



+62 813 8765 4578

081387654578

<https://dinastipub.org/DIJEMSS>

editor@dinastipub.org

**ANALYSIS OF SUPPLIER SELECTION OF CORN STARCH RAW MATERIAL FOR CREAMER PRODUCTION ON KOPIKO AND TORABIKA ITEMS USING THE ANALYTICAL HIERARCHY PROCESS (AHP) METHOD
(Case Study Of PT. Mayora Indah Tbk)**

Maksi Prima Dewi, Hasmand Zusi

¹⁾ Mercu Buana University, Jakarta, Indonesia

²⁾ Mercu Buana University, Jakarta, Indonesia

ARTICLE INFORMATION

Received: 10 December 2019

Revised: 14 December 2019

Issued: 20 December 2019

Corresponding author: first author

E-mail: maxi_zones@yahoo.co.id,
hasmandgindo@yahoo.com



DOI:10.31933/DIJMESS

Abstract: This thesis is compiled to analyze supplier selection in Mayora Group, which is a Fast Moving Consumer Goods (FMCG) company, with the object of research using Corn Starch as raw material for making glucose creamer on Kopiko and Torabika items. Based on the criteria that have previously been used by the company, the researcher develops the criteria, sub-criteria for supplier selection and supplier classification as well as consistency test from respondents' answers based on the level of experience and competence of the 4 departments related to the procurement process of raw material imports so that priority suppliers are selected from the current existing suppliers. The determination of supplier selection criteria is calculated based on the weight of the criteria. This criterion weighting is applied through the Analytical Hierarchy Process method. Based on the results of the study, 7 criteria are obtained for the supplier selection, in order of the highest to the lowest priority: Quality, Price, Document Completeness, Delivery, Service, Company Condition, and Geographical location. The value of consistency ratio (CR) in the pairwise comparison matrix of the criteria, sub-criteria, and alternatives of the results of the respondent's questionnaire answers is within the tolerance limit, so that it is included in the valid and consistent category.

Keywords: Fast Moving Consumer Goods (FMCG) Company, Analytical Hierarchy Process, Supplier, Corn Starch

INTRODUCTION

The issue of leadership in aspects of human life is something that is very important, especially if it is associated with the necessity of interacting with an ever-changing and evolving environment, partly because of the rapid advances that occur in the fields of science and technology.

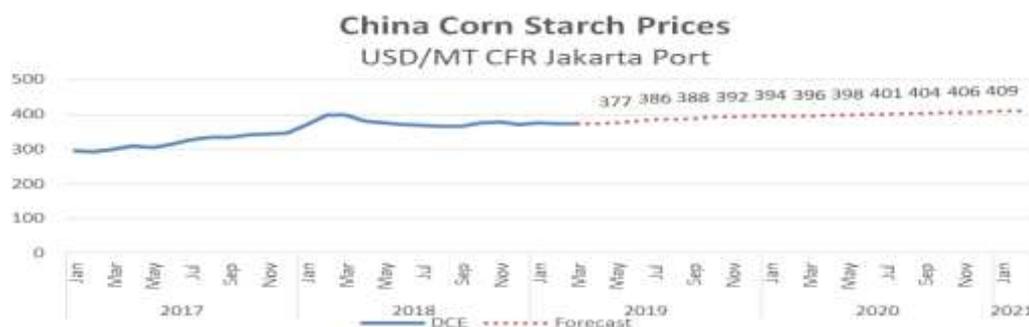
Choosing a supplier is a strategic activity, especially if the supplier will supply critical items or will be chosen in the long term as an important supplier. Suppliers play an important role in the availability of raw materials for the production activities of a company. The right supplier selection for the corn starch products is not only profitable for the company in terms of cost but can also increase yields for the produced glucose syrup products. Companies that are able to meet customer demands, develop products on time, incur low costs in the field of inventory and product delivery, and manage the industry carefully and flexibly are companies that have high competitiveness and can dominate the market. (Putra 2015). Corn starch is the main raw material for making glucose creamer (DE 21-26) then glucose will be spray sprayed into creamer powder. A well-produced creamer can create good taste and can build brand equity to drive sales. In the last three years Torabika has been able to increase market share compared to previous competitors.

Table 1.
Demand of Corn Starch 2016-2018

Year	Demand (Kg)
2016	95.191.050
2017	119.923.352
2018	137.784.927

With the increasing need for corn starch, companies must find alternative suppliers that can supply, but from their tendency, corn starch future prices continue to increase.

