NOVATEUR PUBLICATIONS
INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY
[IJIERT] ISSN: 2394-3696 Website: ijiert.org
VOLUME 8, ISSUE 9, Sep. -2021

SELECTION OF THE BEST ALTERNATIVE IN THE PROCESSING OF PINEAPPLE JUICE AT PT. PUTRA JAYA, BLITAR REGENCY

Rakhmawati,
Agricultural Industrial Technology Study Program,
Faculty of Agriculture, University of Trunojoyo Madura (UTM)
Email: rakhma_ub@yahoo.co.id

Rekzi Ikhwan Sumardi,
Agricultural Industrial Technology Study Program,
Faculty of Agriculture, University of Trunojoyo Madura (UTM)

Abdul Azis Jakfar
Agricultural Industrial Technology Study Program,
Faculty of Agriculture, University of Trunojoyo Madura (UTM)

ABSTRACT

Pineapple is one type of tropical plant that is widely spread in Indonesia. Pineapple plants are easy to grow in various types of climates and soils, East Java is no exception. The processing of pineapples into food and beverages in Indonesia has been widely carried out, including PT Putra Jaya. In its production, PT Putra Jaya produces waste in the form of liquid waste from washing and solid waste in the form of pineapple leaves, pineapple skin from cuttings, pineapple pulp left over from cooking pineapple juice. Of the three wastes, there are several wastes that cause odors and can attract flies, including pineapple peel waste and pineapple pulp waste. Therefore, there is a need for waste treatment at PT Putra Jaya. In this study using the Composite Performance Index (CPI) method and the Hayami Method. There are three alternatives proposed, namely animal feed from pineapple peel waste, fertilizer from pineapple peel waste and meat tenderizer from pineapple peel waste. The results of the CPI method used to determine the application of clean production are the first rank of liquid fertilizer with a value of 344,441. In the second rank is animal feed with a yield of 340,280. The third rank is meat tenderizer with 284,151 results. From these results, an alternative liquid fertilizer was chosen which has the opportunity to be applied as waste treatment for clean production at PT Putra Jaya. The added value analysis of the selected alternative is Rp. 14.79. The alternative liquid fertilizer from pineapple peel waste is produced in 1 liter packaging at a price of Rp. 20,000.

Keywords: Pineapple, Composite Performance Index, Value Added Analysis

PRELIMINARY

Pineapple is one type of tropical plant that is widely spread in Indonesia. Pineapple plants are easy to grow in various types of climates and soils, East Java is no exception. According to the Central Statistics Agency, in the East Java area in 2017 pineapple production reached 1,269,631 quintals, while in 2018 the number of pineapple production increased by 1,392,349 quintals. From this very large production, many companies process pineapples to be used as various kinds of food and beverages.

The processing of pineapples into food and beverages in Indonesia has been widely carried out, including PT Putra Jaya. This company was founded in 2013 in Blitar, East Java, but at the beginning of its establishment this company did not produce pineapple juice. The pineapple processing process has only started in the last two years with the trademark "Segar". The raw material for the product comes from fresh pineapple obtained from land owned by the company and from farmers around the Blitar area. PT Putra Jaya in a day can produce 5-10 times of production, this is influenced by the available raw materials, if the pineapple is harvesting it will produce more. In one cooking or production requires 50 kg of peeled pineapple raw materials, these raw materials produce 211

According to the Minister of Environment Decree No. 75 of 2015, companies and industries in Indonesia are expected to be able to maintain environmental sustainability in the implementation of their production, therefore the application of clean production in production activities is very important. Clean production is an

environmental management activity that is systematic and applied continuously to the production process of a company which aims to reduce the risk of pollution to the environment so as not to have a negative impact on public health. In the production of pineapple juice, PT Putra Jaya produces waste in the form of liquid waste from washing and solid waste in the form of pineapple leaves, pineapple skin from cuttings, pineapple pulp left over from cooking pineapple juice. Of the three wastes there are several wastes that cause odors and can attract flies, including pineapple peel waste and pineapple pulp waste. Therefore, there is a need for waste treatment at PT Putra Jaya.

