



## Decision Analysis to Improve Company's Time Utilization during Clove Harvest-Interval Using Analytical Hierarchy Process and Situation Appraisal

Kevin Kegan<sup>1</sup>, Pri Hermawan<sup>2</sup>

<sup>1,2</sup> School of Business Management, Institut Teknologi Bandung

**ABSTRACT:** Indonesia is a country that has very diverse natural resources, one of which is spices. Various kinds of spices such as cloves, nutmeg, ginger, turmeric, candlenut, pepper, cinnamon, and vanilla are what make Indonesian spices known worldwide and contribute to the country's economy. Clove is a typical Indonesian spice originating from the Maluku islands (Ternate and Tidore). Currently, cloves have been cultivated in various regions in Indonesia, namely Java, Central Kalimantan, East Kalimantan, Sulawesi, and others. Clove season in Indonesia occurs once or twice a year, namely from April to May and October to November. The farmers will harvest ripe clove flowers, then the clove flowers are dried in the sun and processed as raw materials for the production of cigarettes, cosmetics, and others. CV. Rempah Jaya is one of the leading and best clove suppliers in Indonesia. Especially variations of cloves such as whole cloves, clove oil, dried clove leaves, dried clove stems, and clove ash. Usually, the supply of cloves to the cigarette factory is held every few months in large quantities, so a lot of spare time is available before sending it to the factory. Therefore CV. Rempah Jaya needs the right work to be done when there is a time vacuum. The purpose of this study is to increase the time utilization of CV companies. Rempah Jaya during the clove harvest interval. In this study, a situation analysis was carried out using the Kepner-Tregoe method, then external and internal analysis was carried out using Mendelow's Matrix and SWOT Analysis methods. After that, root cause analysis was carried out using Ishikawa Diagram. Then the decision-making process is carried out using the Analytical Hierarchy Process (AHP) method. From the results of the AHP method, alternative values were obtained for the three available criteria, namely oil distillation, spice mixtures, and collaboration with the food and beverage industry with values of 0.64, 0.19, and 0.17.

**KEYWORDS:** AHP, Cloves, Kepner-Tregoe, Utilization Time.

### INTRODUCTION

Indonesia is a country that has very diverse natural resources, one of which is spices. Various kinds of spices such as cloves, nutmeg, ginger, turmeric, candlenut, pepper, cinnamon, and vanilla are what make Indonesian spices known worldwide and contribute to the country's economy. Clove is a typical Indonesian spice originating from the Maluku islands (Ternate and Tidore). Cloves have also been a very popular and expensive spice in Europe, the price is almost the same as a bar of gold at the time of the Portuguese to the Maluku islands. Currently, cloves have been cultivated in various regions in Indonesia, namely Java, Central Kalimantan, East Kalimantan, Sulawesi, and others. Clove season in Indonesia occurs once or twice a year, namely from April to May and October to November. The farmers will harvest ripe clove flowers, then the clove flowers are dried in the sun and processed as raw materials for the production of cigarettes, cosmetics, and others. The following is clove production data for 2017-2021.

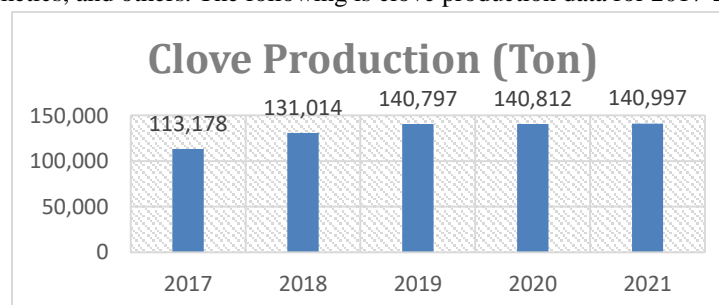


Figure 1. Clove Production in Indonesia

Based on Figure 1.1, it can be seen that there is an increase in the number of clove production every year, namely from 2017 to 2021. From this figure, it is also known that the sharpest increase was from 2017 to 2019, while from 2020 to 2021 the number of clove production tends to be stable. Next will be explained the clove season that occurs in Indonesia

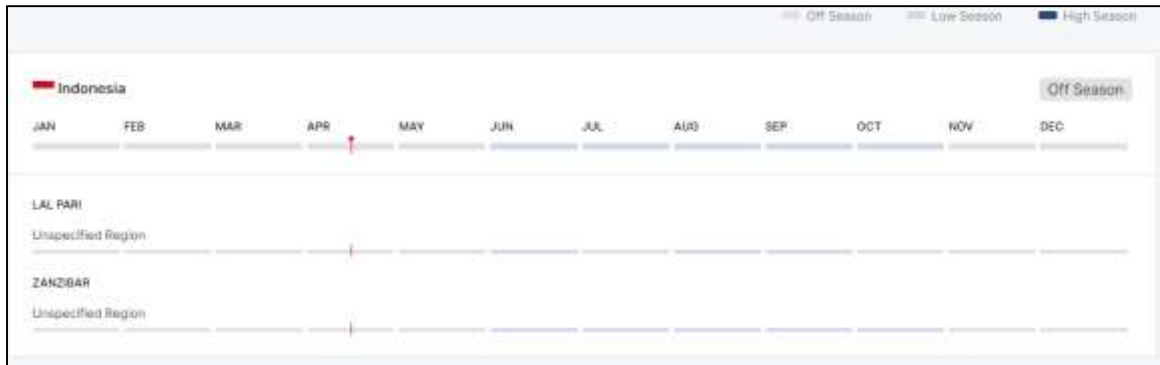


Figure 2. Clove Seasonal in Indonesia

(Source: <https://www.tridge.com/intelligences/clove/ID/season>)

From Figure 1.2, it can be seen that the clove season in Indonesia occurs from June to October and there is no harvest from November to May. Then in Figure 1.2, it is also known that there are two types of cloves in Indonesia, namely Lal Pari and Zanzibar. Based on the article "Clove Harvest Season Blessings for Clove Pickers" it is known that clove harvest is very dependent on soil, weather, seeding, and clove tree care. So special treatment is needed from clove farmers to produce high-quality clove flowers. According to the Ministry of Agriculture, clove is a native plant originating from Indonesia and is locally used as raw material for kretek cigarettes. In addition to being used as a raw material for cigarettes, cloves can also be processed into clove oil which is broken down into various chemical compounds as shown in Figure 1.3.

