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Application of Analytical Hierarchy Process Method on the Selection Process of Fresh Fruit Bunch Palm Oil Supplier

(Case Study: Pt Sahabat Mewah and Makmur)

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Abstract:- This study aimed to analyze the selection criteria of suppliers at PT Sahabat Mewah dan Makmur located in Jangkang Village, Dendang District, East Belitung Regency, a company engaged in the planting and integrated harvesting of Fresh Fruit Bunches (FFB) from oil palm plantations, processing FFB into Crude Palm Oil (CPO) and core crude oil, Palm Kernel (PK), and sells Crude Palm Oil (CPO) and Palm Kernel (PK). There are twelve partners (suppliers) work with the companies to handle the process of procuring outside fresh fruit bunches in the processing of fresh fruit bunches into crude palm oil. Suppliers are burdened with the same activities and responsibilities with different quality and delivery achievements. Based on these findings, the researcher intends to determine the priority criteria, priority sub-criteria and alternative priorities and the level of consistency of answers from the respondents who are the workers of PT Sahabat Mewah and Makmur plantation area. In this study, the author used the Analytical Hierarchy Process (AHP) method to determine the priorities of the criteria, sub criteria and alternatives which were tested for the level of consistency of the respondents' answers. The results of the priority sequence at the criteria level in this study shows that the quality placed the highest priority with 0.276 scores followed by management and organization that got 0.227 scores, shipping with 0.173 scores, flexibility with 0.165 scores and the price with 0.160 scores. The order of global priorities at the alternative level are Koperasi Anugrah followed by PT Agro Inti Abadi, CV Tata Subur Makmur, PT Rawi Agro Mandiri, PT Tri Selaras Agri, and KUD Bakti. The value of Consistency Ratio (CR) in the pairwise comparison matrix between criteria, sub-criteria and overall alternatives was at the tolerance limit stating that the answers of the respondents are classified into valid and consistent category.

Keywords:- *Supplier, Kriteria, Subkriteria, Analytical Hierarchy Process.*

I. INTRODUCTION

Competition in the industrial world at this time makes industry players to improve themselves facing the era of competition and globalization. The demand for high productivity has become the main target in every industrial activity. By producing good quality products, not only consumers are satisfied, but the internal side of the company will also get various benefits because the cost of production can be reduced.

Focusing on where to do research, namely PT Sahabat Mewah and Makmur is a food-based agribusiness company that is committed to responsible development. One of the big challenges that PT SMM must overcome in 2017 is a significant reduction in the production of fresh fruit bunches (FFB). The decline was caused by a prolonged dry season at the end of 2016 due to the impact of El Nino. Management overcame the negative impact by holding fruit from sources outside the plantation. This initiative resulted in improvements in production volume and kept costs incurred by the company within manageable limits. PT SMM has produced Crude Palm Oil reaching 76,975 metric tons in 2018 with an average annual production volume of 63,300 metric tons. Seen from the data Chart 1. CPO production.

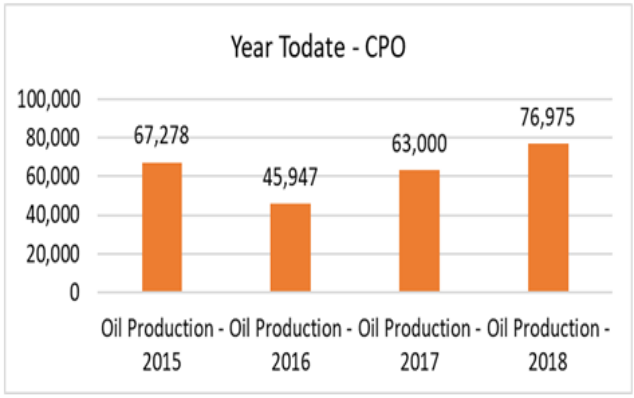

Chart 1:- Produksi CPO
Source: Internalization Data PT SMM (2015-2018)

Visible chart 2. the performance of suppliers of fresh fruit bunches in the January-December 2018 period which forms the basis of research into selecting FFB suppliers TBS.

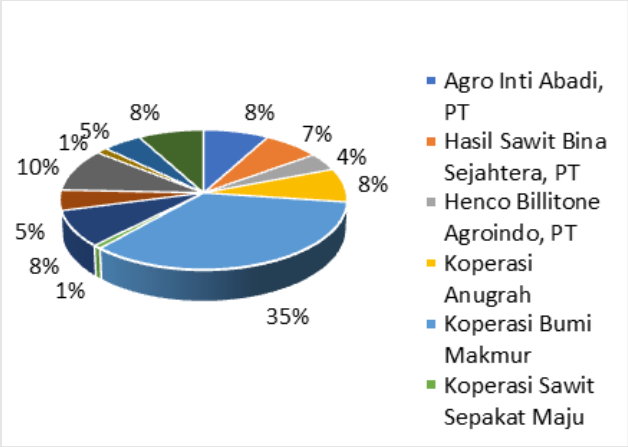

Chart 2:- Kinerja Supplier Tandan Buah Segar (TBS)
Source: Internalization Data January - December 2018.

