visitors can provide an assessment of the quality of coffee that is already available on the Assessment form. On this assessment input page, visitors can *add*, *edit*, *delete*, *search* and *show* data related to assessment.



Figure 14. Assessment Input Page Display

Leader Homepage

The leader's Home Page is the initial display of the leadership page after the leader inputs the username and password in the Login system. The Leader's Home page contains a menu that can be used to view or display reports on coffee quality rankings which are the results of the assessment of visitors.



Figure 15. Display of the Leader's User Home Page

Assessment Results Report Page

The assessment results report page is a page display where leaders can view reports on the assessment results from visitors about the quality of the coffee. On this assessment results report page, leaders can select and display reports based on year, *Show*, and *Search*, relating to the desired assessment result data.

Alternatif	C1 (Jenis Kopi)	C2 (Asam)	C3 (Basa)	C4 (Rasa)	C5 (Harga)	Nilai S
K2 - Kopi Lesung Arabika	1.225	5	5	1.177	5	1.402
K3 - Kopi Lesung Sumatera	1.347	5	5	1.177	5	3.215
K4 - Kopi Lesung Sumatera	1.347	5	5	1.177	5	3.488

Figure 16. Assessment Result Report Page Display

Page Show Data Assessment Results Report

The show data assessment page is a page where the system can display the amount of data you want to display on the assessment results data.

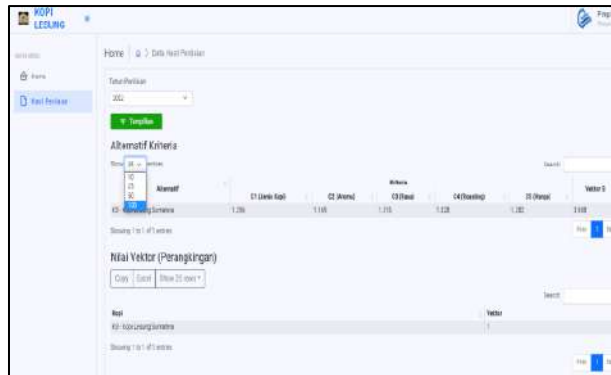


Figure 17. Display of the Assessment Result Report Page Display

Page Search Data Assessment Results Report

The search data page for the assessment results report is a system page that can display certain data reports that you want to display from the assessment results data, by writing the desired identity, the system will display the desired data.

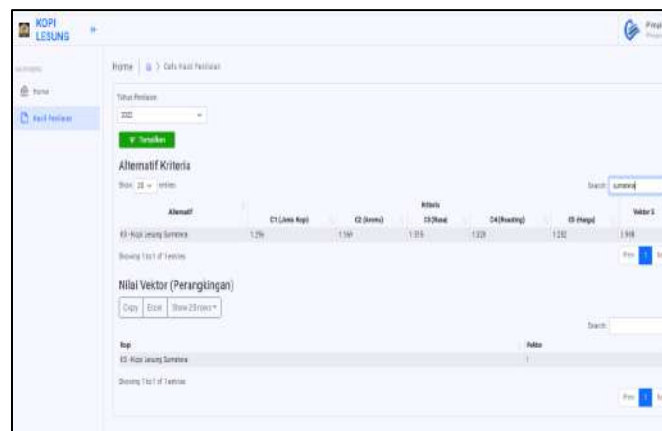


Figure 18. Search Results Assessment Report Page Display

Copy and Excel Pages of Assessment Results Report

Copy and Excel page of assessment report data is a system page that can duplicate data and display data in Microsoft Excel format.

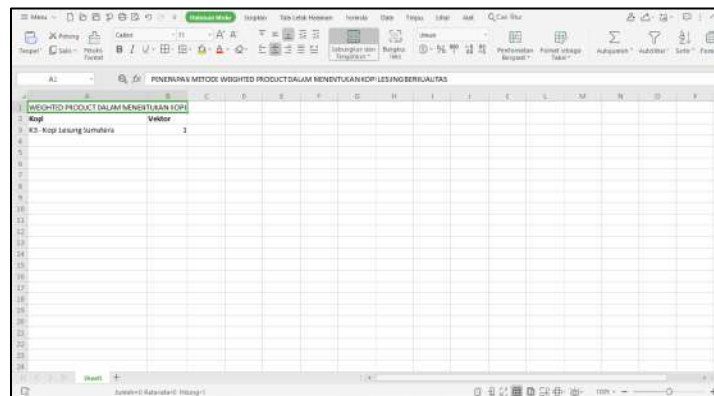


Figure 19. Copy and Excel Page View of Assessment Result Report Data

Logout

Logout is a menu button option for the users, in this case admin, visitors and leaders ending using the system. In this application, the system will respond by returning the system display to the Login page if the user selects and presses the Logout menu,

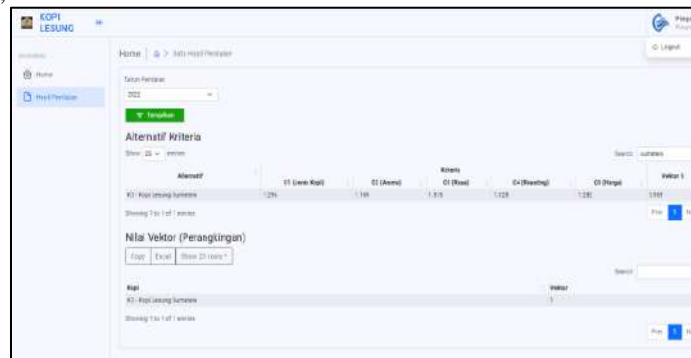


Figure 20. Display Logout

5. Conclusion

From the results of the discussion and the system testing carried out on the Website for applying the Weighted Product Method in determining the quality of lesung coffee at PT. Hafizh Lesung Blessings, it can be concluded that:

1. The website to implement the Weighted Product Method in determining the quality of lesung coffee at PT. Hafizh Lesung Blessings can ease the work to determine the quality of coffee in PT. Hafizh Lesung Blessings instead of using manual method.
2. The use of the website to implement the Weighted Product Method in determining the quality of lesung coffee at PT. Hafizh Lesung Blessings can help store the assessment data from visitors about the quality of the coffee properly and the data can be reused for evaluation of the quality of the coffee.

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