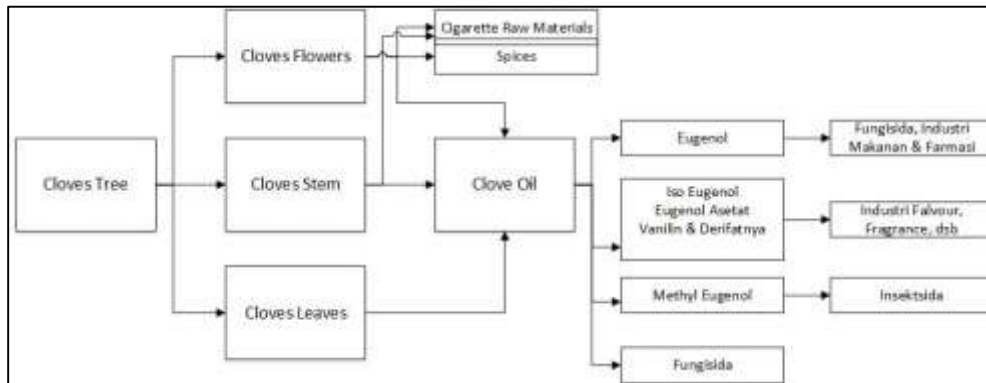


Figure 3. Clove Processing and Used

Figure 1.3 is the processing of clove commodities and their derivatives, it can be seen that the parts of the clove tree can be used for several industries, namely as raw materials for cigarettes, cooking spices, and also processed into chemical compounds used for various industries. Therefore, clove commodities can meet various industrial needs in the world.

### LITERATURE REVIEW

The Kepner-Tregoe (KT) method is a framework used to help a person or a team analyze and identify a problem, and develop a solution to the problem. According to Kepner and Tregoe, there are main steps used in the KT method, Situation Analysis / Problem, Problem Decision Analysis, Potential Problem Analysis, and Decision Analysis. At this stage, an evaluation of the criteria used in decision-making will be carried out, then an assessment of each available solution will be carried out. .



**Table I.** Priority Concern Using the Kepner-Tregoe Method

Concerns Code	Action Statement	Current Impact	Future Impact	Time Frame
C1	Business owners are confused because several activities can be applied, but which one is the right one to choose	H	H	M
C2	The company needs additional sales when there is no clove harvest	H	H	M
C3	Limited company funds in carrying out activities	H	M	M
C4	The company's sales are declining when there is no clove harvest caused by additional inefficient activities	H	H	M
C5	The sales target of limited goods is only based on the needs of local factories	M	H	M
C6	There has been no further development of clove products	M	H	M
C7	Have not exported to enlarge the sales target of clove products	M	H	M

From Table 1.3, it can be seen that seven concerns are ranked based on current impact, future impact, and time frame. From these three aspects, an assessment was carried out using the ratio of high (H), medium (M), and low (L). After that, planning is carried out to solve the problem by categorizing the concern.

**Table II.** Categories of Questions For Concerns

<b>PA-1</b>	<b>Does the situation require an explanation?</b>
<b>PA-2</b>	Is there a deviation?
<b>PA-3</b>	Is the cause unknown?
<b>PA-4</b>	Do I need to know the cause?
<b>DA-1</b>	Does a choice need to be made?
<b>DA-2</b>	Do objectives need to be set to undertake some activity?
<b>PPA-1</b>	Has a decision been made but not yet implemented?
<b>PPA-2</b>	Is it necessary to act now to avoid possible future trouble?
<b>PPA-3</b>	Does a plan need to be made to safeguard some decisions for future activity?

**Table III.** Plan For Solution Using Kepner-Tregoe Method

Concerns Code	PA-1	PA-2	PA-3	PA-4	DA-1	DA-2	PPA-1	PPA-2	PPA-3	Solution	Method
C1	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	DA	AHP
C2	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	PPA	RM
C3	Yes	No	No	Yes	No	No	Yes	Yes	Yes	PPA	RM
C4	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	PA	RCA
C5	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	PA	RCA
C6	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	DA	AHP
C7	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	DA	RM

Table 1.3 is a design for the solution to each concern based on the questions in Table 1.2. To answer each question in Table 1.3 use the answer "Yes" or "No". If all questions of the category are answered "Yes", then the resulting solution is the category of



the question. For example, in C1, or the first concern of the PA and PPA category questions, there is the word "No", while in the question category "DA" all questions are answered "Yes". So that the solution of concern C1 is DA or Decision Analysis using the AHP method. After knowing the various problems and solutions using the KT method, a selection of concerns was made that would be raised as the main problems in the research conducted. From the KT method, it can be concluded that the first concern, or C1 is a concern that will be carried out further research, namely determining choices regarding additional work to increase time utilization on the CV. Spice Jaya. After that, design is carried out for the implementation of the results of the solution obtained and control of the implementation. Mendelow's Matrix is a tool used to analyze and identify stakeholders in an organization or company.

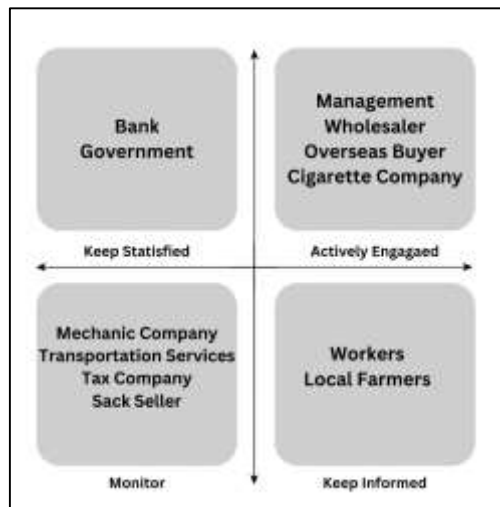


Figure 4. Mendelow's Matrix CV. Rempah Jaya

SWOT Analysis is a method used to evaluate a company based on strengths, weaknesses, opportunities, and threats. The purpose of SWOT Analysis is to examine various entities in an organization both internally and externally.

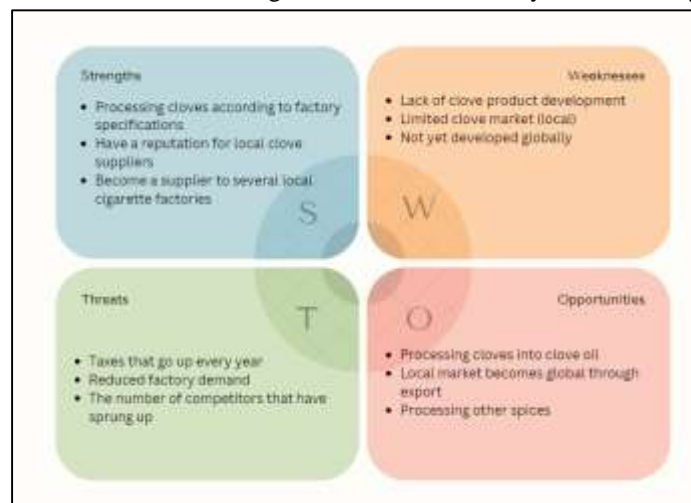


Figure 5. SWOT Analysis CV. Rempah Jaya

The Ishikawa diagram, also known as the fishbone diagram, is a tool used to analyze the root cause of a problem that occurs in an organization. Ishikawa diagrams also help to visualize the influential aspects that caused the problem to occur. In the Ishikawa diagram, there is a main problem placed in the "fish head" section which consists of various factors and sub-factors.