Based on Chart 2. the performance of 12 suppliers, which is the basis of PT Sahabat Mewah and Makmur's assessment of the supplier's performance can be seen from the amount of raw fruit bunches. The percentage of uncertainty in the amount of raw fruit bunches sent from suppliers to palm oil mills is very low due to the quality of oil palm that does not meet company quality standards and traceability in the supply chain of fresh fruit bunches from independent smallholders is a challenge with many intermediaries so the company does not know all the sources of oil palm in the supply chain to plantation. Supplier performance measurement system at PT SMM is still very standard and subjective, considering that currently there are many performance indicators appearing and it is necessary to consider in assessing supplier performance. Performance measurement carried out using the Vendor Performance Indicator (VPI) approach is a supplier performance measurement management system that is carried out comprehensively and in accordance with company requirements using the Analytical Hierarchy Process (AHP) method.

In order to maintain the quality of production, PT SMM must choose suppliers who are able to provide quality FFB products, prices and quantities that are appropriate and timely. The selection of the right supplier can be done through the right decision making process. Therefore, there needs to be definite criteria in determining suppliers so that management can evaluate and choose the right supplier to work together in the long run. Seeing the limitations of the criteria used as variables, the researchers chose the Analytic Hierarchy Process (AHP) model approach which is one of the most commonly used methods in determining a choice.

A. Identification Problems

In this study, researchers tried to design a supplier selection and evaluation system with multiple criteria, so the authors have identified two main problems that form the basis of this research. The two main problems are the traceability of palm oil sources in the supply chain of 12 suppliers which has made the company lack of supervision processes, the difficulty of getting external FFB supplies from suppliers that meet the quality standard criteria.

B. Research Purposes

The research conducted at PT SMM, in accordance with the explanation in the background section, aims to find out the criteria that are the top priority of PT SMM in the selection of External FFB suppliers, analyze the performance of external FFB suppliers by using the Analytical Hierarchy Process (AHP) approach.

II. LITERATURE REVIEWS

A. Supply Chain Management

According to Terry, George and Leslie W. Rue (2010), management is a typical process that consists of planning, organizing, mobilizing and controlling actions to determine and achieve goals through the use of human resources and other resources. Furthermore, logistics is known as a material for carrying out operational activities that are consumable. Logistics is a strategic management process for the strategic transfer and storage of goods, parts and goods from suppliers, between company facilities and to customers (Bowersox, Donald J. (2016).

B. Purchasing Management

J. Damiri (2005) purchasing is planning the commodity goods needed with guaranteed quality and quantity based on specified specifications and reasonable and competitive prices with timely delivery according to applicable procedures. Indrajit and Djokopranoto (2005) said that "The purchasing function is the tasks that need to be performed by the part of the company responsible for the purchase. The purchasing process is the actions carried out sequentially in a company in the activities of purchasing goods and services ".

C. Supplier Selection

Choosing the right or suitable supplier is a difficult task for the company as a buyer (Tahriri et al., 2008). Each supplier has its own strengths and weaknesses. It's a good idea for the company to rank the company's estimates of the strengths and weaknesses of each supplier. Before making a decision to cooperate with suppliers, the company must first conduct research on the condition of the prospective supplier's company in accordance with predetermined criteria.

D. Product Quality

Product quality is one of the factors that influence customer satisfaction. Product quality is determined by a set of uses and functions, including performance, durability, conformity to specifications, product aesthetics, and also perceived quality / product impression. Despite having a good quality product, it does not necessarily make consumers satisfied. Consumer satisfaction also depends on the quality of services offered by the company. Quality of service is any action / activity offered by one party to another party, usually intangible. Kotler, Philip and Keller, Kevin Lane. (2009).

III. METHODS

Analytic Hierarchy Process (AHP) is a decision support model developed by Thomas L. Saaty, from the Wharton School of Business in 1970. AHP describes a complex multi-factor or multi-criteria problem into a hierarchy. According to Saaty (2013), hierarchy is defined as a representation of a complex problem in a multi-level structure where the first level is the goal, followed by the level of factors, criteria, sub criteria and so on down to the last level of alternatives. With hierarchy, a complex problem can be broken down into groups which are then arranged into a hierarchical form so that the problem will appear more structured and systematic.

There are several benefits gained by using AHP in solving complex problems Marimin, M. (2004), namely unity, complexity, interdependence, hierarchical structure, measurement, consistency, synthesis, bargaining, assessment and consensus, repetition of processes. To start the pairwise comparison process a criterion is chosen from the top level of the hierarchy and then the elements below it are taken to be compared. Example in a hierarchical structure there are criteria in the form of price (price) where the price criteria (price) has two indicators which are sub-criteria of the price criteria (price), then defines a pairwise comparison so that the total valuation is obtained using the following calculation formula:

$$n\,x\left(\frac{(n-1)}{2}\right)$$

n is the number of elements compared.