RESEARCH METHODS

This research was conducted at PT Putra Jaya, Blitar Regency, East Java Province in December 2020.
This study uses the Composite Performance Index (CPI) method and the Hayami method. The Composite Performance Index method is useful for determining alternatives, while the Hayami method is useful for analyzing the value-added alternatives from the results of the Composite Performance Index method.
Data collection in this study used primary and secondary data and involved experts from the Environment Agency.

RESULTS AND DISCUSSION

Composite Performance Index

Table 1. Alternative Use of Cleaner Production at Pt Putra Jaya

No	Waste Type	Company Handling	Alternative	Impact
1	Pineapple Leaves	Accommodated in the Shelter	Opportunity to be processed	No impact
2	Washing water	Thrown away	Use of water filters	No impact
3	Pineapple Skin	Accommodated in sacks	Opportunity to be processed	Smells and attracts flies
4	Pineapple pulp	Accommodated in the drum	Opportunity to be processed	Smells and attracts flies

Based on **Table 1.** the waste that needs to be proposed for processing is pineapple pulp and pineapple skin, this is because the skin and pulp cause a pungent odor and invite flies that can disturb the surrounding community, so from these problems three alternatives were chosen, namely animal feed from pineapple skin, liquid fertilizer from pineapple skin and flesh tenderizer from pineapple pulp.

Table 2. Results of Criteria Weighting.

Respondent	Criteria Weight		
	Technical	Economy	Environment
1	5	5	5
2	4	5	4
3	4	5	3
Results	0.325	0.375	0.3

Based on **Table 2**, the weight of the criteria for each criterion in a row, namely the economy has the highest weight with a value of 0.375, technical has a criterion weight of 0.325 and for the environment has a criterion weight of 0.3. From the results above, it can be concluded that the processing of pineapple peel waste at Pt Putra Jaya is more concerned with economic criteria than the other two criteria, namely technical and environmental.

Table 3. Results of the Composite Performance Index (CPI) method

Alternative	Criteria									amount	Rating
	Technical			Economy				Environment			
	Quantity of raw materials	Production process	Production Time	Advantage	Cost	ayback period	aste volume	Ease of processing	Environmental Impact		
Animal feed	125	69.69	90	200	100	100	100	138.89	86.96	340,280	2
Fertilizer	107.2	100	90	200	100	100	100	138.89	86.96	344,441	1
Meat Tenderizer	100	69.69	100	100	100	100	80	100	100	284.151	3

Based on Table 3. the results of the calculation of CPI (Composite Performance Index) which were processed using the Microsoft Excel 2013 program. Alternative fertilizers made from pineapple peel waste got a total calculation value of 344.441, while alternative animal feed made from pineapple peel waste appeared as much as 340,280, while for the alternative meat tenderizer made from pineapple pulp waste, the calculation value reaches 284,151. of the three alternatives, the first rank is an alternative to fertilizer from pineapple peel waste, for the second rank is occupied by alternative animal feed from pineapple peel waste and the third rank is an alternative to meat tenderizer from pineapple pulp waste.

Fertilizer Manufacturing Process

In making organic fertilizers refer to the references of Susi et al (2018) and Satriawi et al 2019. The materials needed in making fertilizer are 10 kg of pineapple peel, 300 ml of EM4, 15 liters of water and 1 kg of granulated sugar or palm sugar. The procedure for making fertilizer starts from milling pineapple peel waste and then adding EM4.