Figure 1.
Future Corn Starch Price



Source : Dalian Comodity Exchange (DCE)

Every company has its own procedures for assessing and selecting suppliers. Supplier selection is the most important operating strategy in every company. The highest priority is set on the quality of the input because this is a condition that is needed for companies to produce high quality products. The dominant factor carried out by purchasing department in the process of purchasing raw materials is the bid price / contract price of each supplier. This decision making can affect the use of raw materials during the production process, related to

the quality of glucose and creamer yields and additional costs that can affect the cost of production. It is because the low purchase price not always has good quality raw materials and good supplier service. Therefore, quality criteria are considered by the purchasing department to ensure that the goods purchased meet the quality standards set by the QC (Quality Control) and RnD (Research and Development) departments. Delivery is also a criterion for supplier assessment at Mayora Group, in which the delivery of goods must be in accordance with the delivery date specified on the PO (Purchase Order). The Performance History Criterion will be the next criterion after the supplier has been selected to be the existing supplier at the Mayora Group, by considering the supplier's performance on after sales both in terms of quality and complaints.

LITERATURE REVIEW

1. Supply Chain Management

Supply chain management is the integration and coordination of all supply chain activities oriented to internal aspects as well as external aspects including suppliers, distributor companies, wholesalers, and/or retailers to maximize competitive advantage in terms of delivering products and/or services to end consumers. The goal of supply chain management according to Heizer and Render (2014: 468) is to coordinate activities in the supply chain to maximize competitive advantage and supply chains for end consumers.

2. Procurement Management

Procurement management is one of the main components of supply chain management. The task of procurement management is to provide input in the form of goods and services needed in production activities and other activities. (Pujawan and Mahendra, 2017: 176).

3. Supplier Selection Criteria

In general, companies determine basic criteria such as the quality of goods offered, price, and delivery time punctuality. However, supplier selection often requires other criteria that are considered important by the company in accordance with its supply chain strategy. Dickson (1966) first conducted an extensive study to identify, determine, and analyze what criteria were used in selecting supplier in a company. More than 23 criteria were considered in his study,

Table 2.
Supplier Criteria Selection Dickson

No.	Factor	Notes
1	Quality	Quality of Goods
2	Delivery	Delivery of Goods
3	Performance History	Performance History
4	Warranties and Claim Policies	Warranty & Complaint Service
5	Production facilities and capacities	Production Capacity & Facility
6	Price	Price of goods
7	Technical Capabilities	Technical Capabilities
8	Financial Position	Company's Financial Position
9	Procedural Compliance	Complaints Procedure
10	Communication System	Communication System
11	Reputation & Position	Company's Position & Reputation

12	Desire for business	The Business Spirit
13	Management & Organization	Company’s Management & Organization
14	Operating Control	Control in Operation
15	Repair Service	Service Improvement
16	Attitude	Attitude
17	Impression	Impression
18	Packaging Ability	Packaging Ability
19	Labor Relation Record	Relationship with Employees
20	Geographical Location	Geographical Location
21	Amount of past business	Amount of Previous Business
22	Training Aids	Training Assistance
23	Reciprocal Arrangements	Reciprocal Relationship

4. Supplier Classification

According to Pujawan and Mahendrawati (2017: 200), there are two factors used in designing relationships with suppliers:

- a. The level of importance of strategic items purchased for the company/supply chain
- b. The level of difficulty in managing the purchase of the items.

By using these two factors, four supplier classifications are obtained as shown in Figure 1 below:

Figure 2.
Commodity Portofolio Matrix

Level of difficulty	High	Bottleneck Suppliers		Critical Strategic Suppliers	
		-	Difficult to find substitution	-	Important / strategic
		-	Monopoly Market	-	Difficult to find substitution
		-	New suppliers are difficult to enter		
	Low	Non-critical Suppliers		Leverage Suppliers	
		-	The availability is enough	-	The availability is enough
		-	The items are quite standard	-	Substitution is possible
		-	Substitution is possible	-	Standard Specifications
	-	The value is relatively low	-	The value is relatively low	
	Low		High		
	Level of Importance				

5. Analytical Hierarchy Process

Analytical Hierarchy Process is a technique in organizing and analyzing complex problems, especially those related to the decision making process. The Analytical Hierarchy Process method was first explained by Dr. Thomas L. Saaty from the Wharton School of Business in 1970.

Analytical Hierarchy Process is a method used in the decision making process of complex problems such as problems, such as: planning, determining alternatives,

prioritizing, choosing policies, allocating resources, determining needs, predicting needs, planning for performance, optimizing and solving conflicts.