The results of the comparison of each element will be a number from 1 to 9 which shows the comparison of the importance level of an element. If an element in the matrix is compared with itself, the comparison results are given a value of 1. These nine scales have been proven to be acceptable and can distinguish the intensity between elements. The results of the comparison are filled in cells that correspond to the elements being compared, followed by calculating eigenvalues and testing their consistency. If it is not consistent then the data collection is repeated, repeating the calculation process for all levels of the hierarchy, calculating the eigenvectors of each paired comparison matrix which is the weight of each element for determining the priority of the elements at the lowest hierarchy level until reaching the goal. If there is more than one respondent who gives an assessment of an alternative criterion, then the answers of the respondents must be put together first using the Geometric Mean formula:

$$GM = \sqrt[n]{(X1)(X2)\ \ldots\ \ldots\ (Xn)}$$

Where:

GM : *Geometric Mean*
X1 : People assessors ke – 1
Xn : People assessorske – n
n : Number of evaluators

Furthermore, the calculation is done by adding up the value of each column of the matrix, dividing each value of the column by the total column concerned to obtain the normalization of the matrix and adding up the value of each row and dividing it by the number of elements to get the average. The calculation formula is as follows:

$$Consistency\ Index\ (CI) = \frac{(Eigen\ Factor - n)}{(n-1)}$$

Next check the consistency of the hierarchy. What is measured in AHP is the consistency ratio by looking at the consistency index. Expected consistency is near perfect to produce a decision that is near valid. Although it is difficult to achieve perfect results, a consistency ratio is expected to be less than or equal to 10%. If the consistency ratio is less than or equal to 10%, the results of the study can be stated consistent but if it is greater than 10%, the results of the study are stated to be inconsistent and the assessment process needs to be repeated, and iterations are calculated (matrix multiplication).

➢ *Research Methods*

This study is schematically illustrated in figure 1. Below:

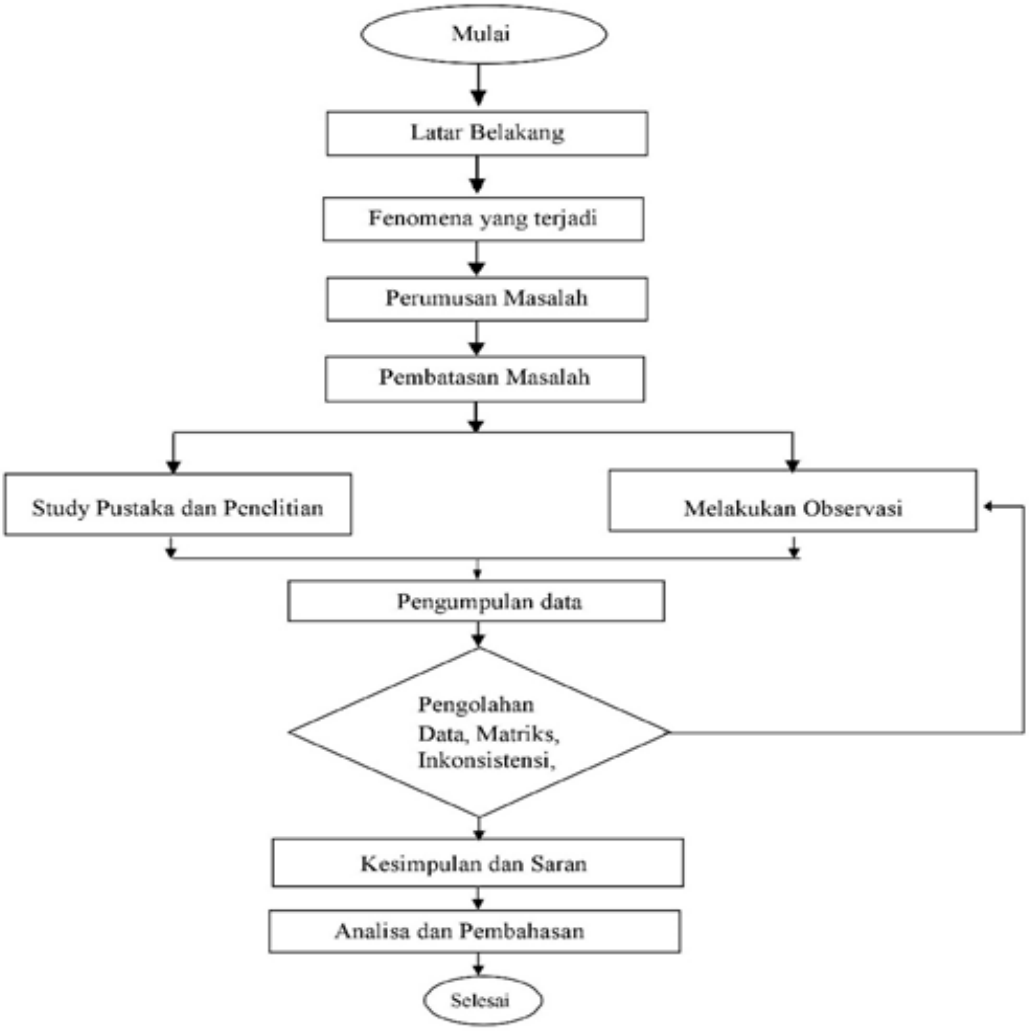

Fig 1:- Research Methods Framework
Source: Author (2019)

IV. RESULTS

A. Determine Supplier Selection Criteria

In determining supplier selection criteria, the researchers had previously conducted initial verification with 6 respondents who were experts in their respective fields, namely the Head of Commercial, General Manager of Estate Operations, Regional Office Commercial Manager, Regional Office Commercial, Estate Commercial and Mill Assistant Process.

B. Structure Hierarchy

The hierarchy arrangement starts with the goal / target, ten the first level criteria, and continues with the sub criteria. Goal / target in this study is to determine the supplier selection criteria with 7 total criteria. Each of these criteria has several sub criteria. This hierarchical structure was formed to make it easier for decision makers to see problems in a more structured way so that they fit their objectives. This hierarchy is seen in Figure 2.

