

## RELEVANT COSTS AND DECISION MAKING OF INVESTMENT

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### **Abstract**

*The activity of running a cultivation oyster mushroom, farmers faced with the decision of several alternative fuel to generating baglog and fresh white mushrooms, which use LPG fuel or wood fuel. Thus required an appropriate decision of some of the most favorable alternative. The study was conducted at Enterprises of White Oyster Mushroom in Samarinda City, East Kalimantan, Indonesia. Data were analyzed using financial ratios to assess and calculate the revenues, expenses, and investment decisions. This research aims to: 1) Analyze and calculate a more favorable alternative between to the use of fuel than the fuel LPG compared fuel timber on white oyster mushroom cultivation in Samarinda City based on: (1) Costs and revenues; (2) Break even point (BEP); 2) Analyze and calculate investment decisions on White Oyster Mushroom cultivation in Samarinda by: (1) Payback Period; (2) Average Return On Investment (ROI); (3) Net Present Value (NPV). Results of the study of white oyster mushroom cultivation in Samarinda City showed that: the decision to use wood fuel more profitable than using LPG fuel.*

**Key words:** *alternative, decisions making, investment*

### **INTRODUCTION**

Indonesia as an agricultural country with the potential to develop the production of mushrooms, because natural resources are owned and can be used as an ingredient mushroom production. Mushroom is a plant that is often found in the wild. The Mushrooms can grow easily on a log or plants and organic waste. White oyster mushroom or known by the scientific name *Pleurotus ostreatus*, [2] is one of the wood mushrooms and cultivated widely consumed by the public. White oyster mushroom more easily cultivated. This Mushroom has a high nutritional content, the relatively higher protein and fat are relatively lower than other vegetables and mushrooms. White oyster mushroom is a commodity that can be developed to cultivated of society, increase incomes and improve nutritional status [17].

One white oyster mushroom producers in East Kalimantan is Samarinda City, Indonesia. White oyster mushroom production in Samarinda city is managed by farmers scattered in the regions and districts in the city of Samarinda. The spread of farmers are joined in the Association of Employers' White Oyster Mushroom in Samarinda city.

This association is a medium for deliberation, determine and set the selling price of white oyster mushroom (equity production of mushrooms and mushrooms price stability).

The activity of running a white oyster mushroom cultivation, farmers faced with the decision making of some of the most profitable option for business. Farmers faced with the choice of using LPG (liquid Petroleum Gas) fuel and the fuel of wood. The choice of this fuel to used to produce baglog and fresh white mushrooms. Baglog [17] is a planting medium that will be given seeds (inoculated) mushrooms. Manufacture of baglog (growing media) and white mushrooms are ready to harvest are the business activities of the Employers' Association of White Oyster Mushroom in Samarinda city.

An attempt should be able to manage their business properly, because the market still has room for white mushrooms. Thus required an appropriate decision making of some of the most favorable alternative of income and expenses. Decision-making [11] [16] is the process of choosing an alternative, how to act in an efficient method according to the situation. The process of finding and resolving organizational problems. This statement

confirms that the decision-making requires a series of actions, requires several steps. Decision-making [16] is to choose one among several alternative measures available. Decision-making is describe the process of a series of activities chosen as the settlement of certain problems.

All forms of decision-making by the management must consider all the factors that can influence decision-making, one of the factors that influence the decision making is the cost factor is called the relevant costs. Relevant costs [8] is the cost of future expected to be different or be affected by an election decision making among various alternatives. Relevant costs [5] is the cost of a future that is different for each alternative. All decisions relating to the future so that future costs is only that may be relevant to a decision. The relevant cost [7] is the estimated future costs and revenues relevant is the expected future income, which differ among alternative actions that are being considered by a manager. Costs and revenues that are relevant to decision making depends on the context of the decision and the alternatives available. In the final stage of the decision-making process, managers compare two or more series of alternative actions [7]. Costs and revenues that are relevant to the alternative of investment decisions generate costs, revenues and profits are different.

The decision making process of several alternatives [1], the management must choose the alternative most favorable to the company. To choose one of these alternatives, the management need information about costs.

Information on the costs need to be considered by every company because it is used in pricing, efficient use of resources, and even the evaluation of the most profitable product line. The amount of charge needed to monitor support various functions in the business, including decisions concerning the selection of various kinds alternatif. Management often face uncertainty in selecting the most favorable alternative. Therefore, management requires cost information that can reduce uncertainty, thereby enabling them to determine a good choice. One of the important information for

planning and decision-making is information of the cost analysis of relevant [15].