Picture 1. Milling Result

Picture 2. EM4 Eddition

Picture 3. Water Eddition

Table 4. Fixed Cost Details

Machinery and Equipment	amount	Purchase Value (Total price)	Residual value	Economic Age (Months)	Depreciation (Month)
Milling Machine	1	3,100,000	1,000,000	60	35,000
Funnel	2	1,500	0	1	1,500
Drum	12	3,600,000	3,000,000	60	10,000
		Total			Rp 46,500

Picture 4. Sugar Eddition

After that put into the drum and add water. Then the sugar is put into the drum, after all the ingredients enter then stirred so that the ingredients are mixed. after that put into the drum and add water. Then the sugar is put into the drum, after all the ingredients enter then stirred so that the ingredients are mixed. The covered material is allowed to ferment for 2 weeks.

Value Added Analysis

Fixed cost

Fixed costs are costs that are not affected by the total product produced by a company. In production activities, the costs used for production equipment, in the calculation using depreciation costs on the tool, the formula for calculating depreciation costs, namely the purchase price of the tool compared to the economic life of the tool or arguably the length of use of the tool (Hamidah et al 2015).

In the production of pineapple peel waste fertilizer, which includes fixed costs, namely milling machines, drums and funnels. The assumption of the purchase price of the three goods is obtained from E-commerce. Details of the costs of machinery and equipment used in the production of pineapple peel waste fertilizer can be seen in **Table 4.**

Variable cost

Variable costs are costs that can change proportionally with production activities, these costs generally include the purchase of raw materials, costs of auxiliary materials, labor costs and other costs (Hamidah et al 2015). In the production of pineapple peel waste fertilizer, which includes variable costs, namely raw materials for pineapple skin, Em4, coconut water, palm sugar, 1 liter jerry can packaging, labels, employee costs and diesel fuel costs.

The cost assumptions that are included in the calculation of variable costs are obtained from E-commerce sources. Details of variable costs can be seen in **Table 5** as follows:

Table 5. Variable Cost Details

Needs	amount	Unit	Unit price	Total
Raw material				
Pineapple Skin	100	Kg	IDR 1000	IDR 100,000
Auxiliary Material				
Water	60	Liter	-	-
Sugar	10	Kg	IDR 8,000	IDR 80,000
Em4	3	Liter	IDR 20,000	IDR 60,000
Packaging				
1 Liter jerry can	87	Unit	IDR 3,000	IDR 261,000
Label size 10 x 10 cm	87	Unit	IDR 1,000	IDR 87,000
Labor				
Employees	2	Person	IDR 30,000	IDR 60,000
Energy				
Solar	1.3	Liter	IDR 5,150	Rp 6,695
Total				Rp 654,695

Based on **Table 5**. the total variable cost required for one production is Rp. 654,695, thus the variable cost for one month of production or 26 times of production is Rp. 17,022,070.

Total Cost

The total cost is calculated from the calculation of the total fixed costs and the total variable costs. From the results of the calculation of fixed and variable costs added up, the result of the addition is called the total cost. Details of the total costs are in **Table 6.**

Table 6. Total Cost Details

Fee Type	Nominal
Fixed cost	Rp 46,500
Variable cost	Rp 17.022.070
Total	Rp 17,068,570

From the total cost of Rp. 17,068,570, it produces 2,262 liters of liquid fertilizer. It is assumed that in a day the production produces 87 liters, in a month it can produce 26 times, so it can be assumed that the total cost produces 2,262 products, so that the production cost for one product is Rp. 7,545.

Total Revenue

Total revenue is obtained from product sales multiplied by product price. Sales results are assumed to be the result of fertilizer production, which is 87 liters in one production, so that in one month production gets 2,262 liters. This fertilizer product is packaged using 1 liter jerry cans, so that in one day 87 products are obtained and in one month 2,262 products are obtained. The price of pineapple peel waste fertilizer is sold in one package for Rp. 20,000, the price is assumed by comparing the price of liquid fertilizer in the market, from that price the profit taken is Rp. 12,454. Determination of revenue, the price of fertilizer is multiplied by the production, so that in one month the total revenue production is Rp. 28,170,948.