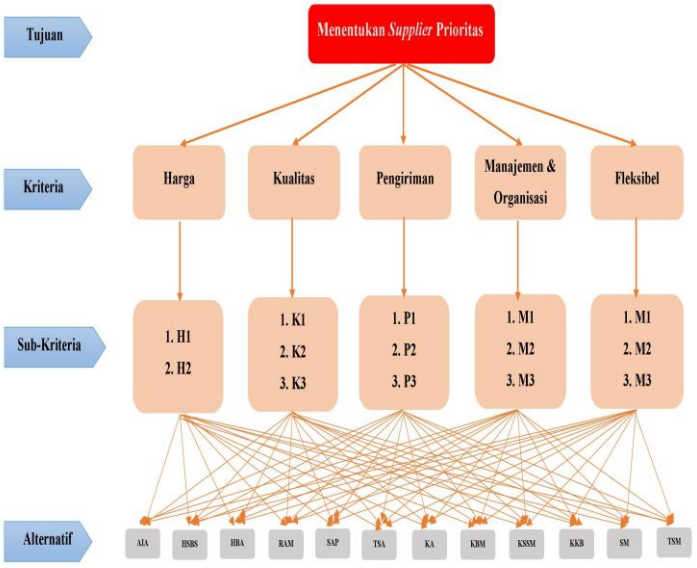

Fig 2:- Supplier Selection Criteria Hierarchy
Source: Author (2019)

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C. Determine Priorities

Based on the results of the assessment of each respondent, the overall results of the respondents' opinions were averaged using the Geometric Mean calculation method. Geometric Mean calculations need to be done because in the Analytic Hierarchy Process method, only one answer will appear in the comparison matrix so that the results of the Geometric Mean calculations can be said to be representative of the results of all respondents 'answers to a choice. After the Geometric Mean results are obtained for all respondents' answers, the next step is to calculate priority vector and eigen factor and then proceed with the consistency test.

Priority vectors are obtained by dividing according to the number of criteria, sub-criteria or alternatives being calculated. Eigen factor is the result of the total addition of the results of the priority vector with the total in the pairwise comparison matrix. The next step is to do a consistency test by calculating the consistency index (CI) from the results of the previous eigen factor calculation. After obtaining the value of consistency index (CI), it is continued with the calculation of consistency ratio (CR).

Consistency ratio is a parameter used to check whether pairwise comparisons in the questionnaire have been done consistently or not. The results are said to be consistent if they have a small consistency ratio of 0.1. If a consistency ratio value greater than 0.1 is obtained, the questionnaire must be revised again. The revision was carried out until a consistency level of less than 0.1 was obtained. The following table 1 below shows the results of the calculation of the pairwise comparison matrix to the results of the consistency test at the criteria level.

Kriteria	Harga	Kualitas	Pengiriman	M&O	Fleksibel	Priority Vector
Harga	1.00	0.63	1.66	0.69	0.47	0.16
Kualitas	1.60	1.00	0.87	2.12	1.94	0.27
Pengiriman	0.60	1.14	1.00	0.51	1.57	0.18
M&O	1.44	0.47	1.98	1.00	1.71	0.22
Fleksibel	2.12	0.51	0.64	0.58	1.00	0.16
Total	6.76	3.76	6.15	4.90	6.70	1.00
Eigen Factor						5.40
Consistency Index (CI)						0.10
Consistency Ratio (CR)						0.09
						KONSISTEN

Table 1:- Results of Pairwise Comparison Matrices between c Criteria.
Source: Primary Data Results (2019)

Based on the table above then:

1) *The result of 0.63 in the paired matrix for the price criteria for quality is obtained from the Geometric Mean which is the average of all respondents' answers for the comparison. In this case the number 0.63 is obtained from the calculation stage as follows:*

$$\sqrt[6]{(\tfrac{1}{5})x(3)x(3)x(\tfrac{1}{2})x(\tfrac{1}{5})x(\tfrac{1}{3})} = 0{,}63.$$

2) The result of 0.16 in Priority Vector is obtained from the calculation of the division in accordance with the number of criteria that exist to the results of the division between the value of the paired matrix with the total of the paired matrix for a comparison of elements. In this case the number 0.16 is obtained from the following calculation:

$$\frac{(\frac{1}{6{,}76})+(\frac{0.63}{3{,}76})+(\frac{1{,}66}{6{,}15})+(\frac{0{,}69}{4{,}90})+(\frac{0{,}47}{6{,}70})}{5} = 0{,}16.$$

3) The results of 5.40 on the Eigen Factor are obtained from the sum of the multiplications for each Priority Vector value with the total of each element. In this case the number 5.40 is more clearly obtained from the calculation results as follows:

$$(6{,}76\ x\ 0{,}16) + (3{,}76\ x\ 0{,}27) + (6{,}15\ x\ 0{,}18) + (4{,}90\ x\ 0{,}22) + (6{,}70\ x\ 0{,}16) = 5{,}40.$$

4) The result of 0.10 on the Consistency Index is obtained using the calculation formula (2.3) that has been described in the previous section by using the following formula:

Consistency Index (CI) = *(Eigen Factor – n) / (n*-1)
= (5,40-5) / (5-1)
= 0,10.