There are several benefits obtained by using AHP in solving a complex problem (Wirianto and Unbersa, 2008: 08), including: Unity, Complexity, Interdependence, Arrangement of the hierarchy, Measurement, Consistency, Synthesis, Bargaining, Assessment and Consensus, and Repetition of processes.

In the AHP method, the steps are as follows:

- a. Defining the problem and determining the desired solution
- b. Creating a hierarchical structure that is started with the main goal
- c. Making a pairwise comparison matrix that illustrates the relative contribution or influence of each element to the goals or criteria on the above level
- d. The matrix approach reflects a dual aspect of priorities that is dominating and being dominated
- e. Defining pairwise comparisons so that the total assessment is obtained using the following calculation formula:

$$n \times \left(\frac{(n-1)}{2} \right) \quad (1)$$

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 level of importance of an element. If an element in the matrix is compared with itself, the comparison results are given a value of 1.

- f. Calculating eigenvalues and testing their consistency. If they are not consistent, then data collection is repeated.
- g. Repeating the calculation process for all levels of the hierarchy.
- h. Calculating the eigenvectors of each pairwise comparison matrix which is the weight of each element for determining the priority of 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:

$$GM = \sqrt[n]{(X1)(X2) \dots \dots (Xn)} \quad (2)$$

Where:

- GM : Geometric Mean
 X1 : 1st person assessment
 Xn : n person assessment
 n : Number of Assessors

Next, the calculation is done by summing 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 summing the value of each row and dividing it by the number of elements to obtain the mean. The calculation formula is as follows:

$$Consistency\ Index\ (CI) = \frac{(Eigen\ Factor - n)}{(n-1)} \quad (3)$$

$$Consistency\ Ratio\ (CR) = \frac{(CI)}{(RI)} \quad (4)$$

- i. Checking the consistency of the hierarchy. What is measured in AHP is the consistency ratio by looking at the consistency index. The expected consistency is the one which is close to perfect to produce a decision that is close to valid. Although it is difficult to achieve perfect results, a consistency ratio is expected to be less than or equal to 10%. If

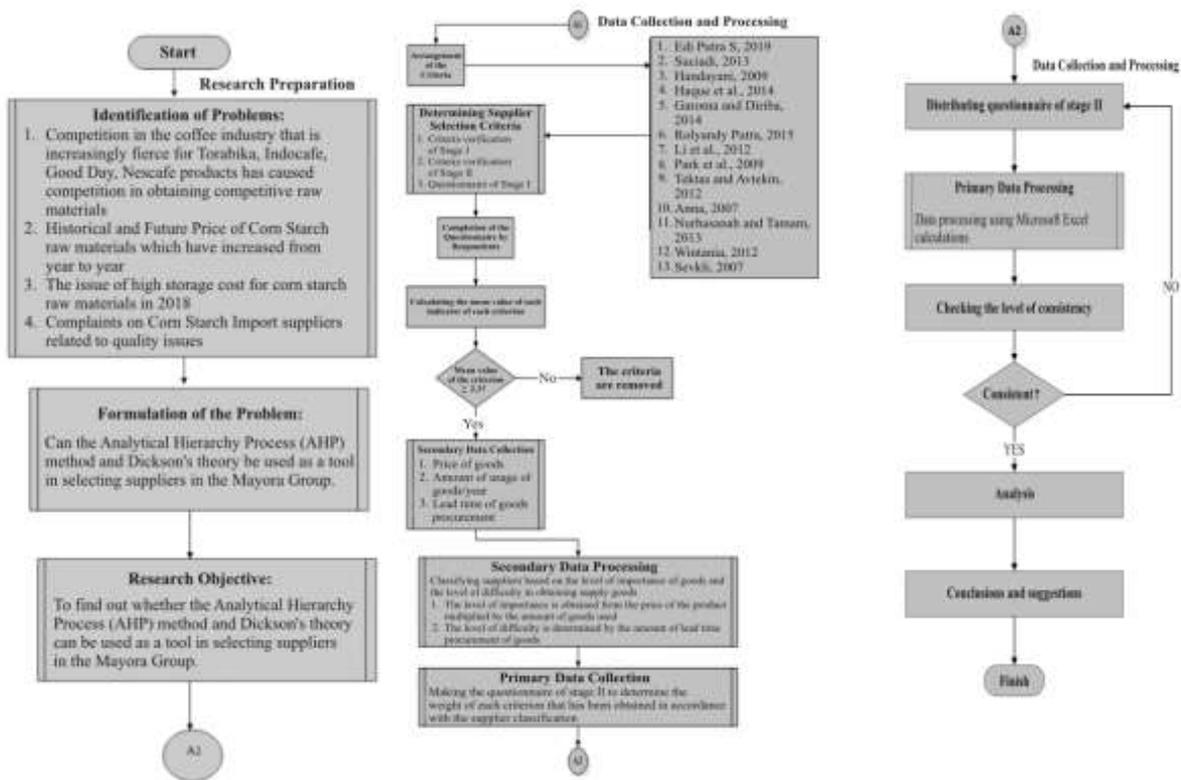
the consistency ratio is less than or equal to 10%, the results of the study can be categorized as consistent. However, if it is greater than 10%, the results of the study are categorized as inconsistent and the assessment process needs to be repeated.