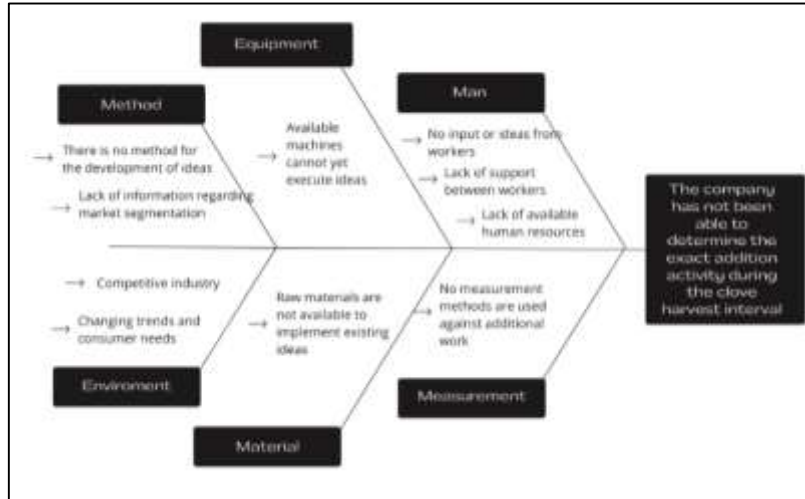


Figure 6. Ishikawa Diagram CV. Rempah Jaya

Multi-Criteria Decision Making (MCDM) is a method of decision-making based on criteria considered to evaluate available alternatives quantitatively, namely by using weights for each criterion or sub-criteria. This is so that decision-makers can make the right decisions. Analytical Hierarchy Process is an MCDM method used to solve problems in an organization by combining the assessment criteria used subjectively and objectively. AHP also assesses qualitative and quantitative factors and assesses between criteria and alternatives used in decision-making.

**RESEARCH METHODOLOGY**

Research design is used to see the flow of research carried out to solve business problems through various stages and methods used. The research begins with conducting a situation analysis to obtain various problems that occur in the CV. Rempah Jaya. To identify various problems on the CV. Rempah Jaya carried out the Situational Appraisal (SA) method using the Kepner Tregoe (KT) tool as its approach. In analyzing using the KT method, concerns are identified, separated concerns into several concerns, ranked each concern, and provided solutions for each concern. From several concerns obtained, one concern will be selected that will continue to be a business problem. After knowing the business problem to be solved, internal and external analysis is carried out to find out what stakeholders are related to the company and the identity of the company itself. Internal and External analysis is carried out using Mendelow's Matrix and SWOT Analysis methods. After that, root-cause analysis is carried out using Ishikawa Diagram to find out the root problem of the business problem determined earlier. After knowing the root of the problem, a solution will be found by taking the necessary data, the data collection consists of two sources, namely primary and secondary. Primary data is obtained from the results of focus group discussions and surveys on the CV. Rempah Jaya and secondary data were obtained from literature and journals that had previously discussed problems that were almost the same as the problems faced by the company today.

After taking primary and secondary data related to the company's problems, data analysis is carried out to ensure that the data used is suitable for processing. If the data does not match, the data retrieval process will be carried out. Furthermore, the criteria used in decision-making will be identified. These criteria are obtained from the results of primary data collection, namely conducting FGD with stakeholder CV. Rempah Jaya to find out the right criteria related to making additional work decisions. After knowing the criteria and sub-criteria used in decision-making, an analysis or decision-making process is carried out using the Analytical Hierarchy Process (AHP) method. From the AHP Method, an alternative ranking will be produced which is the best alternative among other alternatives. These alternative results will be used as a solution to business problems CV. Rempah Jaya. After answering the problem of business solutions from the AHP method, planning will be carried out to implement these business solutions by CV. Rempah Jaya. The implementation plan will be given to the decision maker to be applied to the CV. Rempah Jaya, then the company can provide feedback regarding the implementation plan that has been designed. With this completed research is done and the CV. Rempah Jaya is expected to receive a positive impact from the implementation plan that has been prepared. Figure 1.4 is a research design.

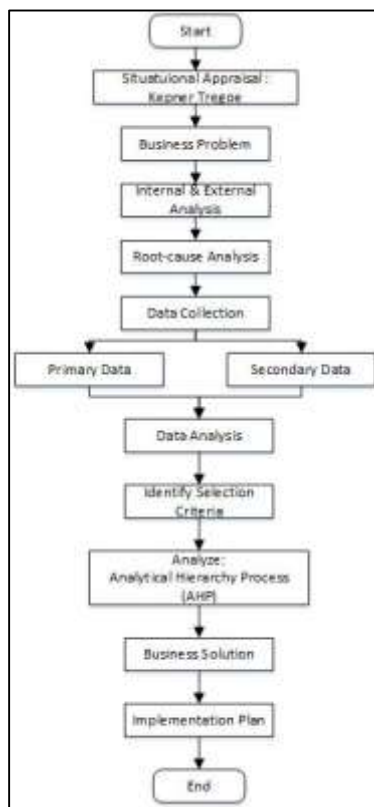


Figure 7. Research Design

**DATA COLLECTION**

The data retrieval process is classified into two categories, namely primary and secondary data. Primary data is data taken by interviews, surveys, and FGDs related to resource persons who have broad insight into the clove commodity business. While secondary data is data taken from journals, books, and news. The first process carried out is to first collect secondary data in the form of research journals related to CV problems. Rempah Jaya at this time. The goal is to collect data related to the criteria and alternatives used to be applied to this study. Furthermore, it will be explained primary data collection carried out by conducting a Focused Group Discussion (FGD) on stakeholders who influence the company. The secondary data obtained previously became one of the basic topics in conducting FGDs with the participants. The goal is that in the FGD, the topics discussed are to find out alternatives that can be applied to CV. Rempah Jaya as well as the criteria used in decision-making. According to Peter and Suzanna (2017), FGD is a data collection method that involves a group consisting of certain members to obtain in-depth information. The purpose of conducting FGD in data collection carried out is to obtain information related to criteria and alternatives used to make decisions related to problems in CV. Rempah Jaya. Table 3.2 represents participants related to the FGD conducted.