Profit

According to Nuzuliyah (2018), profit is generated from a reduction in total cost minus total revenue. The production of pineapple waste fertilizer has a total cost of Rp. 17,068,570 and a total revenue of Rp. 28,170,948, so it can be seen that the profit of pineapple peel waste production is Rp. 11,102,378.

Ratio

Ratio calculation is done by dividing total revenue by total cost. In the production of pineapple peel waste fertilizer, it is known that the total revenue is Rp. 28,170,948 while the total cost is Rp. 17,068,570. The result of the ratio calculation is 1.65, this result means that the alternative production of pineapple peel waste fertilizer is profitable.

Value Added Analysis Results

The added value analysis in this study uses the Hayami method (1987) taken in Nuzulia's research (2018) and research from Aji et al (2018) as well as thesis reference from Prastika (2018). The results of the calculation of the added value analysis can be seen in Table 7.

Table 7 shows the results of the added value analysis of alternative pineapple peel waste fertilizers in one production process. The raw material in the form of pineapple peel waste used in the production of fertilizer is 100 kg, of the amount of raw material the fertilizer produced in one production process is 87 liters with the selling price of one liter is Rp. 20,000.

The conversion factor value is obtained based on the division between the volume of output produced and the volume of raw materials used, resulting in a conversion factor value of 0,87. The workforce used in the production process is 2 people with a wage of IDR 30,000 per day. So that the resulting coefficient is 0.02, the results are obtained from the division between the use of labor and the input used.

According to Prastika et al(2018) the value of the contribution of other inputs is obtained by dividing the total cost of auxiliary materials with the results in one production process. In the production of pineapple peel waste fertilizer, the total cost of the auxiliary materials is Rp. 140,000 then divided by the output of 87 liters so that the value of the contribution of other inputs is Rp. 1,609.

The added value generated from processing pineapple peel waste is Rp. 14,791 per kg, while the added value ratio is 850.01% . The ratio is obtained from the percentage between the added value and the product output, thus concluding that every Rp 100 the value of the fertilizer product contains an added value of Rp 85.01.

Table 7. Value Added Analysis Results

	No	Variable	Notation
Output Input and Price	1	Output (Kg)	87
	2	Raw Material Input (Kg)	100
	3	Labor (HOK/production process)	2
	4	Convection Factor (Kg output/Kg Raw material)	0.87
	5	Labor Coefficient (HOK/Kg of raw material)	0.02
	6	Output Price (Rp/Kg)	20,000
	7	Labor Wages (Rp/production process)	30,000
Revenue and Profit	8	Raw Material Input Price (Rp/Kg)	1,000
	9	Contribution of Other Inputs (Rp/Kg output)	1,609
	10	Output Value (Rp/Kg)	17,400
	11	A. Added Value (Rp/Kg)	14,791
		B. Value Added Ratio (%)	85.1
	12	A. Labor Income (Rp/Kg)	600
		B. Labor share (%)	4.06
	13	A. Profit (Rp/Kg)	14,191
		B. Profit Share (%)	81.55
Remuneration and Owner of Factors of Production	14	Margin (Rp/Kg)	16,400
		A. Labor Income (%)	3.65
		B. Other Input Donations (%)	6.09
		C. Profit (%)	86.53

According to Prastika et al(2018) the value of the contribution of other inputs is obtained by dividing the total cost of auxiliary materials with the results in one production process. In the production of pineapple peel waste fertilizer, the total cost of the auxiliary materials is Rp. 140,000 then divided by the output of 87 liters so that the value of the contribution of other inputs is Rp. 1,609.

The added value generated from processing pineapple peel waste is Rp. 14,791 per kg, while the added value ratio is 850.01% . The ratio is obtained from the percentage between the added value and the product output, thus concluding that every Rp 100 the value of the fertilizer product contains an added value of Rp 85.01.

The remuneration received by the workforce is the compensation received by the workforce for every kilo of fertilizer product produced. The result of employee benefits is Rp. 600 per kg, so that if a percentage is 40.05%. For the company's profit obtained from the difference between the added value and the value of the workforce, the result is Rp. 14,191 with a profit percentage of 81.55%.