- j. Conducting an iteration calculation (matrix multiplication). This is done after the consistency test stage is carried out to determine the priority order of each subject being compared.

RESEARCH METHODS

The steps in the research are divided into three stages. The first stage is the stage of determining the research topic, the second stage is the stage of data collection and processing, the last stage is the stage of analysis and conclusion. The steps above are described in Figure 3. The method of solving the problem is as follows:

Figure 3.
Research Method Framework



FINDINGS AND DISCUSSION

1. To Determine The Criteria For Supplier Selection

To determine the criteria for supplier selection, the researcher has previously conducted initial verification with respondents who are experts in their respective fields with 12 respondents who are assumed to have competence in assessment to represent their respective fields, including:

- a. Purchasing Manager of Raw Material Purchasing
- b. Purchasing Supervisor of Raw Material Purchasing
- c. Manager of Quality Control (QC)
- d. Supervisor of Quality Control (QC)
- e. Manager of Production Planning Inventory Control (PPIC)

- f. Supervisor of Production Planning Inventory Control (PPIC)
- g. Manager of Import and Logistic
- h. Supervisor of Import and Logistic

Based on the results of the 12 respondents questionnaire, the criteria that have a mean value < 3 are the criteria that are inappropriate to use, while the criteria that have a mean value ≥ 3 are the appropriate criteria to use.

Table 3.
Supplier Criteria Based on Research Respondents

No.	Variable	Mean value
A. PRICE		
	Sub Criteria:	
A1	Competitive Price	4.58
A2	Negotiation	4.67
A3	Payment Method	4.67
A4	Price Details	4.17
B. DELIVERY		
	Sub Criteria:	
B1	Delivery Time Punctuality	4.75
B2	Prevention of Damage	4.75
B3	Order Conformity	4.67
B4	Accuracy in Amount of Goods	4.58
C. COMPANY CONDITION		
	Sub Criteria:	
C1	Experience and Background	4.17
C2	Having certification	4.50
C3	Financial ability	4.08
D. DOCUMENT COMPLETENESS		
	Sub Criteria:	
D1	Submitting all required documents on time to be a supplier	4.33
D2	Completing the documents in accordance with Mayora Group requirements as stated in the Purchase Agreement	4.83
D3	Agreeing the General Conditions to be a Supplier of Mayora Group	4.67
D4	Completing the results of external analysis in accordance with SNI and Mayora's requirements	4.58
E. QUALITY		
	Sub Criteria:	
E1	The quality of goods is good and in accordance with company specification	4.92
E2	Good packaging	4.58
E3	Providing a guarantee	4.58
E4	Container used is in good condition and food grade	4.42
F. SERVICE		
	Sub Criteria:	
F1	Speed of response to Outstanding PO	4.25

F2	Speed of response to complaints	4.58
F3	Speed of submitting sample approval	4.42
F4	Providing the requested data	4.42
G. GEOGRAPHICAL LOCATION		
	Sub Criteria:	
G1	Distance	4.00
G2	Delivery Time Range	4.42
G3	Transportation Cost	3.9

2. Supplier Classification

Based on the results of the questionnaire, Mayora Group categorized suppliers into two, consisting of:

Figure 4.
Supplier Classification Mayora Group

Critical Strategic Suppliers	Leverage Suppliers
Corn Starch	ATK
	Activated Carbon
Enzyme	Filter Aid
	Caustic Soda Liquid

3. Determining the Weight of the Criteria of Supplier Selection

The criteria weighting of sub-criteria and alternatives uses the Analytical Hierarchy Process (AHP) method with data processing using Microsoft Excel 2007.

a. Arranging the Hierarchy

This hierarchical structure is formed to make it easier for decision makers to see problems in a more structured way so that they fit their objectives. This hierarchy can be seen in Figure 5.



