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Article

Economic Feasibility of Ginger Emprit Extract Drink (*Zingiber officinale* Var. *Amarum*) using CMC Stabilizer

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Abstract

The tempe industry is one of the most numerous industries in Indonesia, so there is a high opportunity for making tempeh juice in the tempe industry. The application of tempeh in the manufacture of tempeh essence drink with emprit ginger extract is expected to provide benefits to the tempe industry in Indonesia. Tempe juice drink is one of the processed food products made from tempeh. Tempe juice drink is added with emprit ginger extract to remove the unpleasant aroma from tempeh and give flavor to the tempeh juice drink. On manufacture Tempe juice drink Emprit ginger extract need addition material CMC stabilizer for increase stability and viscosity product . Study This aim To determine the economic feasibility, an economic analysis was carried out regarding the feasibility of applying tempeh juice in the tempe industry. The research begins with making assumptions and analyzing the parameters, components and cost structure, the need for investment funds and working capital. This parameter calculates projected production, revenue and cash flow. Determination of the economic feasibility of the Tempe juice drink with Emprit ginger extract with the Net Present Value (NPV), Incremental Rate of Return (IRR), Net B/C and Pay Back Period (PBP). The assumption of drinking tempeh juice with emprit ginger extract in a year is 45.600 bottles at a price of IDR 10.000.00 / bottle . The proportion of capital comes from 60% own capital and 40% credit. The average operational cost per year is IDR 278.606.467,00, variable costs Rp 233.606.467,00 and a flat fee of Rp 45.000.000,00 . Average income per year Rp 319.200.000,00 while spending Rp 304.017.802,00. The profit earned is Rp 151.982.198. Sales profit 28,33 % with 15% tax per year. This business BEP occurs in sales with an average value of Rp. 151.982.198 or 33,33 % of production capacity per year. The results showed that the NPV was Rp 156.180.415, IRR is 53 %, and Net B/C is 1,82 times. Based on existing criteria or assumptions, this business is feasible to run with PBP for two years, or the capital invested in this business can be returned before the project ends (3 many years).

INTRODUCTION

The tempe industry is one of the most numerous industries in Indonesia, so there is a high opportunity for making tempeh juice in the tempe industry. Tempe juice drink is one of the processed foods from tempe which is widely consumed by the wider community. Tempeh

has a number of excess compared to with peanut soy . Compared to with soya bean raw , tempeh No only own more flavour can acceptable , but also more easy digested . Fermentation process tempeh can maintain part big substance contained nutrients in soy , increase power digest protein , too increase rate a number of kinds of vitamin B7 . The price of tempe is relatively cheap, making tempe easily accessible to all levels of society, from the lower, middle to upper layers. This can be proven by the increasing number of tempe industries, both on a household and medium scale industry.

Tempe juice drink is one of the products that can be produced in order to diversify processed tempe products. Tempe juice is made by extracting tempe using water. Thus, the nutritional value and components contained in tempeh can be better maintained. Tempe juice is more practical to consume than fresh tempeh [1] .

Soy milk that has become tempeh has a greater nutritional value. Tempe juice drinks have more value than soy milk drinks. Tempe is considered because of its nutritional content and active substances with a nutritional composition that is more than soybeans. The nutritional value of soybeans with tempeh on protein is 46.2 g with 46.5 g. The nutritional value of soybeans with tempeh on fiber is 3.7 g with 7.2 g [2].

The results of previous research on tempeh juice with the addition of emprit ginger extract had a neutral preference value for color, aroma, and taste, namely a preference score of 3 out of a scale of 5, which means that tempeh juice with the addition of emprit ginger extract can still be accepted by the panelists and also needs to be improved. quality so that it is preferred by consumers for the stability of drinks [3]. So that CMC stabilizer is added to this tempeh extract ginger emprit drink.

Making tempeh juice drink with emprit ginger extract using substances CMC stabilizer is expected to be an alternative and help the tempe product industry . However, for its application, it is necessary to carry out an economic feasibility test in the tempe industry . One of the competitiveness of a product can be seen from the maximum profit.

EXPERIMENTAL SECTION

Materials

The research method used is descriptive method with mathematical analysis. Making tempeh juice drink with emprit ginger extract with substances CMC stabilizer is a follow-up research from previous research, namely influence type and concentration substance stabilizer againstp characteristics tempeh juice drink extract ginger syringe (*Zingiber officinale* var. *amarum*) . The research was conducted from January to April 2022. The tools used in this research were stationery, calculators and Microsoft Excel 2019 software .

The research begins by making assumptions and analyzing the parameters, components and cost structure, the need for investment funds and working capital. This parameter is used to calculate production, revenue, cash flow projections. The economic feasibility of the Tempe juice drink with emprit ginger extract with the Net Present Value (NPV), Incremental Rate of Return (IRR), Net B/C and Pay Back Period (PBP). The data is processed in the form of tabulations, then analyzed mathematically with reference to the calculation aspects of financial feasibility analysis. Variable cost and fixed cost data are used to determine the total production cost or total cost, with the calculation:

$$TC = VC + FC$$

Description:

TC = Total Cost

VC = Variable Cost

FC = Fixed Cost

Determination of assumptions is made to assist data processing, setting the Cost of Production (COP), and making cash flow. The assumptions set include the number of employee working days, product selling prices, expected increase in production capacity, raw material prices, and project life.. Cost calculations carried out include investment costs, variable costs, fixed costs, and other costs. Investment costs are the capital or costs used to start or develop a business [4].

Variable costs are costs that are routinely incurred every time a production business is carried out where the amount depends on the number of products to be produced [9]. Fixed costs are another type of cost routinely incurred by the company while the company is carrying out production activities. However, the amount of fixed costs does not depend on production capacity. Calculation of installed or actual COP capacity, is done by setting the selling price among producers and calculating revenue through the following [5]:

Cost of Production = TC/Actual Capacity

Revenue = Selling price x total production

Calculating cash flow, to see the development of financial flows that can be obtained. BEP is a point in the amount of production or sales that must be made so that the costs incurred can be covered again or the value where the profit received is zero.

BEP Unit=FC/(p-VC)orBEP Rupiah=FC/(1-VC/P)

Net Present Value analysis is carried out to determine the investment value by considering changes in currency values. NPV is the difference between the present value of profits and costs⁶.

$$NPV = \sum_{t=1}^n \frac{(B_t - C_t)}{(1+i)^t}$$

Description

B_t = t-year gross receipts

N = Economic Age

C_t = Gross cost of year t

I = Interest rate

The criteria used⁷:

NPV > 0, business is worth running

NPV = 0, the business returns the same amount of money invested

NPV < 0, the business is not worth running

The IRR of the investment rate is the discount rate which shows the present value (NPV) equal to the total project investment. A business plan is said to be feasible when the IRR value is greater than the Marginal Average Revenue Return (MARR). MARR determination can be calculated as in the following equation:

$$MARR = (1 + i) (1 + f) - 1 \quad (6)$$

Description:

i = investment interest rates

f = highest inflation

The estimated payback period for an industry's investment can be shown by calculating the payback period. The payback period is the minimum time to return the initial investment in the form of cash flow based on the total receipts minus all costs[8].

$$PBP = (\text{Investasi awal}) / (\text{Penerimaan periode}) \times 1 \text{ tahun}$$

The calculation of the B/C ratio is a comparison between total receipts and total costs, which shows the value of receipts obtained from each rupiah spent. The project is feasible if the ratio $B/C \geq 19$.

$$B/C \text{ ratio} = \sum_{t=1}^n \frac{(B_t - C_t)}{(1 + IRR)^t}$$

Description

B_t = t-year gross receipts

N = economic age

C_t = The gross cost of year-t

RESULT AND DISCUSSION

Assumptions for Financial Analysis

The feasibility analysis uses assumptions regarding process technology parameters and costs, as seen in Table 1. These assumptions were obtained based on a study of the process of making tempe beverage carried out in this study and compared with tempe beverage on the market.

Table 1. Assumptions and Parameters of Financial Analysis

No	Assumption	Unit	Value/Amount
1	project period	Year	3
2	Month of work year	Month	12
3	Working days in a month	Day	20
4	Output, production and prices		
	a. The average annual production of tempeh extract ginger emprit drink	Bottle	45600
	b. The average production of emprit ginger extract tempeh drink per month	Bottle	3800
	c. Average production of tempeh extract ginger emprit drink per day	Bottle	190
	d. The average selling price of juice, tempeh, emprit ginger extract / bottle	Rp	10,000
	f. Long wait for earnings	Month	2
	e. Yield of tempe extract drink emprit ginger extract per kg of tempe	Bottle	9

	f. The need for tempe/bottle of tempeh extract ginger emprit drink	kg of tempeh	0.111
	g. The need for ginger/bottles of tempeh extract, emprit ginger extract	Kg ginger	0.075
5	Average labor requirement per month	Person	5
6	Use of inputs and prices		
	a. The average annual raw material requirement for tempeh	kg	4800
	b. The average need for ginger raw materials per year	kg	281
	c. The average purchase price of tempeh raw materials per year	IDR/kg	18,000
	d. The average purchase price of ginger raw materials per year	IDR/kg	20,000
7	Interest rate per year	%	14
8	Capital Proportion:		
	a. Credit	%	40
	b. Owner's equity	%	60
9	Term of Investment Credit	Year	3
10	Term of working capital credit	Year	1

Tempe juice beverage industry extract ginger The syringe is assumed to be done in groups with a monthly production of 380 0/ bottle of 200 ml which will be done by 3 workers. Assuming an average of 20 working days per month. This assumption was taken because of the process of making tempeh juice extract ginger Emprit is carried out continuously with Saturdays and Sundays off. Determination of the life of the project for 2 years is based on the economic life of the equipment used for a maximum of 3 years.

Tempe raw materials needed to make 1 bottle drink is 1 11 g or 0.111 kg . Ginger The syringe is obtained from the extraction process of 0.075 /kg ginger . Production of tempeh juice extract ginger syringe per day based on the capacity of the machine and tools used. Production of tempeh juice extract ginger syringe by means of blending and heating . Production is done 4 times a day so it can produce 1 90 bottle drink . The need for tempeh per year is obtained from knowing the production of tempeh juice extract ginger emprit in a year multiplied by the need for tempe per bottle . The raw material requirement for tempe is 4800 kg/year.

Components and Cost Structure

The cost component in the feasibility analysis of tempeh juice processing business extract ginger Emprit is divided into two, namely investment costs and operational costs. Investment cost is a cost component required to meet the initial funding requirements for production activities which include production equipment. Operational costs as costs that must be incurred in production process.

a. Investment Cost

Cost investment required at stage _ the beginning of the production process tempeh juice drink extract ginger emprit is used to provide production equipment and other equipment as well as buildings amounting to Rp 189 . 515 . 2 00 . consists of supporting equipment. land and buildings production in produce tempeh juice drink extract ginger syringe . Cost investment making tempeh juice drink extract ginger syringe assumed to be in production medium capacity home industry . Economic value is used within 3 years of production. The calculation of the depreciation value is based on the total investment cost and the economic life of the production equipment used. Full investment costs can be seen in Table 2.

Based on the data above, it can be seen that the main production equipment is needed includes a stove , blender, and screening . The need for a blender with a quantity of 10 units, machine filler drink 2 units, machine closing bottle 2 units, and machine washer bottle 2 units. Determination of blender needs is calculated based on the time and capacity needed in one batch. Time to make tempeh juice drink extract ginger emprit is 5 minutes using belnder , and heating for 15 minutes , and working the other for 20 minutes. The preparation and production process for each batch takes 2 hours with 4 production times/day.

The land and production buildings used are calculated based on the area of space needed for the production process, work space, access to car raw materials, sanitation, and parking. The size of the production area is seen from the dimensions of the production machine and the mobility of the workforce in the production process. The land area based on production requirements is 70 m² and the building area is m².

The total cost of production and packaging equipment is Rp 34. 515. 200, while land and buildings amounted to Rp. 155.000.000. The annual depreciation expense for production and packaging costs as well as land and buildings is Rp 22. 421.733.

Table 2 . Machine Requirements. Production Equipment. Production Land and Buildings

No	Cost component	Unit	Physical Amount	Price per unit (Rp)	Total Cost (Rp)	Economic Age (Years)	Depreciation Value (Rp/month)
1	Production and Packaging Equipment						
	a. Bottle filling machine	units	2	2.985.600.00	5.971.200.00	3	1.990.400.00
	b. Basin/ bucket	units	12	100.000.00	1.200.000.00	3	400.000.00
	c. Scales	units	3	750.000.00	2.250.000.00	3	750.000.00
	d. Presses and filters	units	3	1.500.000.00	4.500.000.00	3	1.500.000.00
	e. Blender Machine	units	10	1.000.000.00	10.000.000.00	3	3.333.333.33
	f. Pan	units	6	169.000	1.140.000	3	338.000.00
	g. Bottle washer	units	2	1.480.000.00	2.960.000.00	2	1.000.000.00

No	Cost component	Unit	Physical Amount	Price per unit (Rp)	Total Cost (Rp)	Economic Age (Years)	Depreciation Value (Rp/month)
	h. Bottle cap tool	units	2	1.000.000.00	2.000.000.00	3	666.666.66
	i. Knife	units	10	50.000.00	500.000.00	2	250.000.00
	j. Stove	units	8	500.000.00	4.000.000.00	3	1.333.333.00
	k. Stirrer	units	8	15.000.00	120.000.00	3	40.000.00
2	Production Land and Buildings						
	Production Building	m ² -	70	1.500.000	105.000.000.00	10	10.500.000.00
	Land	m ² -	100	500.000	50.000.000.00		
	Amount				189.515.200		22.421.733

b. Operational Cost

Operational costs in the business of processing tempeh extract ginger emprit drink include variable costs and fixed costs. The average total operational cost per month is IDR 23.217.205,6 or in one year Rp. 275.606.467, 2 assuming that since the first month this business can operate fully with 100% capacity. Operational costs per month consist of variable costs IDR 19.467. 205,6 and a fixed fee of Rp 3.750.000.00. Full details of the need for fixed costs and variable costs can be seen in Table 3.

Table 3. Composition of Operations Cost

No	Cost component	Average per month	Per year
1	Fixed cost	IDR 3.750.000	IDR 45.000.000
2	Variable Cost	IDR 19.467. 205,6	IDR 233.606.467,2
3	Total Operational Costs	IDR 23.217.205,6	IDR 278.606.467,2

Based on the data above, the fixed cost per year is IDR 45. 000. 000, while the variable cost is Rp 233.606.467,2/year. The total operational cost of producing emprit ginger extract tempeh drink is Rp 278.606.467,2/year.

Funding Requirements for Components and Working Capital

The total initial project cost requirement for investment is Rp 189.515.200 and Rp 75.806.080 (40%) came from bank loans. with a loan term of 3 years and an interest rate of 14% per annum. Working capital requirements are calculated based on production needs where operational costs per month are IDR 46.434.411 . The determination of the time period is based on the calculation of the processing time for the emprit ginger extract tempeh drink until the product is sold. 40% or IDR 18.573.764 of the planned working capital requirements from credit . with a one-year loan term and 14% interest. Details of project requirements and sources of financing can be seen in Table 4.

Table 4. Components and Structure of Project Cost Requirements

No	Project Cost Components	Percentage	Total Cost (Rp)
1	Investment Cost		Rp 189.515.200
	a. Credit	40%	IDR 75.806.080
	b. Owner's equity	60%	Rp 1 13.709.120
2	Working Capital Costs		Rp 46.434.411
	a. Credit	40%	Rp 18.573.764
	b. Owner's equity	60%	IDR 27.860.647
3	Total Project Cost		IDR 278.606.467,2
	a. Credit	40%	Rp 111.442.587
	b. Owner's equity	60%	IDR 167.163.880

The project cost component with the distribution of credited working capital is 40% and 60% own capital. The total project cost is obtained from investment costs and Work capital (variable cost) of IDR 278.606.467,2 . Credit costs that must be issued for the initial investment amounted to Rp 111. 442 . 587 and own capital of Rp 167.163.880 . The businessman the obligation to pay principal installments and interest installments is made every month during the credit term. Bank loans with annual interest of 14% per year.

Production and Revenue

Based on the existing capacity, production from the beverage processing business of tempeh extract ginger emprit extract per month averages 3,800 bottles. This business is projected to be able to produce throughout the year (12 months) with a total production of 45.600 bottles per year, with an average monthly selling price of juice, tempeh, and emprit ginger extract of Rp. 10.000.00 per bottle. So for one month of production it is projected to earn Rp. 319.200.000.00 per year.

Projection of Operating Income and Break Even Point (BEP)

The projection of operating profit loss shows that the business of processing tempeh juice, emprit ginger extract, has generated an average profit of IDR 129.184.868 per year. with an average profit on sales value per month of 28,33 %. Briefly the profit and loss projection data can be seen in Table 5 .

Table 5. Projection of Business Income and Profit and Loss

Based on Table 5, it can be seen that the income is obtained from the sale of tempeh juice,

No	Description	Average per Year
1	Revenue (IDR)	319.200.000
2	Expenditures (IDR)	304.017.802
3	Profit/loss before tax (Rp)	151.982.198
4	Tax (15%) (Rp)	22.797.330
5	Profit after tax	129.184.868
6	Profit on sales (%)	28,33%
7	BEP : Rupiah	151.982.198
8	%	33,33

emprit ginger extract per year. While expenses are based on investment costs, fixed costs, and variable costs. Profit after tax of IDR 129.184.868, with taxes paid to the company at 15%. So the sales profit is 28,33%.

Comparing expenses for fixed costs to variable costs and total revenue, the BEP of this business occurs in sales of an average of IDR 151.982.198 or 33,33% of production capacity per month.

Projection of Cash Flow and Project Feasibility

Cash flows in data analysis on the emprit ginger extract tempe tempe drink project are divided into two flows, namely cash inflows and cash outflows. Inflow was obtained from the sales of juice, tempeh, emprit ginger extract for one year. Outflows include investment costs, variable costs, and fixed costs, including principal payments, interest installments and income tax.

Evaluation of the profitability of the business plan for the tempeh drink with emprit ginger extract is carried out by assessing the business feasibility criteria, namely NPV (Net Present Value) and Net B/C Ratio (Net Benefit-Cost Ratio). The business of processing tempeh extract ginger emprit drink using the existing assumptions obtains an NPV value of IDR 156.180.415 with an IRR (Incremental Rate of Return) of 53% and Net B/C of 1,82 times, this can be seen in Table 38. Based on existing criteria or assumptions, this business is feasible to carry out with a Pay Back Period (PBP) of 2 years or the capital invested in this business can be returned before the project ends (3 years).

CONCLUSION

Based on the research that has been done, the following conclusions can be drawn: (1) Tempe juice drink with emprit ginger extract using the assumption that there is a Net Present Value (NPV) of IDR 156.180 .415 with an Incremental Rate of Return (IRR) of 53 % and Net B/C of 1,82 times; (2) Based on existing criteria or assumptions, this business is feasible to carry out with a Pay Back Period (PBP) of 2 years or the capital invested in this business can be returned before the project ends (3 years).

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