Identification of a charge is relevant or irrelevant to a decision, then the manager approach in analyzing costs should take steps according to [12] as follows:

- 1) Collect all the expenses to be incurred related to each alternative to be considered.
- 2) Elimination of costs sunk.
- 3) Elimination of expenses that do not differ among various alternatives.
- 4) Make a decision based on the remaining charge. These costs will be the relevant costs or expenses inevitable, therefore, relevant costs to consider in making decisions that will be taken.

The activity of running the business, the company's management faced with the decision making of the most profitable investment. Investments [10] that is capital expenditures or funds invested every related assets in the hope that funds will be received back in both the short and long term. Investment decision [4], it is important for management, as relates to the source of corporate funds in the amount of relatively large, relatively long investment period and a future filled with uncertainty. Therefore, the accuracy required management in making investment decisions.

Investment planning can be done through analysis of capital budgeting. Capital budgeting is the process of evaluating, selecting capital which can provide revenue for the company [13]. In the capital budgeting process there are three things that must be considered by decision-makers are the type of project, the availability of funds, and approaches to decision making. One of the barriers of capital budgeting process is the limited amount of money available. The amount of funds the company to carry out investment activities greatly influence the decisions taken as acceptable or not related to the investment proposal.

This research aims to:

- 1) Analyze and calculate a more favorable alternative between to the use of fuel than the fuel LPG compared fuel timber on white oyster mushroom cultivation in Samarinda City based on: (1) Costs and revenues; (2) Break even point (BEP);

2) Analyze and calculate investment decisions on White Oyster Mushroom cultivation in Samarinda by: (1) Payback Period; (2) Return On Investment (ROI); (3) Net Present Value (NPV).

## MATERIALS AND METHODS

This study was carried in units of oyster mushroom cultivation Samarinda city in the Association of Employers of Oyster Mushroom Samarinda. Locations were selected includes all the data of white oyster mushroom farmers enrolled in the association. The research location in Samarinda city, East Kalimantan, Indonesia. This study was conducted in June-October 2015, to obtain preliminary data through surveys, interviews from the chairman of the Employers' Association of Mushroom Samarinda.

This study uses a formulation ratios as follows:

1) Alternative of fuel is more profitable between LPG fuel compared with wood fuel on white oyster mushroom cultivation in Samarinda city use:

(1) Revenue and Cost Ratio (R/C Ratio): is the ratio to see revenues per unit costs incurred, use indicator of Revenue Cost Ratio (R/C ratio) [15], namely:

$$R/C \text{ Ratio} = \frac{\text{Total Revenues}}{\text{Total Costs}}$$

Decision-making is: (a) If the  $R/C > 1$ , then the cultivation of oyster mushrooms which done profitable, because the reception is greater than the total cost. (b) If the  $R/C < 1$ , then the oyster mushroom cultivation which is done not profitable, because the reception is smaller than the total cost. (c) If the  $R/C = 1$ , then the oyster mushroom cultivation which is done is break even.

(2) Benefit and Cost Ratio (B/C ratio), is the ratio between profit or revenue generated from any cost incurred in the production process [10] namely:

$$B/C \text{ Ratio} = \frac{\text{Net Revenues}}{\text{Total Costs}}$$

Decision-making is:

(a) If  $B/C > 0$ , then the cultivation of oyster mushrooms which done profitable, because the income is greater than the total cost.

(b) If the  $B/C < 0$ , then the oyster mushroom cultivation which done not profitable, because the income is less than the total cost.

(c) If the  $B/C = 0$ , then the oyster mushroom cultivation which done is break even.

(3) Analysis of Break Even Point (BEP) within the unit and IDR [6] is the point where total revenues equals total costs, the point where the profit is equal to zero.

(4) Break Event Point (BEP) formulated [1] as follows:

$$\text{Breakeven in IDR} = \frac{\text{Total Fixed Costs}}{1 - \frac{\text{Total Fixed Costs}}{\text{Total Selling Price}}} \text{ or } \frac{\text{Total Fixed Costs}}{\text{Contribution Margin Ratio}}$$

$$\text{Breakeven in Unit} = \frac{\text{Fixed Cost}}{\text{Selling price per unit} - \text{Variable costs per unit}}$$

2) The investment decision on Cultivation White Oyster Mushroom in Samarinda city based:

(1) Payback Period, [4] analyzes the payback period is a time period / period required investors to pay back all the costs that have been incurred to invest in a project with the formula:

$$\text{Payback Period} = \frac{\text{Invested capital}}{\text{Operating Cash Flow}}$$

(2) Return On Investment (ROI) is also called accounting rate of return method, which measures the rate of profit ability (profitability) which ignored in the payback period method [4], the formula:

$$ROI = \frac{\text{Profit}}{\text{Total Costs}} \times 100 \%$$

(3) Net Present Value (NPV) that is calculates cash receipts (cash inflows) in the future for ongoing investments, calculated based on the present value [4], using the formula:

$$NPV = PV (\text{Present Value}) - I (\text{Initial investment costs})$$

Criteria for assessment of investment decisions using the NPV is an investment proposal will be accepted, if the present value of cash inflows is greater than the present value of its cash outflows.

## RESULTS AND DISCUSSIONS

### Results

#### Profit, R/C Ratio and B/C Ratio Baglog and Fresh Mushrooms

The feasibility analysis of white oyster mushroom cultivation with target of baglog sales and target of fresh oyster mushroom sales, the business analysis is made assuming the use of LPG fuel and wood fuel for the following:

Table 1. Profit, R/C Ratio and B/C Ratio Baglog and Fresh Mushrooms

Description	Unit	Alternative Fuel	
		LPG	Wood
Total Revenue :			
Baglog Revenue+ Mushrooms Revenue	IDR	41,974,134	42,025,800
Total Operating Costs	IDR	23,853,733	23,027,900
Profit Per Period	IDR	18,120,401	18,997,900
R/C ratio = Revenue Total / Total	%	1.76	1.82
B/C ratio = Net Revenue / Total Costs	%	0.76	0.82

Source: Result research.

Analysis of calculation of receipts over costs or R/C ratio in the cultivation of oyster mushrooms White with fuel use LPG or firewood obtain the number over 1. Decision-making criteria in the analysis of the acceptance of charges or R/C ratio, if the R/C ratio > 1, then the effort profitable because the reception is greater than the total cost, if the R/C ratio < 1, then the work done is not profitable, because the revenues is smaller than the total cost.

The cultivation of oyster mushrooms white which are run by farmers in Samarinda city with fuel use LPG or firewood "beneficial" because of the amount of revenue is greater than the total cost to the value of R/C ratio > 1 fuel use LPG with a value of 1.76 when using wood fuel with a value 1.82.

Analysis of the calculation of net revenue over expenses or B / C ratio in the cultivation of oyster mushrooms White with fuel use LPG or firewood obtain a value > 0. Decision-making is: If B/C > 0, then the cultivation of oyster mushrooms which done efficiently. If the B/C < 0, then the oyster mushroom cultivation which done is not efficiently.

The cultivation of white oyster mushrooms which are run by farmers in Samarinda with fuel use LPG or firewood "efficiently"

because the amount of net income is greater than the cost of the total value of B/C ratio > 0, using the fuel of LPG with a value of 0.76 and using fuel wood with a value of 0.82.

#### Analysis Break Even Point on the cultivation of White Oyster Mushrooms

Break even point analysis on the cultivation of White Oyster Mushrooms is done on the production activities by comparison calculations on fuel used.

Table 2. Break Event Point (BEP) on The Cultivation of White Oyster Mushrooms

Description	Unit	Alternative Fuel	
		LPG	Wood
BEP Baglog Production:			
= Total Cost of Production/ Sales Price Baglog	baglog	2,385	-
= IDR14,312,240 / IDR6,000	baglog	-	2,303
= IDR13,816,740 / IDR6,000			
BEP Mushroom Production:			
= IDR9,541,493 / IDR30,000	Kg	318	-
= IDR9,211,160 / IDR30,000	kg	-	307

Source: Result research.

Here is presented BEP picture for BEP production and fresh mushrooms with a comparison using LPG fuel and wood fuel.

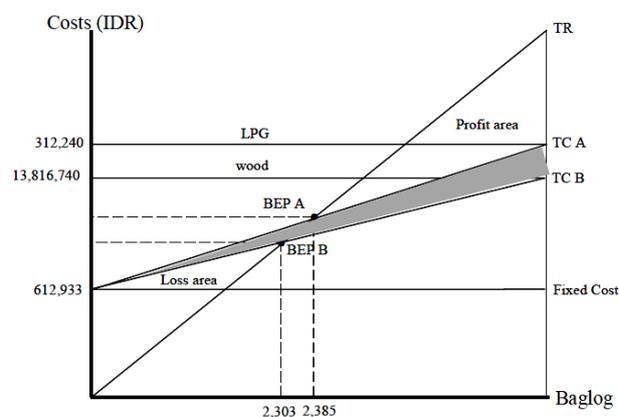


Fig.1: BEP of Baglog Production with Fuel LPG and Wood

Source: Own calculation.

Description for Figure 1:

TC A is Total Cost of baglog production using LPG fuel. TC B is Total Cost of baglog production using wood fuel. BEP A is break-even point of baglog production using LPG fuel. BEP B is break-even point of baglog production using wood fuel.

The shaded area above the point coordinates BEP indicate differences BEP of baglog production with LPG fuel and wood. The shaded area below the coordinates of BEP

shows production loss baglog with different fuels.

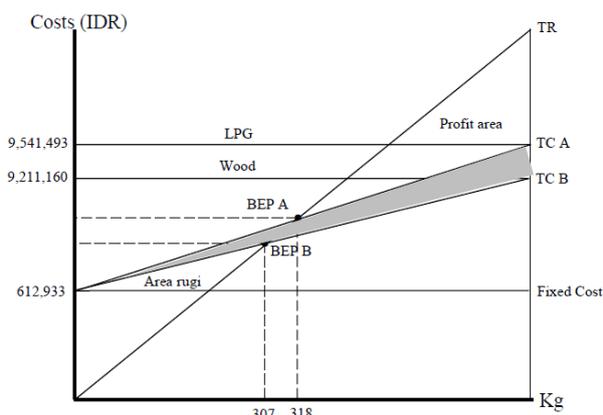


Fig.2. BEP of Mushroom Production with Fuel LPG and Wood

Source: Own calculation.

Description for Figure 2:

TC A is Total Cost of mushroom production using LPG fuel. TC B is Total Cost of mushroom production using wood fuel. BEP A is break-even point of mushroom production using LPG fuel. BEP B is break-even point of mushroom production using wood fuel.

The shaded area above the point coordinates BEP indicate differences BEP of mushroom production with LPG fuel and wood. The shaded area below the coordinates of BEP shows production loss mushroom with different fuels.

### Analysis of investment decision in Cultivation White Oyster Mushroom in Samarinda

The following of analysis of investment decisions Cultivation white oyster mushroom in Samarinda City based on aspects Payback Period, Return on Investment, and Net Present Value.

Table 3. Payback Period, and Return On Investment.

Description	Unit	Alternative Fuel	
		LPG	Wood
Payback Period:			
= (Investment Costs / Profits) x 1 Period			
= (IDR60,016,800 / IDR18,120,401) x 1 Period	Period	3.32	-
= (IDR57,666,800 / IDR18,997,900) x 1 Period	Period	-	3.04
Return On Investment:			
= (Profits / Total Costs) x 100%			
= (IDR18,120,401 / IDR23,853,733) x 100%	%	75	-
= (IDR18,997,900 / IDR23,027,900) x 100%	%	-	82

Source: Own calculation.

The time difference payback (payback period) on the white oyster mushroom cultivation is influenced by factors costs and profitability. The payback period using wood fuel more quickly than using LPG fuel.

Production period of oyster mushroom cultivation is 5 months in one period, the time is the early period of production from the breeding and preparation production until the end of the period of production namely the harvest and post-harvest.

Return On Investment using LPG fuel has rate of 75%, it is lower rate when using wood fuel by 82%.

The return on investment returns using fuel wood yield greater profits than using LPG fuel.

Table 4. Net Present Value

Year	Interest Rate **	Alternative LPG Fuel		Alternative Wood Fuel	
		Cash Flow* (IDR)	Present Value (IDR)	Cash Flow* (IDR)	Present Value (IDR)
1	0.835	18,120,401	15,100,334	8,997,900	16,812,301
2	0.783	19,620,401	15,365,652	20,497,900	16,052,862
3	0.693	21,120,401	14,637,497	21,997,900	15,245,648
4	0.613	22,620,401	13,873,516	23,497,900	14,411,702
5	0.543	24,120,401	13,091,587	24,997,900	13,567,859
Total Present Value			72,068,586		76,090,372
Original Investment			60,016,800		57,666,800
Net Present Value			12,051,786		18,423,572

Description :

\* Projections Estimated net Cash Flow

\*\* Rate of Return required is 13%.

Source: Own calculation.