Figure 5. Hierarchy Criteria Supplier Selection

b. Making the Pairwise Comparison Matrix

After all variables consisting of objectives, criteria, sub-criteria and alternatives have been arranged sequentially into an appropriate hierarchy, the next step is to make a pairwise comparison matrix inter-criteria, inter-sub-criteria and inter-alternatives. Each pairwise comparison matrix made describes the relative contribution of the influence of each element to other elements at one level above it. In this study, the pairwise

comparison matrix inter-criteria, sub-criteria and alternatives is illustrated in the following set of tables:

Table 4.
Comparison Matrix Inter-Criteria

CRITERIA	PRICE	DELIVERY	COMPANY CONDITION	DOCUMENT COMPLETENESS	QUALITY	SERVICE	GEOGRAPHICAL LOCATION
PRICE	1						
DELIVERY		1					
COMPANY CONDITION			1				
DOCUMENT COMPLETENESS				1			
QUALITY					1		
SERVICE						1	
GEOGRAPHICAL LOCATION							1

Table 5.
Comparison Matrix Inter-Sub-Criteria (Price)

SUB-CRITERIA	A1	A2	A3	A4
A1	1			
A2		1		
A3			1	
A4				1

Notes:

- A1 : Competitive Price
- A2 : Negotiation
- A3 : Payment Method
- A4 : Price Details

c. Making the Pairwise Comparison of Criteria and Sub-Criteria of Supplier Selection

The questionnaire is presented in a table containing the criteria used to assess suppliers. These criteria are in the left column of the table and the comparison criteria are in the right column of the table. The weights are filled on the left if the criterion has a higher level of importance than the right criterion. Conversely, the weights are filled on the right if the criterion has a higher level of importance than the left criterion.

d. Determining the Priority

Arrangement of priority is done for each element of the problem at the hierarchical level. This process will produce criteria weights or contribution to achieve goals. Priority is determined by the criteria that have the highest weight. The weights of each criterion and sub-criterion is determined by inputting the paired assessment results from the questionnaire into the existing questionnaire table using Microsoft Excel.

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. The 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 calculation can be said to be representative of the results of the respondents' overall answers to an option.

After the results of the Geometric Mean are obtained for all respondents' answers, the next step is to calculate the priority vector and eigen factor and then proceed with the consistency test. The priority vector is obtained by dividing according to the number of criteria, sub-criteria, or alternatives being calculated. The eigen factor is the result of the sum total of the results of the multiplication of 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) of the results of the previous eigen factor calculation. After the consistency index (CI) is obtained, it is continued with the calculation of the consistency ratio (CR). Consistency ratio is a parameter used to check whether the pairwise comparisons in the questionnaire have been done consistently or not. The results are categorized as consistent if they have a consistency ratio of smaller than 0.1. If the consistency ratio value is greater than 0.1, the questionnaire must be revised. The revision is carried out until the consistency level is less than 0.1. After the revision, the weight of each criterion is presented numerically and graphically.

Table 6.

The Results of Calculation of Pairwise Comparison Matrix for the Criteria

CRITERIA	PRICE	DELIVERY	CONDITION OF THE COMPANY	COMPLETENESS OF DOCUMENTS	QUALITY	SERVICE	GEOGRAPHICAL LOCATION	PRIORITY
PRICE	1	3.56	4.34	2.17	0.58	3.87	6.61	0.275
DELIVERY	0.28	1	3.11	0.72	0.46	1.65	3.69	0.125
CONDITION OF THE COMPANY	0.23	0.29	1	0.37	0.22	0.46	1.82	0.053
COMPLETENESS OF DOCUMENTS	0.46	1.39	2.54	1	0.43	1.25	3.76	0.133
QUALITY	1.57	1.97	4.40	2.22	1	4.10	5.67	0.289
SERVICE	0.26	0.61	2.16	0.80	0.17	1	2.98	0.087
GEOGRAPHICAL LOCATION	0.15	0.27	0.55	0.27	0.18	0.34	1	0.037
TOTAL	3.95	9.09	19.09	7.54	3.04	12.67	25.54	1
EIGEN								7.11
CI								0.019
RI								1.320
CR								0.0141
STATUS								CONSISTENT

Based on the table above, then:

- 1) The result of 3.56 in the pairwise matrix for the criteria of price on delivery is obtained from the geometric mean which is the mean of all respondents' answers for the comparison. In this case, the value of 3.56 is obtained from the calculation stage as

$$\sqrt[12]{(3)(5)(5)(3)(3)(3)(5)(3)(3)(5)(3)(3)} = 3.56.$$

- 2) The result of 0.275 in Priority Vector is obtained from the calculation of the division of the value of the pairwise matrix with the total of the pairwise matrix for one element comparison. In this case, the value of 0.275 is obtained from the following calculation:

$$\frac{\left(\frac{1}{3,95}\right)\left(\frac{3,56}{9,09}\right)\left(\frac{4,34}{18,09}\right)\left(\frac{2,17}{7,54}\right)\left(\frac{0,58}{3,04}\right)\left(\frac{3,87}{12,67}\right)\left(\frac{6,61}{25,54}\right)}{7} = 0.275$$