**Table IV.** Focused Group Discussion Participant

Name	Role
Kevin Kegan	Moderator, Co-Founder, Clove Business Analyst
Joni Tedi	Participant, Founder, and Clove Business Expert (>30 years of clove expertise)
Lily Muliaty	Participant, Co-Founder, and Production Director
Muhammad Nur Azzis	Participant and Production Manager who has experience for > than 10 years



Steven Sanjaya	Participant and Owner of a clove buying and selling business that has been operating for more than 20 years
Yani Mulyani	Participant and Marketing Manager who has experience for > than 10 years
Budi Setiawan	Participant and Owner of a clove buying and selling business that has been operating for more than 20 years

At this stage, the FGD was carried out with several groups, first namely Kevin Kegan as moderator, and Mr. Joni Tedi, and Mrs. Lily Muliati as participants. In this first group, FGD was carried out to find out the criteria used in decision-making and alternatives available internally by the company, this is because both party’s participants are internal stakeholders who have the highest positions and decision-makers in CV. Rempah Jaya. In the second group, FGD consisted of Kevin Kegan as moderator, Muhammad Nur Azzis, and Yani Mulyani as managers in the company who had roles as production and marketing managers in the company. From the second group, FGD was carried out to find out additional criteria and alternatives from the middle and lower levels in CV. Rempah Jaya. Then the third group consisted of Kevin Kegan as moderator and Steven Sanjaya and Budi Setiawan as participants. FGD in the third group is carried out to find out the criteria and alternatives available according to external parties outside the company. In addition to seeking additional information, reconfirmation of criteria and alternatives that have been carried out previously with external parties is also carried out.

After that, it will be explained data analysis from taking comparative value data for criteria and alternatives using surveys. The survey was filled out by three people each, namely Mr. Joni, Mrs. Lily, and Kevin Kegan because these three people are decision-makers in CV. Rempah Jaya. Therefore, a survey is filled out by the decision maker related to the assessment of the comparison of criteria, sub-criteria, and alternatives used in decision-making. The process of filling out the survey is directly accompanied by the author so that the resource person who fills in can understand and know how to fill in, the definition of each criterion and alternative, and the meaning of the scale given. After filling in the comparison value by three speakers who participated as decision-makers in the CV. Rempah Jaya, there is a discrepancy between resource persons regarding the selection of criteria or alternatives chosen.

**Table V.** Example of Assessment Nonconformities in Surveys

Name of Resource Person	Expected Cost or Return On Investment [Expected Cost]	Expected Cost atau Return or Investment [Retrun On Investment]
Kevin Kegan	No	7
Joni Tedy	9	No
Lily	No	3

As Table 3.3 Kevin Kegan and Lily prefer the Return On Investment criterion compared to Expected Cost with a rating of 7 and 3, while Joni Tedy chooses the expected cost criterion compared to Return On Investment with a rating of 9. This causes invalid data to be continued as input in the data processing process. Therefore, a reassessment was carried out by filling out a survey by three decision-makers (Kevin Kegan, Joni Tedy, and Lily) simultaneously. During the process of filling in the comparison value, fellow decision-makers can give opinions and praise to compare the selected criteria and the rating value set. So that the assessment results obtained from the filling become valid and can be used as input for data processing.

**ANALYSIS**

After knowing the main needs in the CV. Rempah Jaya is increasing time utilization during the clove harvest interval by choosing additional work, a decision-making process related to the additional work is carried out using the Analytical Hierarchy Process (AHP) method. In the AHP method, several inputs are needed, namely, the criteria used, available alternatives, and decision-makers



who play a role in determining the value of pairwise comparisons for criteria and alternatives used in decision-making. Furthermore, it will be explained the development of criteria, sub-criteria, and alternatives used in decision-making in CV. Rempah Jaya. The criteria and alternatives used in decision-making are developed through FGDs with stakeholders conducted interviews contained in Table 3.2 and also literature in the form of journals that support related criteria and alternatives used in decision-making in industries that use spices. The literature is found in Table 3.1. After developing the criteria and alternatives available, the following is an explanation of the criteria and sub-criteria used in decision-making in CV. Rempah Jaya.

**Table VI.** Definition of Criteria and Sub Criteria

Criteria	Sub Criteria	Definition
Profit Potential	Expected Cost	The amount of expenses that need to be incurred by CV. Rempah Jaya to execute the job
	Return On Investment (ROI)	The percentage of profit obtained after deducting the costs incurred on a project or activity to be carried out.
Market Conditions	Target Market	Characteristics of consumers who are seen to need the product or service to be offered.
	Market Growth	The rate of change in the number of sales that occur in one year related to the project or investment made.
Human Resource (HR) Skills	Operational Skills	The level of ability required by workers to perform work related to projects or investments made
	Work Experience	The length of time it takes for someone to work on a project or activity to be carried out

In Table 4.1 there are three main criteria, namely profit potential, market conditions, and HR skills. The profit potential criterion has two sub-criteria, namely expected cost and return on investment. In the expected cost sub-criterion, the greater the value of the cost required for a job or project, the less attractive it is for a CV. Rempah Jaya to choose the project. As for the return on investment sub-criterion, the greater the percentage of ROI obtained on a job, the more attractive it is for CVs. Rempah Jaya to choose the job. Then the market conditions criteria have two sub-criteria, namely target market and market growth. In the target market sub-criteria, the clearer the intended target market, the more attractive the job is for a CV. Rempah Jaya. As for the market growth sub-criteria, the more sales increase in one year related to additional work, the more attractive it is for a CV. Rempah Jaya. Then for HR skills criteria, there are two sub-criteria, namely operational skills and work experience. For the operational skills sub-criterion the greater the skills required related to additional work, the less attractive the CV. Rempah Jaya. As for the work experience sub-criteria, the more experience the worker has in doing additional related work, the more attractive it is to the CV. Rempah Jaya to hire the worker.

According to Saaty (1980), alternatives to the MCDM method are choices or options used in decision-making. Based on the data collection that has been done, three alternatives can be developed by CV. Rempah Jaya to increase time utilization during the clove harvest interval. Pada Table 4.2 merupakan hasil yang diperoleh untuk setiap alternatif berdasarkan kriteria dan sub kriteria yang digunakan.