The margin obtained in the production of pineapple peel waste fertilizer is Rp. 16,400, for labor income to the margin of 3.65%, while for the contribution of other inputs to the margin of 6.09%, and for the company's profit to the margin of 86.53%, so it can be concluded that Pineapple skin waste is better processed than sold directly, this is because the profit percentage is still above 50%.

CONCLUSIONS AND SUGGESTIONS

Conclusion

1. There are three alternatives proposed, namely animal feed from pineapple peel waste, fertilizer from pineapple peel waste and meat tenderizer from pineapple peel waste. The results of the CPI method used to determine the application of clean production are the first rank of liquid fertilizer with a value of 344,441. In the second rank is animal feed with a yield of 340,280. The third rank is meat tenderizer with 284,151 results. From these results, an alternative liquid fertilizer was chosen which has the opportunity to be applied as waste treatment for clean production at PT Putra Jaya.
2. Analysis of the added value of the selected alternative of Rp. 14.79. The alternative liquid fertilizer from pineapple peel waste is produced in 1 liter packaging at a price of Rp. 20,000.

SUGGESTION

1. Further research is needed to determine the fertility of plants against pineapple peel waste fertilizer.
2. Further studies are needed to how to use pineapple peel waste fertilizer.
3. Further research is recommended to analyze the marketing of fertilizer products produced from pineapple peel waste.

BIBLIOGRAPHY

1) Aji, VP, Rasyid, Y and Wahyudi, S. 2017. Analysis of Value Added Processing of Lemuru Fish Using the Hayami Method. Scientific Journal of Industrial Engineering. 17(1) : 56-61.
2) Ariyanti, M., Purwanto, P and Suherman, S. 2014. Analysis of the Application of Cleaner Production Towards an Environmentally Friendly Nata de Coco Industry. Journal of Industrial Pollution Prevention Technology Research. 5(2) : 45-50.
3) Artika, IBE and Ida, AKM 2016. Analysis of Value Added Bananas into Banana Chips in Babakan Village, Mataram City. Ganec Swara. 10(1) : 94-98.
4) Azizah, A., Al-Baarri, AN and Mulyani, S. 2012. Effect of Fermentation Time on Alcohol Levels, pH and Gas Production in Bioethanol Fermentation Process from Whey with Pineapple Skin Substitution. Journal of Food Technology Applications. 1(2) : 72-77.
5) Djayanti, S. 2015. A Study on the Application of Clean Production in the Tofu Industry in Jimbaran Village, Bandungan, Central Java. Journal of Industrial Pollution Prevention Technology Research. 6(2) : 75-80.
6) Fachruddin, L. 2002. Making Various Fruit Juices. Yogyakarta : Kanisius.
7) Hakimi, R and Budiman, D. 2006. Application of Cleaner Production in the Nata De Coco Industry. Journal of Mechanical Engineering. 3(2) : 89–98.
8) Hamidah, M., Yusra, AHA and Sudrajat, J. 2015. Analysis of Added Value of Sweet Potato Chips Agroindustry in Pontianak City. Journal of Social Economics of Agriculture. 4(2) : 60-73.
9) Marimin and Nurul, M. 2010. Application of Decision Making Techniques in Supply Chain Management. Bogor : IPB Press.
10) Hayami, Y., Kawagoe, T., Morooka, Y and Siregar, M. 1987. Agriculture marketing and processing in upland Java, A Prepective from a Sunda village. Bogor : CGPRT Center.
11) Helda. 2004. Analysis of Added Value of Anchovy Processing in Pasaran Island, Lampung Province. Thesis. Bogor : Faculty of Fisheries and Marine Sciences, IPB.
12) Ibrahim, W., Mutia, R and Nurhayati. 2018. Use of Fermented Pineapple Skin in Ration Containing Weeds with Medicinal Properties Against Digestive Organs of Broiler Chickens. Indonesian Journal of Animal Science. 13(2) : 214-222.
13) Indrasti, NS and Fauzi, AM 2009. Clean Production. Bogor : IPB Press.
14) Ministry of Environment of the Republic of Indonesia. 2015 PROPER 2015. Jakarta, Ministry of Environment of the Republic of Indonesia.
15) Kurun In, AW and Nur, FA 2019. The Effect of Competence and Independence on Audit Quality With Auditor Ethics as Moderating Variable. Journal of Accounting Science and Research. 8(8) : 1-15.
16) Kwartiningsih, E and Nuning, SM 2005. Fermentation of Pineapple Juice into Vinegar. Journal of EQUILIBRIUM. 4(1) : 8-12.