- 3) The result of 7.11 on the eigen factor is obtained from the sum of the multiplications for each priority vector value with the total that exists on each element. In this case, the value of 7.08 is more clearly obtained from the calculation results as follows:

$$(3,95 * 0,275) + (9,09 * 0,125) + (18,09 * 0,053) + (7,54 * 0,133) + (3,04 * 0,289) + (12,67 * 0,087) + (25,68 * 0,037) = 7.11$$

- 4) The result of 0.019 in the consistency index is obtained by using the calculation formula (2.3) that has been described in the previous section by using the following formula:

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

$$= (7.11-7) / (7-1)$$

$$= 0.019$$

- 5) The result of 0.014 on the consistency ratio is obtained by using the calculation formula (2.4) that has been described in the previous section by using the following formula:

$$\text{Consistency Ratio (CR)} = \text{CI} / \text{RI}$$

$$= 0.019 / 1.320$$

$$= 0.014$$

Where the RI value which is the index ratio value adjusts to the number of criteria in this study. The following below is a table of RI values for each number of criteria:

Table 7.
Table of Ratio Index Value

<i>n</i>	1	2	3	4	5	6	7	8	9	10
<i>RI</i>	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

- 6) 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.

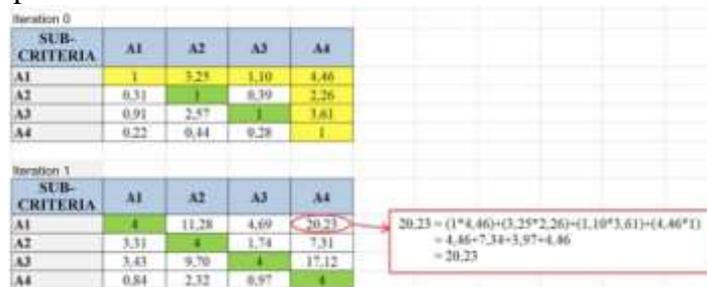


Figure 6. Iteration Calculation Pattern

Based on Figure-6, it can be seen that the iteration calculation pattern can bring up a new matrix with new weight values for each subject. The iteration calculation is continued to be done until the first matrix with the matrix after the next iteration does not experience the change in the priority vector value

4. Priority Weighting and Consistency Test at the Sub-Criteria Level

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

Table 8.
The Results of Priority Weighting and Consistency Test (Price)

SUB-CRITERIA	A1	A2	A3	A4	PRIORITY VECTOR	N	PRIORITY VECTOR
A1	1	3.25	1.10	4.46	1.65	4	0.412
A2	0.31	1	0.39	2.26	0.60	4	0.151
A3	0.91	2.57	1	3.61	1.41	4	0.352
A4	0.22	0.44	0.28	1	0.34	4	0.085
TOTAL	2.44	7.26	2.76	11.34	4.00	16.00	1.000
Eigen Factor							4.04
Consistency Index (CI)							0.01
Index Ratio (IR)							0.9
Consistency Ratio (CR)							0.02
STATUS							CONSISTENT

From Table-8 above, for priority weighting of the price sub-criterion, it is obtained the results of A1 sub-criterion which has the highest priority weight, which is 0.412. After being tested for its consistency, the results of priority weighting of the price sub-criterion are stated to be consistent.

5. Priority Weighting and Consistency Tests at the Alternatives Level

At this stage, we compare the alternative or supplier for each sub criteria

Table 10.

The Result of Priority Weighting and Consistency Test Supplier JB and PB (Sub Criteria A1)

Alternatif	JC	PB	PRIORITY VECTOR
JC	1	1,04	0,51
PB	0,96	1	0,49
Total	1,96	2,04	1,00
Eigen Factor			2,00
Consistency Index (CI)			0,00
Consistency Ratio (CR)			0,00
Ratio Index (RI)			0,00
STATUS			KONSISTEN

6. Determination of Global Priorities

At this stage, the overall results of each weight obtained by each alternative are summed up so that the results of the sum are the overall (global) priority weight values for each alternative.