Table 5. Results of Investment Analysis White Oyster Mushroom Cultivation.

No	Analysis Tools	Alternativ LPG Fuel		Alternativ Wood Fuel	
		Result	Description	Result	Description
1	R/C ratio	1.76%	Profitable	1.82%	Profitable
2	B/C ratio	0.76%	Efisien	0.82%	Efisien
3	BEP Baglog	2,385Log	Total production of 2,700 baglog	2,303Log	Total production of 2,700 baglog
4	BEP Mushrooms	318kg	The total harvest of 900 kg	307kg	The total harvest of 900 kg
5	BEP Baglog	IDR5,301	Selling price of IDR6,000	IDR5,117	Selling price of IDR6,000
6	BEP Mushrooms	IDR10,602	Selling Price IDR30,000	IDR10,235	Selling Price IDR 30,000
7	Payback Period	16.6	3.32 Period	15.2	3.04 Period
8	ROI	75%	IDR1 generate profits of 0.75	82%	IDR1 generate profits of 0.82
9	NPV	IDR 12,051,786	Estimated of cash flows 5 years	IDR 18,423,572	Estimated of cash flows 5 years

Source: Own calculation.

Estimated of cash flow (cash flow) based on the rate of return in 2015 for 5 years, the total NPV generated is greater when using wood fuel compared using LPG fuel.

### **Discussions**

#### **Profit, R/C Ratio, B/C Ratio Baglog and Fresh Mushrooms**

Investment white oyster mushroom using wood fuel have a total investment of less than the investment using LPG fuel with the difference in the cost of investment of IDR1,550,000. The difference occurs because the investment costs using LPG fuel and wood fuel. The operational costs of white oyster mushroom cultivation using wood fuel cheaper than the cost of operational use LPG fuel, difference costs of IDR825,833.

Revenue from white oyster mushroom cultivation using wood fuel is more profitable compared to income using LPG fuel with the difference in revenue amounted to IDR51,666. Gains in the period oyster mushroom cultivation using LPG fuel is less than the revenue using wood fuel with a profit margin IDR877, 499.

Advantage over the cost or called with Revenue Cost Ratio (R/C Ratio) and analysis of net income on fees or so-called Benefit and Cost Ratio (B/C Ratio) using wood fuel is greater than the use of LPG fuel of 0.06. Analysis of R/C ratio and B/C ratio of white oyster mushroom cultivation in Samarinda city has been feasible because both the value of R/C ratio > 1 and the value of R/C ratio > 0.

#### **Break Even Point of White Oyster Mushroom Cultivation**

Break even point baglog production using wood fuel at lower than breakeven levels using LPG fuel with the difference in the number of 82 baglog. Breakeven fresh mushroom production using wood fuel is also lower than the breakeven point using LPG fuel with the difference in the number of break-even point of 11 kg of income of fresh mushrooms.

#### **Payback Period, Return On Investment, and Net Present Value White Oyster Mushroom Cultivation.**

Period of time or the required period (payback period) for the return on investment of oyster mushroom using wood fuel more rapidly

compared with payback periods using LPG fuel with a difference of 0.28. Calculation Return On Investment using LPG fuel is less than the Return On Investment by using wood fuel. Return On Investment using wood fuel more profitable by a margin of 7%.

Net Present Value received by using wood fuel is greater than the Net Present Value which is accepted by the LPG fuel with the difference in acquisition cost of IDR6,371,786.

### **CONCLUSIONS**

White oyster mushroom cultivation using two fuels are LPG fuel and wood fuel. Selection alternative of the fuels have a positive value to the value of R/C ratio > 1 which is 1.76 for the R/C ratio is using LPG fuel and 1.82 for the R/C ratio is using wood fuel, while for B/C ratio has a positive value with numbers > 0 which is 0.76 for the B/C ratio is using LPG fuel and 0.82 for B/C ratio is using wood fuel.

White oyster mushroom cultivation conducted by farmers who are members of the Employers' Association of Mushroom Samarinda City produces a product that feasible to be implemented considering the revenue that tends to benefit.

This is also supported by some of the results of the analysis of the business, namely the analysis of income / receipt business, the ratio of revenues over expenses (R/C ratio), the ratio of profit over cost (B/C ratio), the analysis of Break Event Point (BEP) and investment decisions consisting of (Payback Period, Return on Investment, Net Present Value) that the business is profitable and beneficial for future periods so that it can be used as one indicator to implemented the investment.

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