17) Mahmud, A., Ajeng, W., Leni, RL, Lalu, BW, Suhadi, M and Widia, N. 2017. Community Empowerment in Utilizing Pineapple Skin Waste (Ananas comosus L. Merr) into Vitamin Rich Syrup in Payaraman District . Empowerment Journal. 1(2) : 137-142.
18) Marimin and Nurul, M. 2010. Application of Decision Making Techniques in Supply Chain Management Methods. Bogor : IPB Press.
19) Mustiadi, L., Siswi, A and Aladin, EP 2019. Textbooks Converting Organic and Inorganic Waste Into Charcoal Particle Pellet Fuel. Malang : CV IRDH.
20) Nuzuliayah, L. 2018. Analysis of Value Added Products of Rhizome Processed Plants. Journal of Agroindustry Technology and Management. 7(1) : 31-38.
21) Oviana, T., Titik, N. A and Joko, P. 2015. Isolation and Characteristics of Causes of Fruit Rot Disease in Pineapple (Ananas comosus [L.] Merr.). Journal of Tropical Agrotech. 3(2) : 220-225.
22) Prastika, YD 2019. Determination of the Best Clean Production Implementation in the UKM Cake Serabi "Apen Julit Gettas" Karanganyar Sumenep and Analysis of Added Value. Thesis. Bangkalan : Faculty of Agriculture UTM.
23) Purwanto. 2005. Application of Clean Production in Industrial Estates. Presented at the Seminar on the Implementation of the Clean Production Program in Encouraging the Creation of Eco-industrial Areas in Indonesia. Jakarta.
24) Rosaliana, R., Aisyah, HR and Riska, RN 2019. Training on Pineapple Waste Treatment as a Meat Tenderizer Product. Journal of Community Service and Empowerment. 3(2) : 309-314.
25) Sa'adah, LIN and Teti, E. 2015. Characterization of Apple Cider Drinks for Micro and Small Scale Production in Batu City: A Study of Literature. Journal of Food and Agroindustry. 3(2) : 374-380.
26) Satriawi, W., Etik, W. T and Acmad, I. 2019. The Effect of Organic Waste Fertilizer on Growth and Yield of Cucumber Plants (Cucumis sativus L.). Journal of Applied Agricultural Research. 19(2) : 115-120.
27) Simanjorang, RM 2018. Application of the Composite Performance Index Method in Supporting Decision Making in the Selection of the Best Teacher (Case Study: SDN 03 Pagaran Tapah). Panusa Mantik Journal. 2(2) : 180-184.
28) Suhardi, B., Pringgo, WL and Nabila, NF 2017. Analysis of the Application of Clean Production in Batik Printing IKM Batik Puspa Kencana Laweyan Surakarta. Journal of Agricultural Industrial Technology. 27(2) : 182-191.
29) Susi, N., Surtinah and Muhammad, R. 2018. Testing the Nutrient Content of Liquid Organic Fertilizer (POC) Pineapple Peel Waste. Agricultural Scientific Journal. 14(2) : 46-51.
30) Ujiti, RMD 2017. Clean Production in the Fishery-Based Food Industry. Journal of Food Science and Fishery Products. 1(1) : 28-36.