Goal	Criteria	Weight	Priority	Sub-Criteria	Weight	Priority	Alternative	Weight	Priority
Priority Suppliers for Imported Cars Brands	A	0.275	II	A1	0.412	I	JC	0.52	I
							PB	0.48	II
							BOOZ	0.32	I
							QS	0.44	II
							GA	0.59	I
							ES	0.41	II
							CBC	0.60	I
							CN	0.40	II
				A2	0.151	III	JC	0.49	II
							PB	0.51	I
							BOOZ	0.49	II
							QS	0.31	I
							GA	0.62	I
							ES	0.38	II
							CBC	0.69	I
							CN	0.35	II
A3	0.352	II	JC	0.60	I				
			PB	0.40	II				
			BOOZ	0.44	II				
			QS	0.52	I				
			GA	0.41	II				
			ES	0.57	I				
			CBC	0.54	I				
			CN	0.30	II				
A4	0.085	IV	JC	0.53	I				
			PB	0.47	II				
			BOOZ	0.31	I				
			QS	0.49	II				
			GA	0.54	I				
			ES	0.44	II				
			CBC	0.38	I				
			CN	0.44	II				
Priority Suppliers for Imported Cars Brands	B	0.125	IV	B1	0.398	I	JC	0.52	I
							PB	0.48	II
							BOOZ	0.36	I
							QS	0.44	II
				B2	0.184	IV	GA	0.51	I
							ES	0.40	II
							CBC	0.62	I
							CN	0.38	II
				B3	0.209	III	JC	0.41	II
							PB	0.50	I
							BOOZ	0.41	III
							QS	0.39	I
				B4	0.218	II	GA	0.59	I
							ES	0.41	II
							CBC	0.60	I
							CN	0.31	II
B5	0.209	III	JC	0.52	I				
			PB	0.48	II				
			BOOZ	0.45	II				
			QS	0.55	I				
			GA	0.52	I				
			ES	0.40	II				
			CBC	0.60	I				
			CN	0.40	II				
B6	0.218	II	JC	0.53	I				
			PB	0.47	II				
			BOOZ	0.49	II				
			QS	0.55	I				
			GA	0.54	I				
			ES	0.45	II				
			CBC	0.57	I				
			CN	0.45	II				



Figure 6. Weighting Global Priority

7. Discussion

Based on the overall results of the analysis explained in section 4.3 (Results of the Study), using the Analytic Hierarchy Process (AHP) method, it can be seen that from the seven criteria used by Mayora Group in selecting suppliers, the **Quality** criterion occupies the highest priority position with a weight gain of **0.289**. The next criterion is the **Price** with a weight gain of 0.275 and followed by the **Document Completeness** with a weight gain of 0.133, then followed by the Delivery with a weight gain of 0.125, then the **Service** with a weight gain of 0.087, then the **Company Condition** with a weight gain of 0.053 and **Geographical Location** with a weight gain of 0.036. This result can be a reference that quality is the most important indicator for Mayora Group in the supplier selection. This is because the research objects taken and categorized into Critical Strategic suppliers are corn starch raw materials in a very large number of needs, so competitive prices are needed in order to reduce the cost of production and quality requirements that must be met related to the yield produced. Therefore, suppliers registered to become Mayora Group suppliers must be able to provide quality that can meet the standards of specification. For the each sub criteria, we can see weighting at Table-11.

No	Criteria	Subcriteria	Wieht
1	Quality	Good quality of goods and according to Mayora's specification	0,510
2	Price	Competitive Price	0,412
3	Document completeness	Completing the documents in accordance with Mayora Group requirements as stated in the Purchase Agreement	0,395
4	Delivery	Delivery time punctuality	0,390
5	Company condition	Experience and Background	0,360
6	Service	Providing the requested data	0,340
7	Geographical location	Delivery Time range	0,460

Table 11.
Consistency Test Results

Pairwise Matrix	CR	Notes
Inter-Criteria	0.010	Consistent
Inter-Sub-criteria (Price)	0.020	Consistent
Inter-Sub-criteria (Delivery)	0.004	Consistent
Inter-Sub-criteria (Company Condition)	0.007	Consistent
Inter-Sub-criteria (Document Completeness)	0.001	Consistent
Inter-Sub-criteria (Quality)	0.002	Consistent
Inter-Sub-criteria (Service)	0.010	Consistent
Inter-Sub-criteria (Geographical Location)	0.001	Consistent
Inter-Alternatives (A1)	0.000	Consistent
Inter-Alternatives (A2)	0.000	Consistent
Inter-Alternatives (A3)	0.000	Consistent
Inter-Alternatives (A4)	0.000	Consistent
Inter-Alternatives (B1)	0.000	Consistent
Inter-Alternatives (B2)	0.000	Consistent