**Table VII.** Alternatives And Results Of Each Criterion And Sub-Criteria

Alternatives	Criteria	Sub Criteria	Results
Clove Oil Distillation	Profit Potential	Expected Cost	Rp 68,350,000.00
		Return On Investment (ROI)	338%
	Market Conditions	Target Market	Factories that need raw materials for clove oil





		Market Growth	33%
	HR Skills	Operational Skills	Very needed
		Work Experience	1-3 years
Spice Mixture	Profit Potential	Expected Cost	Rp 20,975,000.00
		Return On Investment (ROI)	43%
	Market Conditions	Target Market	Consumers who consume herbs
		Market Growth	10%
	HR Skills	Operational Skills	Needed
		Work Experience	3-6 months
Collaboration With the Food and Beverage Industry	Profit Potential	Expected Cost	Rp 9,600,000.00
		Return On Investment (ROI)	37.50%
	Market Conditions	Target Market	Industries that require spice raw materials for food or beverage products
		Market Growth	21%
	HR Skills	Operational Skills	Less needed
		Work Experience	1-2 months

After taking data carried out in Chapter 3 related to pairwise comparison assessment for criteria and sub-criteria used in decision making, a matrix was obtained for each criterion and sub-criteria used as follows.

**Table VIII.** Comparison Matrix Between Criteria

	Profit Potential	Market Conditions	HR Skills
Profit Potential	1	3	5
Market Conditions	1/3	1	7
HR Skills	1/5	1/7	1

**Table IX** Profit Potential Criteria Comparison Matrix

	Expected Cost	Return On Investment
Expected Cost	1	1/3
Return On Investment	3	1

**Table X.** Market Conditions Criteria Comparison Matrix

	Target Market	Market Growth
Target Market	1	3
Market Growth	1/3	1



**Table XI.** HR Skills Criteria Comparison Matrix

	Operational Capability	Work Experience
Operational Capability	1	3
Work Experience	1/3	1

**Table XII.** Expected Cost Sub-Criteria Comparison Matrix

Expected Cost	Clove Oil Distillation	Spice Mixture	FnB Industry Collaboration
Clove Oil Distillation	1	1/5	1/7
Spice Mixture	5	1	1/3
FnB Industry Collaboration	7	3	1

**Table XIII.** Return On Investment Sub-Criteria Comparison Matrix

	Clove Oil Distillation	Spice Mixture	FnB Industry Collaboration
Clove Oil Distillation	1	5	5
Spice Mixture	1/5	1	2
FnB Industry Collaboration	1/5	1/2	1

**Table XIV.** Target Market Sub-Criteria Comparison Matrix

	Clove Oil Distillation	Spice Mixture	FnB Industry Collaboration
Clove Oil Distillation	1	5	7
Spice Mixture	1/5	1	3
FnB Industry Collaboration	1/7	1/3	1

**Table XV.** Market Growth Sub-Criteria Comparison Matrix

	Clove Oil Distillation	Spice Mixture	FnB Industry Collaboration
Clove Oil Distillation	1	6	7
Spice Mixture	1/6	1	1/2
FnB Industry Collaboration	1/7	2	1

**Table XVI.** Operational Capability Sub-Criteria Comparison Matrix

	Clove Oil Distillation	Spice Mixture	FnB Industry Collaboration
Clove Oil Distillation	1	5	1/7
Spice Mixture	1/5	1	1/2
FnB Industry Collaboration	7	2	1

**Table XVII.** Work Experience Sub-Criteria Comparison Matrix

	Clove Oil Distillation	Spice Mixture	FnB Industry Collaboration
Clove Oil Distillation	1	1/2	1/6
Spice Mixture	2	1	1/5
FnB Industry Collaboration	6	5	1

Furthermore, data processing related to the AHP method will be carried out using super decision software. Here is a hierarchical structure designed using super decision software.

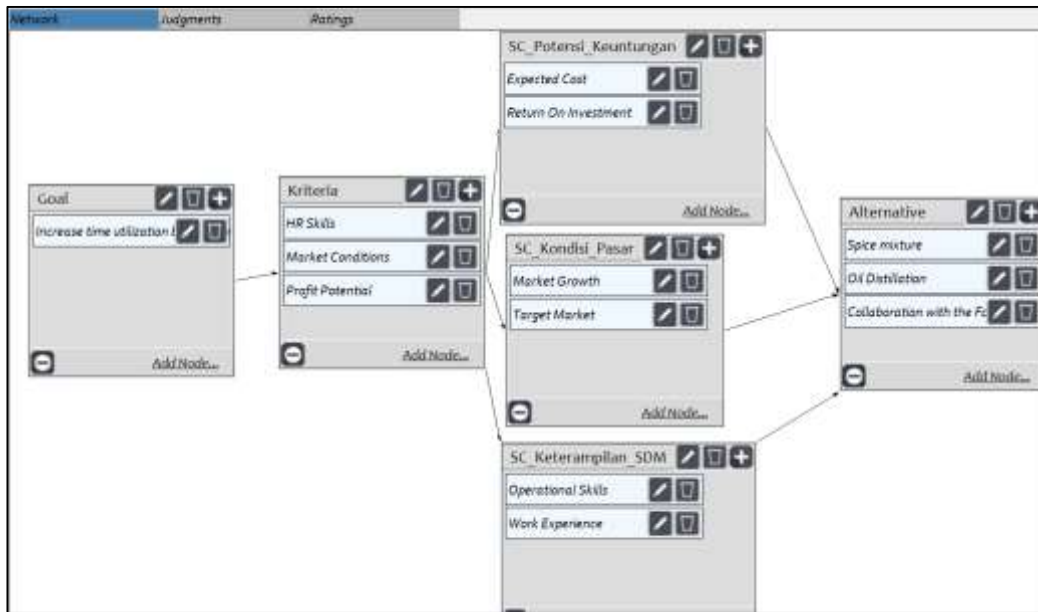


Figure 8. Hierarchical Structure of AHP Method Using Super Decision

Figure 4.2 is a hierarchical structure of the AHP method designed using super decisions. Find out the design of the hierarchical structure can be seen through the flow. It can be seen in Figure 4.2 that the flow of the hierarchical structure is appropriate from the goal to the criteria used. Furthermore, filling in the pairwise comparison value in the super decision software based on the value of the comparison matrix contained in subchapter 4.1.2.

3. Market Condi-	>=0.2	0	8	1	0	2	4	3	5	5	3	4	2	0	1	0	0	>=0.2	NO CO
2. HR Skills	>=0.2	0	8	1	0	2	4	3	5	5	3	4	2	0	1	0	0	>=0.2	NO CO
1. HR Skills	>=0.2	0	8	1	0	2	4	3	5	5	3	4	2	0	1	0	0	>=0.2	NO CO

Figure 9. Filling in comparison values between criteria

Figure 4.3 is a comparison value filling for the criteria used, three criteria are compared, namely profit potential, market conditions, and HR skills.