5) The result of 0.09 on the Consistency Ratio was obtained using the calculation formula (2.4) that was explained in the previous section by using the following formula:

Consistency Ratio (CR) = CI / RI
= 0,010 / 1,12
= 0,09.

Based on the calculation results, if the value of consistency ratio (CR) reaches> 0.1 then the value of the pairwise comparison matrix is declared to be inconsistent and needs to be reassessed from the respondent stage.

However, if the value of consistency ratio (CR) reaches ≤ 0.1 then the value of the pairwise comparison matrix is declared consistent and acceptable. In this case it appears that the value of the consistency ratio (CR) obtained for the pairwise comparison matrix between criteria is 0.09 which means that the value of the pairwise comparison matrix has been declared consistent and acceptable, the next step is to do priority weighting through iteration calculation (matrix multiplication). This is done to determine the order of priorities chosen from all subjects compared. Iteration calculation is done by multiplying the sum for each column to get a new matrix of iteration results. The following shows how to calculate iteration in terms of criteria:

Kriteria	Harga	Kualitas	Pengiriman	M&O	Fleksibel
Harga	1.00	0.63	1.66	0.69	0.47
Kualitas	1.60	1.00	0.87	2.12	1.94
Pengiriman	0.60	1.14	1.00	0.51	1.57
M&O	1.44	0.47	1.98	1.00	1.71
Fleksibel	2.12	0.51	0.64	0.58	1.00

Table 2:- Iteration Calculation (Iteration-0)
Source: Primary Data Results (2019)

Kriteria	Harga	Kualitas	Pengiriman	M&O	Fleksibel
Harga	5.00	3.72	5.54	3.83	5.96
Kualitas	10.89	5.00	9.83	6.92	9.64
Pengiriman	7.09	3.06	5.00	4.77	6.51
M&O	8.45	4.99	7.85	5.00	8.13
Fleksibel	6.28	3.36	6.40	4.05	5.00

Table 3:- Iteration Calculation {Iteration-1 (Advanced)}
Source: Primary Data Results (2019)

5,59 = (1,00 x 0,47) + (0,63 x 1,94) + (1,66 x 1,57) + (0,69 x 1,71) + (0,47 x 1,00)
= 0,47+1,22+2,60+1,17+0,47
= 5,96

The stages carried out at the sub-criteria level are exactly the same as all the stages of priority weighting and consistency testing at the previous criteria level. The difference is only in the subject of comparison. In the following, the authors present the results of priority weighting and consistency testing for each level of sub-criteria.

Kriteria	H1	H2	Priority Vector
H1	1.00	4.43	0.82
H2	0.23	1.00	0.18
Total	1.23	5.43	1.00
Eigen Factor			2,00
Consistency Index (CI)			0.00
Consistency Ratio (CR)			0,00
			KONSISTEN

Table 4:- Priority Weighting Results and Consistency Test (Price)
Source: Primary Data Results (2019)

From Table 4. above for weighting the priority of the Price Sub-Criteria the results obtained are the H1 Sub-criterion which has the highest priority weight of 0.82. After being tested for consistency, the results of weighting the priority of price sub-criteria are stated consistent.

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Kriteria	K1	K2	K3	Priority Vector
K1	1.00	2.37	0.95	0.42
K2	0.42	1.00	1.12	0.26
K3	1.05	0.89	1.00	0.32
Total	2.48	4.25	3.07	1.00
Eigen Factor				3.12
Consistency Index (CI)				0.06
Consistency Ratio (CR)				0.06
				KONSISTEN

Table 5:- Priority Weighting Results and Consistency Test (Quality)
Source: Primary Data Results (2019)

Table 5. above for weighting the priority of the Quality Sub-Criteria the results obtained are Sub-criteria K1 which has the highest priority weight of 0.42. After being tested for consistency, the results of weighting the priority of the shipping sub-criteria are declared consistent.

Kriteria	P1	P2	P3	Priority Vector
P1	1.00	0.57	0.93	0.28
P2	1.76	1.00	0.97	0.42
P3	1.07	1.03	1.00	0.33
Total	3.83	2.60	2.91	1.03
Eigen Factor				3.13
Consistency Index (CI)				0.07
Consistency Ratio (CR)				0.06
				KONSISTEN

Table 6:- Priority Weighting Results and Consistency Test (Delivery)
Source: Primary Data Results (2019)

Table 6. above for weighting the priority of the Quality Sub-Criteria, the Sub-Criteria P2 results which have the highest priority weight is 0.42. After being tested for consistency, the results of weighting the priority of the shipping sub-criteria are declared consistent.

Kriteria	M1	M2	M3	Priority Vector
M1	1.00	1.73	0.42	0.25
M2	0.58	1.00	0.24	0.15
M3	2.40	4.10	1.00	0.60
Total	3.97	6.83	1.66	1.00
Eigen Factor				3.00
Consistency Index (CI)				0.00
Consistency Ratio (CR)				0.00
				KONSISTEN

Table 7:- Priority Weighting Results and Consistency Test (Management & Organization)
Source: Primary Data Results (2019)

Table 7. above for weighting the priority of the Quality Sub-Criteria the M3 Sub-Criteria results which have the highest priority weight is 0.60. After being tested for consistency, the results of weighting the priority of the shipping sub-criteria are declared consistent.