Inter-Alternatives (B3)	0.000	Consistent
Inter-Alternatives (B4)	0.000	Consistent
Inter-Alternatives (C1)	0.000	Consistent
Inter-Alternatives (C2)	0.000	Consistent
Inter-Alternatives (C3)	0.000	Consistent
Inter-Alternatives (D1)	0.000	Consistent
Inter-Alternatives (D2)	0.000	Consistent
Inter-Alternatives (D3)	0.000	Consistent
Inter-Alternatives (D4)	0.000	Consistent
Inter-Alternatives (E1)	0.000	Consistent
Inter-Alternatives (E2)	0.000	Consistent
Inter-Alternatives (E3)	0.000	Consistent
Inter-Alternatives (E4)	0.000	Consistent
Inter-Alternatives (F1)	0.000	Consistent
Inter-Alternatives (F2)	0.000	Consistent
Inter-Alternatives (F3)	0.000	Consistent
Inter-Alternatives (F4)	0.000	Consistent
Inter-Alternatives (G1)	0.000	Consistent
Inter-Alternatives (G2)	0.000	Consistent
Inter-Alternatives (G3)	0.000	Consistent

CONCLUSION AND SUGESTION

Conclusions

Based on the overall results of data processing and assessment analysis conducted on the supplier selection of Corn Starch raw materials in the Mayora Group using the Analytic Hierarchy Process (AHP) method, the main point or conclusions can be drawn on the results of study that are the answer to the problem formulation in this study. The AHP method can be used and help companies, especially the purchasing department, in determining supplier selection according to the criteria formulated by the company. Thus, the AHP method will facilitate and simplify decision making by companies by considering the results of this study. In order to get the right purchasing decision for existing supplier or to evaluate supplier AHP method is right to use.

Suggestions

Suggestions from this research as follows :

1. The results of this study getting quality criteria is a top priority for supplier selection. For this reason, the purchasing department must place quality priority as the most important in selecting suppliers, especially for research objects, namely corn starch, whose needs are very large compared to other raw materials, and also quality is very influential on the yield and output of glucose produced
2. With the determination of quality as the main weight in the selection of suppliers, the existing supplier can be re-evaluated by weighting the quality of the main priorities as a recommendation from this study.
3. This research can be used as a reference for further purchases by the company. Based on the weighting of supplier selection criteria using Microsoft Excel calculation, it is known that the highest criterion indicator in the selection of suppliers classified as

critical strategic suppliers is a quality criterion with weights with sub-criteria indicators:

1. The quality of goods is good and in accordance with company specifications
2. Container used in good condition and food grade
3. Provide a guarantee / guarantee
4. Good packaging of goods

REFERENCE

- Dickson, G.W. (1966). *An Analysis of Vendor Selection System and Decision*. *Journal of Purchasing*. Vol:2, Issue:1.
- Heizer, Jay. Render, Barry. (2014). *Operations Management Sustainability and Supply Chain Management*, 7th Edition. Pearson Education. England.
- Marimin, (2004). "Teknik Pengambilan Keputusan Kriteria Majemuk", Jakarta, PT Grassindo.
- Nurhasanah, Nunung. Tamam, M. Aqil. (2013). "Analisis Pemilihan Supplier Untuk Pemesanan Bahan Baku Yang Optimal Menggunakan Metode Fuzzy AHP".
- Pujawan, I Nyoman. Mahendrawati, ER. (2017). *Supply Chain Management* , Edisi ketiga. ANDI.Yogyakarta.
- Putra, Edi. Sutawijaya, Hidayat Ahmad. (2019). "Analysis of Supplier Selection Criteria of Corrugated Box Packaging for Item Teh Pucuk Harum with Analytical Hierarchy Process (AHP) Method. Vol.04. pp:35-50.
- Rolyandy Putra (2015). "Analisis Pemilihan Supplier untuk menciptakan *Supply Chain Management* Yang Baik (Studi Kasus : PT Scorpa Pranedy)" . Tesis. Program Master Manajemen. Program Pasca Sarjana. Universitas Mercu Buana. Jakarta.
- Saaty & Vargas (1994)."Decision Making With The Analytic Hierarchy Process".RWS Publications
- Suciadi, Yusiana. (2013). "Pemilihan dan Evaluasi Pemasok Pada PT. New Hope Jawa Timur dengan menggunakan metode Fuzzy Analytic Hierarchy Process". *Jurnal Ilmiah, Universitas Surabaya*. Vol.2, No.1. pp:1-17
- Wirdianto, Eri. Unbersa, Elpira. (2008). "Aplikasi Metode Analytical Hierarchy Process". *Jurnal Teknik Industri, Universitas Andalas*. Vol. 2, No. 29. pp:6-13.