3. Results	
HR Skills	0.07193
Market Co~	0.64912
Profit Po~	0.27895

Figure 10. Results of Value Weighting Between Criteria

Figure 4.4 is the result of data processing to determine the weight value and priority of the three criteria used. The priority order of criteria is based on the largest weighted value, namely market conditions, profit potential, and HR skills with values of 0.65, 0.28, and 0.07. Then it can also be known that the inconsistency value of 0.06 means that the weighting results with related comparative assessments have an inconsistency level of 6% or a consistency level of 94%. To input the comparison value of sub-



criteria and alternatives, the same filling system is carried out by entering the comparison value obtained from the matrix comparison results obtained earlier. Furthermore, it will be explained the results of weighting between profit potential sub-criteria.

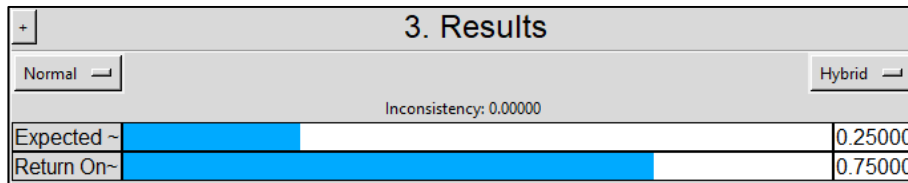


Figure 11. Results of Value Weighting Between Profit Potential Sub-Criteria

Figure 4.5 is the result of weighting the value of data processing to determine the priority of the two sub-criteria used. The priority order of criteria based on the largest value is the return on investment and expected cost with values of 0.75 and 0.25. Then it can also be known the inconsistency value of 0. This is because the comparison is carried out only for two sub-criteria that cause no errors in making comparisons. Furthermore, it will be explained the results of weighting between market conditions sub-criteria.

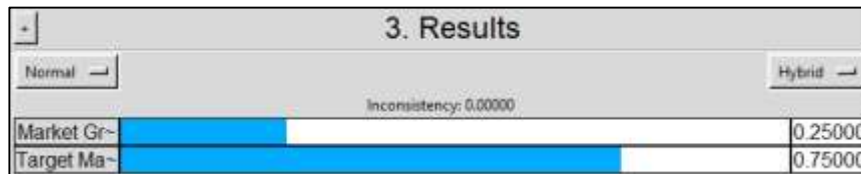


Figure 12. Results of Value Weighting Between Market Conditions Sub-Criteria

Figure 4.6 is the result of weighting the data value to determine the priority of the two sub-criteria used. The priority order of criteria based on the largest value is the target market and market growth with values of 0.75 and 0.25. Then it can also be known the inconsistency value of 0. Furthermore, it will be explained the results of weighting between HR skills sub-criteria.

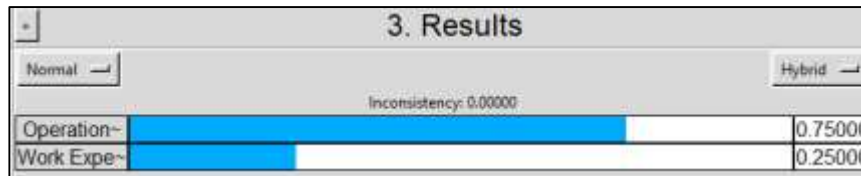


Figure 13. Results of Value Weighting Between Market Conditions Sub-Criteria

Figure 4.7 is the result of data processing to determine the priority of the two sub-criteria used. The priority order of criteria based on the largest value is operational skills and work experience with values of 0.75 and 0.25. Then it can also be known the inconsistency value of 0. Furthermore, it will be explained the results of weighting between alternatives related to the expected cost sub-criteria.

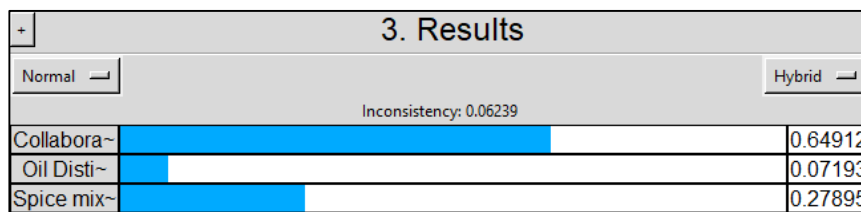


Figure 14. Results of Inter-Alternative Value Weighting Based on Expected Cost

Figure 4.8 is the result of data processing to determine the weight value and priority of the three alternatives used based on the expected cost sub-criteria. Alternative priority orders based on the largest weight values are collaborating with the Fnb industry, spice mixer, and oil distillation with values of 0.65, 0.28, and 0.07. Then it can also be known that the inconsistency value of 0.06 means that the weighting results with related comparative assessments have an inconsistency level of 6% or a consistency level of 94%.

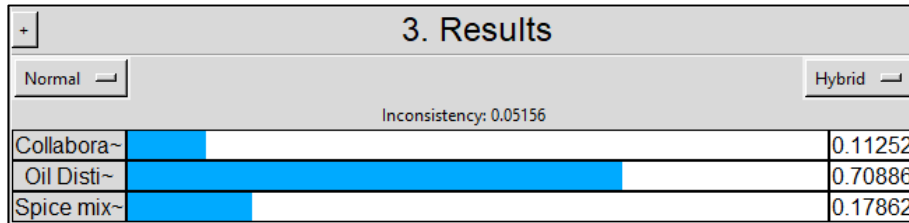


Figure 15. Results of Value Weighting Between Alternatives Based on Return On Investment

Figure 4.9 is the result of data processing to determine the value of the weight and priority of the three alternatives used based on the return on investment sub-criteria. Alternative priority orders based on the largest weight values are oil distillation, spice mixer, and collaboration with the FnB industry with values of 0.71, 0.18, and 0.11. Then it can also be known that the inconsistency value of 0.05 means that the weighting results with related comparative assessments have an inconsistency level of 5% or a consistency level of 95%.

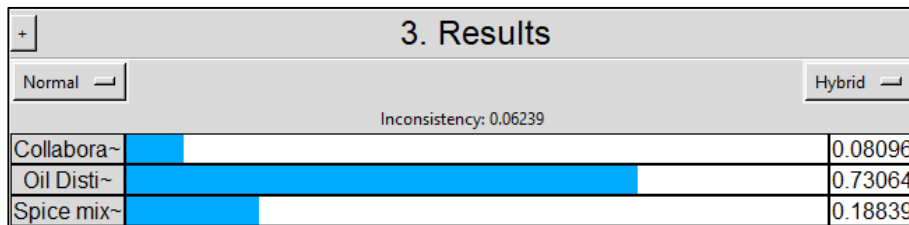


Figure 16. Results of Value Weighting Between Alternatives Based on Target Market

Figure 4.10 is the result of data processing to determine the value of the weight and priority of the three alternatives used based on the target market sub-criteria. Alternative priority orders based on the largest weight values are oil distillation, spice mixer, and collaboration with the FnB industry with values of 0.73, 0.19, and 0.08. Then it can also be known that the inconsistency value of 0.06 means that the weighting results with related comparative assessments have an inconsistency level of 6% or a consistency level of 94%.

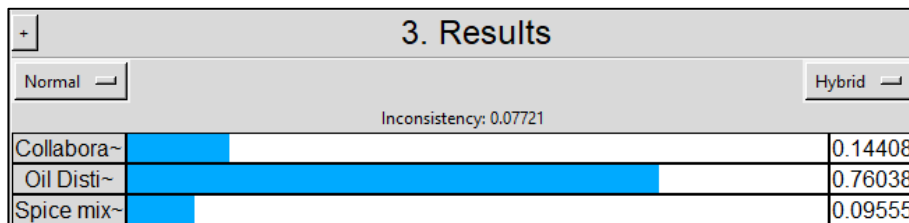


Figure 17. Results of Inter-Alternative Value Weighting Based on Market Growth

Figure 4.11 is the result of data processing to determine the value of weights and priorities of the three alternatives used based on market growth sub-criteria. Alternative priority orders based on the largest weight values are oil distillation, collaboration with the FnB industry, and spice mixers with values of 0.76, 0.14, and 0.10. Then it can also be known that the inconsistency value of 0.07 means that the weighting results with related comparative assessments have an inconsistency level of 7% or a consistency level of 93%.

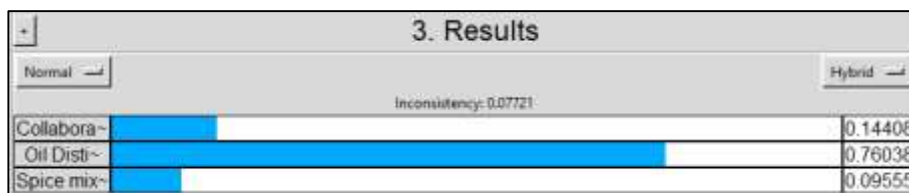


Figure 18. Results of Value Weighting Between Alternatives Based on Operational Skills



Figure 4.12 is the result of data processing to determine the weight value and priority of the three alternatives used based on the operational skills sub-criteria. Alternative priority orders based on the largest weight values are oil distillation, collaboration with the FnB industry, and spice mixers with values of 0.76, 0.14, and 0.10. Then it can also be known that the inconsistency value of 0.07 means that the weighting results with related comparative assessments have an inconsistency level of 7% or a consistency level of 93%.

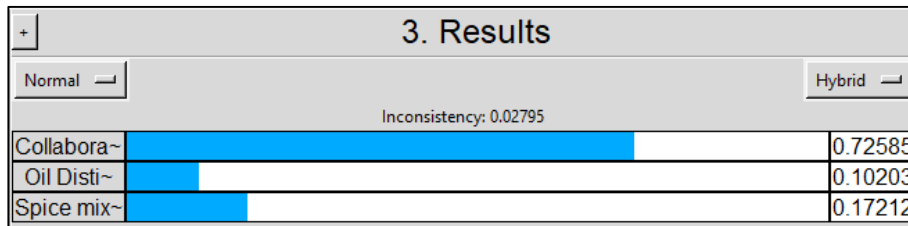


Figure 19. Results of Value Weighting Between Alternatives Based on Work Experience

Figure 4.13 is the result of data processing to determine the weight value and priority of the three alternatives used based on the work experience sub-criteria. Alternative priority order based on the largest weight value is a collaboration with FnB industry, spice mixer, and oil distillation with values of 0.73, 0.17, and 0.10. Then it can also be known that the inconsistency value of 0.03 means that the weighting results with related comparative assessments have an inconsistency level of 3% or a consistency level of 97%. After knowing the priorities and weights obtained for each comparison made, a priority search is carried out from all criteria and sub-criteria used in decision-making. It aims to find out which sub-criteria or criteria are the most influential or look for sub-criteria that are less influential in making decisions.

Criteria	Weight	Priority
HR Skills	0.07193	0.023976
Market Conditions	0.64912	0.216373
Profit Potential	0.27895	0.092985
Operational Skills	0.75000	0.017982
Work Experience	0.25000	0.005994
Market Growth	0.25000	0.054093
Target Market	0.75000	0.162280
Expected Cost	0.25000	0.023246
Return On Investment	0.75000	0.069739

Figure 20. Priority Criteria and Sub Criteria

In Figure 4.14 it can be seen that the most influential criterion in decision-making is market conditions with a value of 0.65, the criterion that is less influential in decision-making is HR skills with a value of 0.07.

An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it. Wherever Times is specified, Times Roman or Times New Roman may be used. After knowing the weighting process and priority for each criterion and sub-criteria used in the AHP method, then a ranking of alternatives is determined based on the score obtained.

Name	Graphic	Ideals	Normals	Raw
Collaboration with the Food and Beverage Indust~		0.276638	0.176579	0.058860
Oil Distillation		1.000000	0.638303	0.212768
Spice mixture		0.290015	0.185118	0.061706

Figure 21. Alternative Ranking

Figure 4.15 is the result of the score of each alternative carried out by data processing, it is known that there are three alternatives, namely collaboration with the FnB industry, oil distillation, and spice mixture. Of the three alternatives, the first rank was obtained



based on the largest point, namely the oil distillation alternative with a normal value of 0.64, followed by the spice mixture alternative and collaboration with the FnB industry with a normal value of 0.19 and 0.17. From these results, it can be concluded that additional work is most appropriate to be applied by CV. Rempah Jaya is an alternative to oil distillation.

**BUSINESS SOLUTION**

This chapter will be explained business solutions related to research questions from the research conducted. To improve time utilization during clove harvest interval, CV. Rempah Jaya can distillate clove oil. This is based on the results of decision-making for three alternative pieces which are additional jobs that can be a CV. Rempah Jaya was developed by distilling clove oil, mixing spices, and collaborating with the food and beverage industry. Of the three alternatives, it is obtained that the alternative of distilling clove oil is the best alternative that can CV. Rempah Jaya choose. In making decisions CV. Rempah Jaya carried out developments related to criteria and sub-criteria. There are three criteria used by CV. Rempah Jaya in making decisions, namely potential profit, market conditions, and HR skills. Each of these criteria has two sub-criteria, the profit potential criterion has two sub-criteria, namely expected cost and return on investment. Furthermore, the market conditions criteria have two sub-criteria, namely target market and market growth, then the HR skills criteria have two sub-criteria, namely operational skills and work experience. These criteria and sub-criteria are used in decision-making to increase time utilization during the clove harvest interval. To implement the solutions that have been obtained, implementation planning is carried out related to selected alternatives, namely oil distillation on the CV. Rempah Jaya. The implementation plan will discuss the objectives, run-down tasks, people responsible for each task (PIC), and the time. This is so that the solutions provided can have a positive impact on the CV. Rempah Jaya.

**IMPLEMENTATION PLAN**

No	Objectives	No	Breakdown Tasks	KPI Done	PIC	Time Period																				
						W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14							
1	Developing a new line of products offered, namely leaf oil and clove handles	1	Buy 50 liters of leaf oil and clove handles per week	Buying oil from farmers around the site	Bu Yani																					
		2	Socialize with five oil refiners to find out product knowledge of clove oil	Socializing with clove oil refiners	Pak Kevin																					
		3	Producing cloves with a capacity of 20 liters per week	-	Pa Supriyadi																					
2	Using raw materials left over from current production as raw materials for refining clove oil	1	20% of the available raw materials can be used as refining raw materials as raw materials for refining clove oil	-	Pa Supriyadi																					
		2	Looking for raw materials for clove leaves to five farmers around the location to collect raw materials	Have farmers who are ready to supply clove leaves	Pak Kevin																					
3	Build networking with buyers or local factories	1	Bidding to 10 local factories/buyers	Has a factory channel that requires clove leaf oil and clove steam oil	Pak Jhon																					
4	Have a company profile that can be accessed by buyers	1	Create and design a website for a company	Have a website for the company's portfolio	Pak Kevin																					
		2	Have a social media account as a company portfolio	Have social media for the company's portfolio	Pak Kevin																					
		3	Have explanatory materials about the products offered	Have product material to explain to buyers	Pak Kevin																					

Figure 22. Implementation Plan Clove Oil Distillation

Figure 4.16 is an implementation plan for the application of clove oil distillation in CV. Rempah Jaya. There are four objectives of the implementation plan, namely developing the paper product line, essential oil from cloves, using the remaining production raw materials, clove leaves and handles to be processed into essential oil, building relationships with factories that need clove leaf essential oil, and creating company profiles as company portfolios so that factories/buyers can easily make contact with CV. Rempah Jaya. Each objective is described in detail about what activities will be carried out and targets to be achieved and each activity will have a party responsible for completing it. Then there is the yellow and green period. Yellow indicates that the activity is being carried out and has not been completed, while green indicates that the activity is complete.

**CONCLUSION & RECOMMENDATION**

Based on the results of data analysis conducted using the AHP method, it can be concluded that the business problem CV. Rempah Jaya wants to increase the utilization of time when the clove harvest interval can be completed by distilling clove oil. Clove oil distillation is the chosen alternative based on data processing carried out in Chapter IV. In data processing, the load value for clove oil distillation is greater than the other two alternatives, which is 0.63 compared to the weight value for spice mixture alternatives



and collaboration with the food and beverage industry of 0.19 and 0.17. So the alternative distillation of clove oil is the first rank. Next will be explained about the recommendations from the research conducted so that in the future it can be even better.

1. CV. Rempah Jaya can conduct continuous market analysis and update within a certain period of time. This is useful to know about changes in trends, competition, and changing consumer characteristics. So CV. Rempah Jaya can implement the right strategy for growing consumers.
2. CV. Rempah Jaya can have to strive in improving the quality and service of the products offered. By looking at the needs of various industries related to spices, innovating products, and improving the quality of production processes or services provided. This aims to retain current consumers and make it easier to get new customers.
3. CV. Rempah Jaya can apply new technology with its business, it aims to improve efficiency, and decision-making, and provide experience to consumers. These technologies include AI, analytical data, sales through e-commerce, and production processes using automation systems.

## REFERENCES

1. Mendelow, A. L. (1991). "Environmental Scanning—The Impact of the Stakeholder Concept." In The Proceedings of the Second International Conference on Information Systems, Cambridge, MA, December 16-18, 1991, pp. 789-795.
2. Fine, L. G. (2009). The SWOT Analysis: Using Your Strength to Overcome Weaknesses, Using Opportunities to Overcome Threats. *Personal Excellence Essentials*, 6(2), 19–20.
3. Hill, T., & Westbrook, R. (1997). SWOT Analysis: It's Time for a Product Recall. *Long Range Planning*, 30(1), 46–52. [https://doi.org/10.1016/S0024-6301\(96\)00095-7](https://doi.org/10.1016/S0024-6301(96)00095-7)
4. Ishikawa, K. (1985). *What is Total Quality Control? The Japanese Way*. Prentice-Hall.
5. Goetsch, D. L., & Davis, S. B. (2014). *Quality management for organizational excellence*. Upper Saddle River, NJ: Pearson.
6. Muralidharan, C. (2012). *Quality control and continuous improvement*. New Delhi: PHI Learning Private Limited.
7. Saaty, T. L. (1980). *The Analytic Hierarchy Process*. McGraw-Hill.
8. Hwang, C. L., & Yoon, K. (1981). *Multiple Attribute Decision Making: Methods and Applications*. Springer.
9. Brans, J. P., Vincke, P. H., & Mareschal, B. (1986). How to select and how to rank projects: The PROMETHEE method. *European Journal of Operational Research*, 24(2), 228-238.
10. Zavadskas, E. K., Turskis, Z., & Tamosaitiene, J. (2010). Multi-criteria decision-making methods: A comparative study. *Journal of Business Economics and Management*, 11(2), 259-278.
11. Mendelow, A. L. (1991) 'Environmental Scanning: The Impact of the Stakeholder Concept'. *Proceedings From the Second International Conference on Information Systems* 407-418. Cambridge, MA.
12. Eeuwijk, Peter & Angehrn, Zuzanna. (2017). *How to ... Conduct a Focus Group Discussion (FGD)*. Methodological Manual.
13. Krueger, Richard A. (1988) . *FOCUS GROUPS: A Practical Guide for Applied Research*. SAGE Publications. California.
14. Fakultas Pertanian Universitas Medan Area. (2022, February 18). Clove Harvest Season is a Blessing for Clove Picking Workers.
15. <https://pertanian.uma.ac.id/musim-panen-cengkeh-berkah-untuk-buruh-petik-cengkeh/#:~:text=butir%20cengkeh%20yg%20siap%20dipetik,tanam%20antara%20%2D%20%20tahun.>

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