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Kriteria	F1	F2	F3	Priority Vector
F1	1.00	1.47	0.86	0.36
F2	0.68	1.00	0.80	0.27
F3	1.16	1.25	1.00	0.37
Total	2.84	3.72	2.66	1.00
Eigen Factor				3.01
Consistency Index (CI)				0.01
Consistency Ratio (CR)				0.01
				KONSISTEN

Table 8:- Priority Weighting Results and Consistency Test (Flexibility)
Source: Primary Data Results (2019)

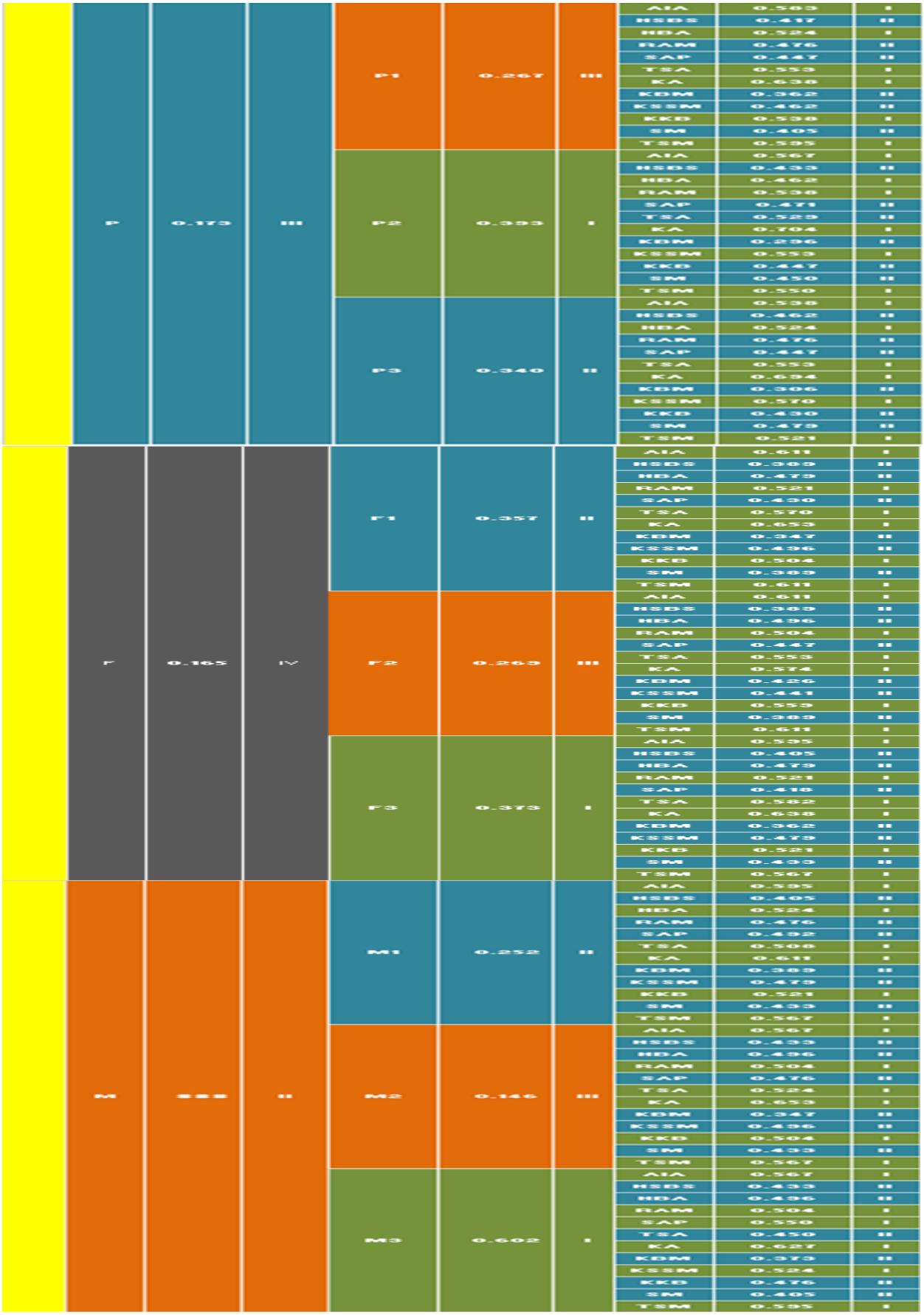
Table 8. above For priority weighting the flexible Sub-criteria results are obtained Sub-criteria F3 which has the highest priority weight of 0.37. After testing the consistency of the sub-criteria, the weighting results are declared consistent.

➢ *Determine Global Weights*

At this stage, the overall results of each weight obtained by each alternative are added up so that the results of the sum are the overall priority (global) weighting values for each alternative. In the following, the authors bring up the overall results of priority weighting in table 9,10.

[illegible]	Kriteria	Bobot	Prioritas	Sub-Kriteria	Bobot	Prioritas	Alternatif	Bobot	Prioritas
Supplier Prioritas Tandan Buah Segar (TBS) luar	H	[illegible]	V	H1	0.816	I	AIA	0.567	I
							HSBS	0.433	II
							HBA	0.378	II
							RAM	0.622	I
							SAP	0.622	I
							TSA	0.378	II
							KA	0.611	I
							KBM	0.389	II
							KSSM	0.405	II
							KKB	0.595	1
							SM	0.433	II
							TSM	0.567	I
				H2	0.184	II	AIA	0.546	I
							HSBS	0.454	II
							HBA	0.426	II
							RAM	0.574	I
							SAP	0.517	I
							TSA	0.483	II
							KA	0.546	I
							KBM	0.454	II
							KSSM	0.454	II
							KKB	0.546	I
							SM	0.433	II
							TSM	0.567	I
[illegible]	K	[illegible]	I	K1	0.427	I	AIA	0.538	I
							HSBS	0.462	II
							HBA	0.458	II
							RAM	0.542	I
							SAP	0.541	I
							TSA	0.459	II
							KA	0.669	I
							KBM	0.331	II
							KSSM	0.576	I
							KKB	0.424	II
							SM	0.570	I
							TSM	0.430	II
				K2	0.254	III	AIA	0.509	I
							HSBS	0.491	II
							HBA	0.508	I
							RAM	0.432	II
							SAP	0.567	I
							TSA	0.433	II
							KA	0.583	I
							KBM	0.417	II
							KSSM	0.508	I
							KKB	0.432	II
							SM	0.433	II
							TSM	0.567	I
				K3	0.318	II	AIA	0.583	I
							HSBS	0.417	II
							HBA	0.462	II
							RAM	0.538	I
							SAP	0.426	II
							TSA	0.574	I
							KA	0.653	I
							KBM	0.347	II
							KSSM	0.524	I
							KKB	0.476	II
							SM	0.479	II
							TSM	0.521	I

Table 9:- Weight of Global Priority



	P	0.173	III	P1	0.267	III	AIA	0.563	I
							HSDS	0.417	II
							HBA	0.524	I
							RAM	0.476	II
							SAP	0.447	II
							TSA	0.553	I
							KA	0.636	I
							KDM	0.362	II
							KSSM	0.462	II
							KKD	0.538	I
							SM	0.405	II
							TSM	0.595	I
				P2	0.393	I	AIA	0.567	I
							HSDS	0.433	II
							HBA	0.462	I
							RAM	0.538	I
							SAP	0.471	II
							TSA	0.529	II
							KA	0.704	I
							KDM	0.296	II
							KSSM	0.553	I
							KKD	0.447	II
							SM	0.450	II
							TSM	0.550	I
				P3	0.340	II	AIA	0.538	I
							HSDS	0.462	II
							HBA	0.524	I
							RAM	0.476	II
							SAP	0.447	II
							TSA	0.553	I
							KA	0.694	I
							KDM	0.306	II
							KSSM	0.570	I
							KKD	0.430	II
							SM	0.479	II
							TSM	0.521	I
	F	0.165	IV	F1	0.357	II	AIA	0.611	I
							HSDS	0.389	II
							HBA	0.479	II
							RAM	0.521	I
							SAP	0.430	II
							TSA	0.570	I
							KA	0.653	I
							KDM	0.347	II
							KSSM	0.496	II
							KKD	0.504	I
							SM	0.389	II
							TSM	0.611	I
				F2	0.269	III	AIA	0.611	I
							HSDS	0.389	II
							HBA	0.496	II
							RAM	0.504	I
							SAP	0.447	II
							TSA	0.553	I
							KA	0.574	I
							KDM	0.426	II
							KSSM	0.441	II
							KKD	0.559	I
							SM	0.389	II
							TSM	0.611	I
				F3	0.373	I	AIA	0.595	I
							HSDS	0.405	II
							HBA	0.479	II
							RAM	0.521	I
							SAP	0.418	II
							TSA	0.582	I
							KA	0.638	I
							KDM	0.362	II
							KSSM	0.479	II
							KKD	0.521	I
							SM	0.433	II
							TSM	0.567	I
	M	[illegible]	II	M1	0.252	II	AIA	0.595	I
							HSDS	0.405	II
							HBA	0.524	I
							RAM	0.476	II
							SAP	0.432	II
							TSA	0.508	I
							KA	0.611	I
							KDM	0.389	II
							KSSM	0.479	II
							KKD	0.521	I
							SM	0.433	II
							TSM	0.567	I
				M2	0.146	III	AIA	0.567	I
							HSDS	0.433	II
							HBA	0.496	II
							RAM	0.504	I
							SAP	0.476	II
							TSA	0.524	I
							KA	0.653	I
							KDM	0.347	II
							KSSM	0.496	II
							KKD	0.504	I
							SM	0.433	II
							TSM	0.567	I
				M3	0.602	I	AIA	0.567	I
							HSDS	0.433	II
							HBA	0.496	II
							RAM	0.504	I
							SAP	0.550	I
							TSA	0.450	II
							KA	0.627	I
							KDM	0.373	II
							KSSM	0.524	I
							KKD	0.476	II
							SM	0.405	II
							TSM	0.595	I

Table 10:- Weight of Global Priority (Advanced)
Source: Primary Data Results (2019)

Following in table 11. The results of the consistency test below have summarized the overall results of the consistency test calculation in this study which shows that all respondents' answers fall into the consistent category so that the results of the study can be stated in accordance (valid).

Matriks Berpasangan	CR	Keterangan
Antar Kriteria	0.090	Konsisten
Antar Sub-kriteria (Harga)	0.000	Konsisten
Antar Sub-kriteria (Kualitas)	0.056	Konsisten
Antar Sub-kriteria (Pengiriman)	0.060	Konsisten
Antar Sub-kriteria (M&O)	0.000	Konsisten
Antar Sub-kriteria (Fleksibel)	0.005	Konsisten
Antar Alternatif (H1)	0.000	Konsisten
Antar Alternatif (H2)	0.000	Konsisten
Antar Alternatif (K1)	0.000	Konsisten
Antar Alternatif (K2)	0.000	Konsisten
Antar Alternatif (K3)	0.000	Konsisten
Antar Alternatif (P1)	0.000	Konsisten
Antar Alternatif (P2)	0.000	Konsisten
Antar Alternatif (P3)	0.000	Konsisten
Antar Alternatif (M1)	0.000	Konsisten
Antar Alternatif (M2)	0.000	Konsisten
Antar Alternatif (M3)	0.000	Konsisten
Antar Alternatif (F1)	0.000	Konsisten
Antar Alternatif (F2)	0.000	Konsisten
Antar Alternatif (F3)	0.000	Konsisten

Table 11:- Consistency Test Results
Source: Primary Data Results (2019)

Priority supplier results obtained based on supplier assessment at PT SMM using the Analytic Hierarchy Process (AHP) method as a whole (global priority) are suppliers of Anugrah Cooperatives, PT Agro Inti Abadi, CV Tata Subur Makmur, PT Rawi Agro Mandiri, PT Tri Selaras Agri, KUD Bakti Cooperative.

No	Prioritas Global	Bobot Global
1	Koperasi Anugrah	8.854
2	PT Agro Inti Abadi	7.976
3	CV Tata Subur Makmur	7.834
4	PT Rawi Agro Mandiri	7.290
5	PT Tri Selaras Agri	7.149
6	Koperasi KUD Bakti	7.033

Table 12:- Selected Supplier
Source: Primary Data Results (2019)

No	Prioritas Global	Bobot Global
1	Koperasi Sawit Sepakat Maju	6.967
2	PT. Sawit Alam Permai	6.851
3	PT. Henco Billitone Agroindo	6.710
4	CV. Subur Mandiri	6.166
5	PT. Hasil Sawit Bina Sejahtera	6.024
6	Koperasi Bumi Makmur	5.146

Table 13:- Not Selected Supplier
Source: Primary Data Results (2019)

In the achievement and results of the Anugrah Cooperative Supplier into the first global priority sequence with global weight gain of 8.854 out of the total weight of 10.00, the second priority supplier was achieved by the next alternative, namely PT Agro Inti Abadi supplier with global weight gain of 7,976 of the total weight of 10.00, the third priority supplier is achieved by the next alternative, namely the supplier of CV Tata Subur Makmur with global weight gain of 7.834 out of the total weight of 10.00, the fourth priority supplier is achieved by the next alternative, namely the supplier PT Rawi Agro Mandiri with the acquisition achieved global weight of 7.290 out of total weight of 10.00, the fifth priority supplier was achieved by the next alternative namely supplier PT Tri Selaras Agri with global weight gain of 7.149 out of total weight of 10.00, the fifth priority supplier was achieved by the next alternative namely supplier KUD Bakti Cooperative with perol ehan global weight achieved at 7.033 out of a total weight of 10.00. Therefore, the Analytic Hierarchy Process (AHP) analysis above shows that there are 6 suppliers out of 12 existing suppliers that are eligible for Anugrah Cooperative, PT Agro Inti Abadi, CV Tata Subur Makmur, PT Rawi Agro Mandiri, PT Tri Selaras Agri, Cooperatives KUD Bakti.

V. CONCLUSION

Based on the results of data processing and assessment analysis conducted on the selection of suppliers of TBS Outside PT SMM by using the Analytic Hierarchy Process (AHP) method, two conclusions can be drawn from the results of the research, each of which is the answer to the problem formulation in this study, namely as follows that the quality criteria are the most important priority that is considered by the company with the achievement of priority weight of 0.276 out of the total weight of 1,000 which is then followed by management and organization criteria, shipping, flexible and price with each priority weight respectively reaching 0.227; 0.173; 0.165 and 0.160, the results of testing the level of consistency based on the results of respondents' answers to the assessment of all criteria, sub-criteria and alternatives in PT SMM by using the Analytic Hierarchy Process (AHP) method is overall declared valid and consistent. This result can be seen from the achievement of the value of the Consistency Ratio (CR) on each calculation both at

the criteria, sub-criteria and alternative levels which are still within the tolerance threshold that is below 10% or 0.1. Achievement of the value of the Consistency Ratio (CR) which reaches below 10% or 0.1 becomes a reference that the overall answers given by respondents in the questionnaire (questionnaire) distributed can be accepted and declared consistent and feasible to proceed into the calculation process Analytic methods Hierarchy Process (AHP). Therefore, the results of the Analytic Hierarchy Process (AHP) analysis showed that there were 6 suppliers out of 12 suppliers who met the requirements with the highest global weighting, Anugrah Cooperative, PT Agro Inti Abadi, CV Tata Subur Makmur, PT Rawi Agro Mandiri, PT Tri Selaras Agri, KUD Bakti Cooperative.

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