Research Article

Value Added Analysis, Break Even PointAnd Profit Of Tofu Industry In District Of Nabire Regency

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Abstract

The value-added of processing soybeans into Tofu and analyzing the break-even point (BEP) and the profit in the Tofu industry in the City District of Nabire Regency were objectives in research using survey research methods through structured interviews using a list of pre-prepared questions. The amount of value-added based on the Hayami Method in processed soybeans into Tofu is IDR 7.840. In contrast, the profit earned in one production process is IDR 9.602.592. The revenue is IDR 17.100.000 with the costs incurred for one time Tofu production process of IDR 7.497.408 so that the Revenue Cost Ratio value is 2.28, while the break-even point analysis results using the BEP approach were divided into two, namely Cost BEP and Production BEP. They show a value of 963 slices of Tofu and IDR 5.780.760, in which the average production will get the break-even point with a total of 963 slices of Tofu or with a production cost of IDR 5.780.760. If this amount is low, the industry will suffer losses, and if this amount is more, it will profit.

Keywords: *Soybean, Value-Added, BEP, Profit*

INTRODUCTION

Agro-industry is an industry with primary raw materials from agricultural products. As a development stage to continue agricultural development, agro-industry has a vital role in agricultural development (Soekartawi, 2000). Efforts to increase the household processing industry constitute an economic activity that converts essential goods into finished or semi-finished goods and goods of less value into goods of higher value. This situation can be seen from its contribution in increasing the income of agribusiness actors, absorbing labour, increasing foreign exchange earnings, and encouraging the growth of other industries.

Nabire Regency is one of the areas located in the *neck of the Cendrawasih bird*, Papua Province, located between 134035 '- 136033' East Longitude and 2025 '- 3035' South Latitude with a Regency area of 6,861.56 km2 consisting of 12 Sub-Districts with approximately 211,401 people (BPS Kab. Nabire 2017). With such a population, the consumption of foodstuffs is relatively high. The food supply in Nabire Regency comes from inside and outside the district to meet their daily needs. Agricultural products are available in a reasonably good area, such as rice, horticulture, crops and beans. The legume crops cultivated by farmers include peanuts, green beans, and soybeans. *Soybean* is a superior crop cultivated and has priority over other legumes by the Agriculture and Plantation Service Office of Nabire Regency.

An increase from year to year can be seen in the planting and harvest area because the need for soybeans by the industry in terms of producing Tofu, Tempeh and soy milk is increasing, so the raw materials for making it are increasingly needed. Until now, soybeans are still imported from outside Nabire, both from Sulawesi Island and Java Island, because soybean farming production by farmers in Nabire Regency is still limited. The essential ingredients for making Tofu are soybeans, valued at IDR 8,500 / kg depending on availability in the market. