

WILLINGNESS TO PAY FOR LIQUID SMOKE COAGULANT TO STAKEHOLDERS ON THE IMPACTS OF ENVIRONMENTAL POLLUTION

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ABSTRACT

The use of coagulants that are not recommended can affect the quality of the processed rubber material produced. It can also cause environmental pollution in the form of air pollution. However, the expensive purchase price of recommended coagulants makes farmers still choose to use coagulants that are not recommended. So this study aims to determine the amount of willingness to pay stakeholder value to the use of liquid smoke coagulants that can reduce odor in rubber. This research was conducted from October 2023 to November 2023 in Kemuja Village and Petaling Village, West Mendo District, Bangka Regency. The research method used is the case study method, while the sampling method used in this study is Non Probability Sampling with the population carried out intentionally (Purposive Sampling) with a sample size of 34 respondents. The analysis method uses quantitative analysis with the Contingent Valuation Method (CVM) approach. The results showed that: the amount of willingness to pay (WTP) value of liquid smoke coagulant after the known amount of the difference in the value of using alum coagulant and liquid smoke coagulant as a rubber coagulant of Rp. 410, so that the WTP value to prevent environmental pollution of rubber stench conducted with the Contingent Valuation Method (CVM) approach obtained an estimated average WTP value of Rp.638, - and the total WTP value of Rp.21,054 / liter.

Keywords: Liquid smoke, value difference, rubber farming, Willingness To Pay

INTRODUCTION

Liquid smoke has different functional properties due to the presence of phenol and carbonyl compounds that can neutralize odor, taste and color. (Jenita, Anggraini and Yuniningsih, 2019). Liquid smoke contains 10.2% acid compounds, 4.13% phenol compounds and 11.3% carbonyl compounds (Darmadji, 1996). In general, the benefit of using liquid smoke is as a preservative in fish smoking. This is because the liquid smoke used has gone through a purification stage so that the resulting content is easy to spread or comfortable to use and can be used for a long period of time. In addition, liquid smoke also has a function as an antioxidant and anti-bacterial ingredient. (Kasim, Fitrah and Hambali, 2015)..

In research conducted by Kasim *et al.*, (2015) the antioxidant and anti-bacterial functions of liquid smoke are used as a rubber latex coagulant. Antioxidants and anti-bacterial properties of liquid smoke are obtained from phenol compounds that can inhibit the growth of putrefactive bacteria in latex, so that rubber coagulated using liquid smoke does not emit a foul

odor. This is also supported by the truth in the results of research Evahelda *et al.*, (2021) With the use of a 15% dose of liquid smoke, liquid smoke coagulants can coagulate rubber quickly within 8.23 minutes and make the rubber 88% very odorless. So that liquid smoke coagulant can be a highly recommended coagulant because it is environmentally friendly. However, based on the survey results in the field most rubber farmers do not choose liquid smoke as a rubber coagulant and choose to use alum.

The reason why most rubber farmers use alum in the rubber clumping process is because according to the farmers the price of liquid smoke is very expensive, compared to alum which is cheaper and easier to obtain. Based on research results Wahyuni *et al.*, (2023) farmers say that using alum is much easier and does not require a long time in the process compared to using other coagulants. However, the use of alum can cause foul odor in rubber because alum coagulants are water-binding and unable to suppress the growth of bacteria in the rubber.

Farmers' perceptions of liquid smoke coagulants apart from the expensive purchase price, farmers also have the perception that the use of liquid smoke reduces their income. This is because the expensive purchase price of liquid smoke can cause production costs to be disproportionate to the selling price received. Research results Wahyuni *et al.* (2023) found that some farmers revealed that farmers were interested in switching to using liquid smoke coagulants with various conditions, one of which was that the selling price that farmers received must be higher than using alum coagulants. So the researcher suspects that there is a difference in value received by farmers if they use alum coagulant with liquid smoke coagulant. Therefore, the difference in value is not efficient if it is charged to farmers, it should be charged by 3 related parties, namely, local government, companies or industries and the community.

The linkage of the three parties has a role in charging the difference in value received by rubber farmers, because the first party, namely the local government, has a role as a regulatory party responsible for protecting the environment against pollution. Based on the results of research conducted by Evahelda *et al.*, (2021) revealed that liquid smoke produced from burning coconut shells can be used as a natural coagulant, because it can reduce environmental pollution caused during rubber latex processing. The second party, namely the company or industry, has the advantage of using liquid smoke as a rubber coagulant, because the use of liquid smoke in rubber can make processed rubber materials have good quality and quality, and can reduce industrial waste that can pollute the environment. In addition, the quality of processed rubber materials (Bokar) produced by farmers who use liquid smoke coagulants meets the requirements of SNI 06-2047-2002 which is safe for export. (Evahelda *et al.*, 2021). The company should be able to provide a higher purchase price for bokar that uses liquid smoke coagulants. The third party is the community whose comfort is disturbed due to air pollution in the form of rotten rubber odor. Rubber odor air pollution in addition to disturbing comfort can also have a negative impact on public health, namely respiratory tract infections, impaired lung function and olfactory sensitivity (Ferosandi, 2018). (Ferosandi, 2018). With the use of liquid smoke

coagulants can prevent air pollution caused by rubber stench.

Foul odor from rubber is a problem that must be addressed with commitment from all parties, including the company, government, and community. The pungent stench is caused by the growth of putrefactive bacteria that biodegrade the protein in the processed rubber material (BOKAR) into ammonia and sulfide. This happens because the freezing agent or latex coagulant used is still unable to prevent bacterial growth during the freezing process. (Eriska *et al.*, 2019). So that the selection of the use of coagulants in rubber is very influential on the process of clumping rubber in forming good rubber. Therefore, based on the exposure of the problems that have been described, researchers want to examine the "*Willingness To Pay for Liquid Smoke Coagulants to Stakeholders Against the Impact of Environmental Pollution*" to *stakeholders*, especially in communities affected by rubber stench to find out how much WTP value is given regarding these problems. The objectives of this research are: 1) To determine the difference in the value of using alum coagulant and liquid smoke coagulant in rubber. 2) To determine the amount of *stakeholder* WTP value for the use of liquid smoke coagulants that can reduce odors in rubber.

METHOD

This research was conducted in Kemuja Village and Petaling Village, West Mendo District, Bangka Regency. The determination of the research location was based on the fact that Kemuja and Petaling Villages are locations that have the largest contribution of rubber production centers and also Kemuja Village is an area that has received directions to use liquid smoke as a latex coagulant. In addition, the determination of the location was also due to Kemuja Village and Petaling Village being villages that were affected by the environmental pollution of rubber stench. The research method used is the case study method. According to Kriyatono (2020), the case study method is a research method that uses various data sources that can be used to create research documents, describe and explain many things comprehensively aspects of individuals, groups, programs, organizations, or events. Case studies can also be used as an effort to examine a number of variables regarding a case. The sample taken was 34 people. The sampling technique uses

a *non-probability sampling* method with the population used is the community affected by environmental pollution of rubber odor using alum coagulant in Kemuja Village and Petaling Village, West Mendo District, Bangka Regency. In this study, researchers chose to use the *non-probability sampling* method because the population used was not known with certainty. The sampling that will be used in this study is using *purposive sampling* which means that sampling is done deliberately by looking at certain criteria, namely in this study researchers selected respondents with the characteristics of respondents determined by researchers, namely 1 rubber farmer who already knows or uses alum coagulants and liquid smoke coagulants, 30 non-rubber farmers affected by environmental pollution due to the use of alum as a coagulant from the clumping of rubber produced by rubber farmers in Kemuja Village and Petaling Village as well as the head of the Environmental Service and the head of PT. Karini Utama as a company or rubber industry.

The data used in this study are primary data and secondary data. Primary data taken is data from interviews and filling out questionnaires from farmers, non-farming communities and TR *stakeholders*. According to Sugiyono (2018: 456) primary data is a data source that directly provides data to data collectors, while secondary data is a source that does not directly provide data to data collection. Secondary data is obtained from sources that can support research, including documentation and literature. Secondary data that researchers use are BPS data, village profiles, research-related literature such as journals and theses.

Data processing and data analysis methods used in this study consist of several methods in accordance with the research objectives. To answer the first research objective using data analysis methods in the form of calculating the difference in values obtained from two treatments of coagulant use in rubber latex consisting of production costs, revenue and income on rubber farms that use liquid smoke freezing agent and do not use liquid smoke. According to Soekartawi (2016) to calculate the total revenue of farming used the formula.

$$TR = Y \times P$$

Where:

TR : Total Revenue of Rubber Farming (IDR)

Y : Total Bokar Production (Kg)

P : Bokar price (IDR/Kg)

Total cost is the sum of the total fixed and non-fixed costs used by farmers. Fixed costs are the cost of agricultural tools tapping knives, sap grooves, sharpening stones, collection bowls, machetes, buckets, large basins and electric *handsprayers* while non-fixed costs include transportation costs and freezing materials.

$$TC = FC + VC$$

Where:

TC : Total Production Cost (Rp)

FC : Total Fixed Cost (Rp)

VC : Total Non-Fixed Cost (IDR)

Soekartawi (2016) states that farm income is the difference between revenue and all farming costs. To calculate farm income, the formula can be used:

$$Pd = TR - TC$$

Where:

Pd : Rubber Farming Income (IDR)

TR : Total Revenue of Rubber Farming Business (IDR)

TC : Total Cost of Rubber Farming (IDR)

To answer the difference in the difference in value received by rubber farms using liquid smoke coagulants and alum coagulants, the calculation of the difference in value from using alum coagulants and liquid smoke coagulants in rubber latex is carried out with the following formula.

$$S = \frac{Pd(\text{alum}) - Pd(\text{liquid smoke})}{TL}$$

Where:

Pd(alum) : Rubber farming income using alum coagulant (IDR)

Pd(liquid smoke): Rubber farming income using liquid smoke coagulant (IDR)

TL : Total rubber latex (liters)

S : Difference value

Furthermore, to answer the second objective, namely to determine the amount of *stakeholder* WTP value for the use of liquid smoke coagulants that can reduce odor in rubber using

quantitative descriptive analysis method with CVM (*Contingent Valuation Method*) approach. According to Hanley and Spash (1993), the stages in the application of CVM analysis in determining the value of willingness to pay, namely:

a. *Creating a Starting Point*

In this study, the *starting point* or *starting point* used is the difference in value obtained from the use of alum coagulant and liquid smoke coagulant. after obtaining the difference in value from the use of alum coagulant and liquid smoke coagulant, a question is asked whether or not to agree to make efforts to deal with environmental pollution in the form of rubber odor. then how much is the willingness to pay. Then what is the willingness to pay that is willing to be paid.

b. *Obtaining Bids*

At this stage the researchers conducted a direct survey using a questionnaire. The purpose of this survey is to obtain the maximum value that respondents are *willing to pay for* the use of liquid smoke coagulants. In conducting the auction value, researchers conducted a comparative explanation related to the benefits and impacts caused and the improvement of rubber quality by using liquid smoke coagulants compared to using alum coagulants in the form of narratives, besides that there were also narratives related to the ease of obtaining products, and convenience in using products.

c. *Calculating Average Estimation of WTP*

The estimated average WTP can be calculated using the formula:

$$EWTP = \frac{\sum WTP.Xi}{N}$$

Table 1. Production costs of rubber farming

Cost	Coagulant	
	Alum	Liquid Smoke
Total fixed cost (IDR)	99,959	99,959
Total variable cost (IDR)	27,000	72,000
Total	126,959	171,959

(Source: Processed primary data, 2023)

Based on Table 1, it is known that the total production cost of rubber farming using alum coagulant and liquid smoke coagulant has a difference in total production cost, where the total production cost using alum coagulant is Rp 126,959 and Rp 171,959 using liquid smoke coagulant. The difference that occurs is due to the

Description:

EWTP : Estimated average WTP (IDR)

WTP. Xi: WTP value for each respondent (IDR)

N : Number willing to pay (People)

d. *Aggregating Data*

This process involves converting the overall sample mean data. One way to convert this is to multiply the sample mean by the number of samples as below (Suwanda, 2012).

$$TWTP = EWTP \times Ni$$

Description:

TWTP : Total WTP (IDR)

EWTP : Estimated or average WTP (IDR)

Ni : Number of Respondents (Person)

RESULTS AND DISCUSSION

Difference value of using alum coagulant and liquid smoke coagulant on rubber latex

To determine the first objective, namely the difference in the value of the use of alum coagulants and liquid smoke coagulants in latex, the calculation of rubber farming production costs, revenue and income of rubber farming is carried out. Rubber farm production costs are the value of various inputs in the form of objects and services used during the farm production process. According to Kurniawan & Handayani, (2023) Production costs are economic costs that are sacrificed to manage an organization or business. Production is the overall crop produced in farming activities expressed in units of kg or tons The production costs of rubber farming can be seen in Table 1.

amount of coagulant used in the agglomeration process and the difference in the purchase price of alum coagulant and liquid smoke coagulant. For 1 kg of alum coagulant costs Rp 5,000 while for the purchase price of 1 liter of liquid smoke coagulant costs Rp 20,000.

Reception

Revenue in farming is the result of multiplying the amount of production obtained by the selling price. The higher the amount of production and selling price, the greater the farm income obtained, otherwise if the amount of

production and low selling price, the farm income obtained will be smaller (Ramli *et al.*, 2022). Rubber farming revenue in this study is the total revenue earned by rubber farmers who use alum coagulant and liquid smoke coagulant, can be seen in Table 2.

Table 2: Total revenue of rubber farming

Coagulant	Production Quantity / Week (Kg)	Bokar Price (IDR/Kg)	Acceptance (YxP) (IDR/week)
Alum	79	7,800	616,200
Liquid smoke	70	9,100	637,000

(Source: Processed primary data, 2023)

Based on table 2, it can be seen that the selling price of bokar using alum coagulant and liquid smoke is different, where the selling price of bokar using alum coagulant is IDR 7,800 while the selling price of bokar using liquid smoke coagulant is IDR 9,100. In addition, based on the table it can also be seen that the amount of rubber latex production in one month is 79kg / week using alum coagulant and 70kg / week using liquid smoke coagulant with 4 times tapping in one week. This results in total rubber revenue using alum coagulant of Rp 616,200 and Rp 637,000 for revenue using liquid smoke coagulant.

Revenue

Income is the income received by farmers in the form of the difference between total production costs and revenue earned. According to Soekartawi (2016), income is obtained by reducing the overall revenue with production costs. In rubber farming income, the selling price of rubber received, as well as the prices of production factors incurred by farmers as production costs can affect income. (Adam *et al.*, 2023). The income referred to in this study is the amount of revenue received by farmers for one week minus production costs. The following income results of rubber farmers who use coagulants and liquid smoke coagulants can be seen in Table 3.

Table 3. Income of rubber farmers using alum coagulant and liquid smoke coagulant

Description	Alum	Liquid Smoke
Revenue (IDR)	616,200	637,000
Total production cost (IDR)	126,959	171,959
Revenue (IDR)	489,241	465,041

(Source: Processed primary data, 2023)

Based on Table 3, it was found that the income of rubber farmers using alum coagulant was IDR 489,241 and the income using liquid smoke coagulant was IDR 465,041. From the results obtained, the income using alum coagulant is greater than using liquid smoke coagulant.

Difference in value

Based on the research results obtained, rubber farmers still choose to use alum coagulants because farmers prefer the cheaper coagulant price and the heavier weight of the bokar obtained without taking into account the quality of the bokar produced. When viewed from the price received by

farmers based on table 18, there is a slight price difference with a difference of Rp 1,300/Kg between the price of bokar using alum coagulant and liquid smoke. Based on the results of interviews conducted, according to farmers, the price difference is still small enough to influence them in making the decision to switch to using liquid smoke coagulants, where if they switch in the use of coagulants, the costs incurred will also increase. In addition, there is a difference in the value of time and perceived by rubber farmers when using alum coagulants and using liquid smoke coagulants. The difference can be seen in table 4.

Table 4. Difference in the use of alum coagulant and liquid smoke coagulant

Alum Coagulant	1x Tapping	Coagulant Usage (gr)	Clumping Time (minutes)	Bokar Weight (Kg)
Day 1	13	500	43	15
Day 2	14	700	50	17
Day 3	17	1000	64	25
Day 4	15	800	58	22
Total	59	3000		79

Liquid Smoke Coagulant	1x Tapping	Coagulant Usage (ml)	Clumping Time (minutes)	Bokar Weight (Kg)
Day 1	15	750	122	18
Day 2	12	650	94	14
Day 3	15	750	122	18
Day 4	17	850	136	20
Total	59	3000		70

(Source: Processed primary data, 2023)

Based on Table 4, it can be seen that the difference perceived by farmers related to the comparison of the use of alum coagulants and liquid smoke coagulants has a difference in rubber clumping time, where farmers feel that the clumping time of rubber using liquid smoke coagulants is longer than using alum coagulants. However, the difference that is strongly felt by farmers is the difference in revenue and income from the use of alum coagulants and liquid smoke coagulants. To determine the difference in value from the difference in the use of coagulants using alum coagulants and those using liquid smoke coagulants, the calculation of the difference in value from the income obtained from the calculation of revenue minus production costs is divided by the total yield of rubber sap tapping for one week with 4 tapping times. After calculating the difference in value, the result of the difference in the value of the use of coagulants using alum coagulants and liquid smoke coagulants is Rp.410,-/liters.

Stakeholders' Willingness To Pay (WTP) for the Use of Liquid Smoke Coagulant

Willingness to pay or willingness to pay for liquid smoke coagulant is the maximum value that a person is willing to sacrifice to help overcome environmental pollution in the form of foul odor in rubber. Analysis of willingness to pay for environmental pollution prevention efforts in this study using the *Contingent Valuation Method* (CVM) approach with the following steps:

1. *Creating a Starting Point*

Making a *starting point* is the determination of the starting point by describing an illustration in the form of an incident of environmental pollution in the form of rubber stench that occurs due to the wrong use of coagulants that are not recommended in the rubber clumping process. In this study, the depiction of the situation provided in the form of information in the form of a narrative containing information related to the use of alum coagulants to coagulate rubber. In addition, it also contains the disadvantages of using alum coagulants that are able to bind water and cause foul odors in rubber. The narrative was presented in the research questionnaire and continued with questions related to knowledge of the use of alum coagulants in rubber. The results showed that there were 63% of people who knew the use of alum as a coagulant for rubber. However, although many people know the use of alum as a rubber coagulant, there are 53% of people who do not know the impact of environmental problems of rubber stench caused by the use of alum coagulants. This is because according to the community, the cause of rubber foul odor is not from the use of alum coagulants that are not recommended, but the foul odor occurs by the rubber sap itself. After knowing the cause of the environmental problem of rubber foul odor, 67% of the community agreed if there was a buildup related to the problem of rubber foul odor, but there were 33% of respondents who disagreed.

Based on the results in the field, some people said the reason for disagreeing was because other types of alum in the form of liquid smoke were minimal in number and the process of using and liquid smoke was still minimally known, then for the effect of liquid smoke could reduce the yield of the amount of rubber weight produced with an expensive purchase price, it would affect farmers' income compared to the use of alum. In addition, another reason respondents chose to disagree was because the use of alum coagulant was easier and they felt no problem with the use of alum. However, there are 63% of people who do not know the existence of liquid smoke coagulants that can solve the problem of foul odor in rubber. So that researchers analyzed the willingness to pay for liquid smoke coagulant products.

2. Obtaining Bids

The auction value is used to determine the *Willingness To Pay* (WTP) value of liquid smoke coagulant by asking questions in the form of bid values that have been set in the research questionnaire obtained through direct interviews and the help of *google form with* open questions regarding the amount of value that is willing to be paid to prevent environmental pollution in the form of foul odor in rubber. Then the respondent is free to choose and provide how much value is willing to pay. The distribution of the value (Price) that respondents are willing to pay can be seen in Table 5.

Table 5. Distribution of WTP values

Willingness to Pay (Rp)	Frequency (Person)	Value (Price/IDR)
100	0	0
200	1	200
300	1	300
400	1	400
500	11	5.500
1.000	7	7.000
Total	21	13.400

(Source: Processed primary data, 2023)

Based on Table 5, the results show that the lowest value that respondents are willing to pay is Rp.200, while the highest value that is willing to pay is Rp.1,000 with the majority of respondents willing to pay Rp.500 as many as 11 respondents from the number of respondents who are willing to pay consisting of affected communities and PT Karini Utama as a rubber processing industry. Thus there were 12 respondents who were not willing to pay, consisting of 10 affected communities and 2 *stakeholders*.

3. Calculating the Average WTP Value

The estimated average WTP value of liquid smoke coagulant to prevent environmental pollution of rubber stench given by respondents from Kemuja Village and Petaling Village is Rp.638/liter.

4. Sum Data

The last stage is the summation of data on the average value of WTP multiplied by the

number of respondents. Based on the calculation of the average value of WTP of Rp.638 / liter then multiplied by the number of respondents as many as 33 people, the total WTP result is Rp. 21,054 / liter.

The Role of Stakeholders in Supporting the Reduction of Air Pollution (Rubber Odor)

In research conducted by Wahyuni, (2022) that there is *misperception* in rubber farmers in Kemuja Village, West Mendo District, Bangka Regency because there are around 57.14% of rubber farmers stating that the use of alum coagulant in rubber is very environmentally friendly. This is due to the lack of understanding of farmers on the use of coagulants that are recommended in rubber agglomeration. So it is very necessary to provide information about understanding the use of good and correct coagulants. Therefore, the role of *stakeholders* is very important in helping to provide and motivate

farmers in order to change the mindset of farmers for the better.

Kemuja Village has an institution that aims to help the welfare of the people in Kemuja Village. This village welfare institution manages the rubber plantation owned by the Foundation. The purpose of the formation of LKD Kemuja is to help the welfare of the community such as providing assistance funds to the village community. In addition, the purpose of LKD Kemuja is also to help people who work as casual laborers who do not have land to farm. There are 48 laborers who work as rubber tapping laborers in Kemuja Village. For the distribution of farm labor wages, it is divided into a 2/3 division system for farm laborers and 1/3 for LKD Kemuja. Based on the results of interviews in the field with the head of LKD Kemuja related to the use of coagulants used in rubber freezing in Kemuja Village still using alum coagulants. The decision to use alum coagulant is because according to farm laborers in Kemuja Village it is easier and they are used to using alum coagulant.

Based on a statement said by the head of LKD Kemuja in the previous year they had used other coagulants besides alum, namely ant acid coagulants and liquid smoke coagulants. However, they returned to using alum coagulants because the price difference obtained by using alum coagulants and other coagulants was very thin, so the difference was felt to be the same as using alum coagulants and it was better to use alum because it was cheaper and easier to obtain. According to the head of LKD Kemuja, there is a possibility that they will use liquid smoke coagulant or ant smoke coagulant as the recommended coagulant if the price difference they receive is more than Rp.2,000 compared to using alum coagulant. Therefore, these problems must also be supported by the rubber processing industry in providing rubber purchase prices.

Based on the results of interviews with one of the staff of PT Karini Utama Bangka Belitung as a rubber processing factory, the purchase price given by the factory is determined by the calculation of the exchange rate, *sicom rubber* and factory production costs then multiplied by the rubber content to be sold. Determination of the rubber content is carried out by expert staff who really understand and master the rubber content. Based on the results of interviews obtained in the past, PT Karini Utama

did not want to accept bokar that used alum coagulant, only accepted bokar that used ant acid. However, this caused the supply of bokar to be quiet because not many people used ant acid coagulant as a rubber coagulant. One of the reasons rubber farmers do not use ant acid coagulants is because the purchase price is more expensive than alum. Based on research conducted by Wahyuni, (2022) There are 40% of farmers who strongly agree if there is a price subsidy policy on the recommended coagulant and there are expectations from farmers regarding training on how to agglomerate rubber according to recommendations. So that the role of government is also very important to help realize this desire.

Based on an interview with the head of the environmental structuring section of the Bangka Regency Environmental Agency, he stated that he would help recommend the socialization of the use of liquid smoke coagulants to industries in industrial supervision and guidance activities. However, for socialization to farmers, the head of the environmental management section said that it is more appropriate to be carried out by the Agriculture Office in agricultural extension activities and related to whether or not there is a price subsidy from the government budget is also more appropriately handled by the Agriculture Office. In addition, according to the head of environmental management, the existence of liquid smoke coagulants made from coconut shell waste is very good and very interesting. This is because the amount of coconut shell waste that is not used can become garbage that pollutes the environment. So that the manufacture of liquid smoke coagulant from coconut shells can provide added value to coconut shell waste and help realize sustainable development.

CONCLUSIONS

Based on the results of research on *willingness to pay* (WTP) for liquid smoke coagulants to *stakeholders* on the impact of environmental pollution, it can be concluded as follows:

1. The difference in value obtained from the use of alum coagulants and liquid smoke coagulants in the rubber clumping process is Rp.410, -/liter which is done by calculating the difference in income value using alum coagulants and liquid smoke coagulants divided by the total rubber

tapping. The difference in value shows the results that there is a difference between the income of rubber farming using alum coagulant which is Rp. 489,241, while the income of rubber farming using liquid smoke coagulant amounted to Rp. 465,041.

2. The amount of *willingness to pay* (WTP) value of liquid smoke coagulant as a rubber coagulant to prevent environmental pollution of rubber stench conducted with the *Contingent Valuation Method* (CVM) approach obtained an average WTP value of Rp.638, - and a total WTP value of Rp. 21,054/liter.

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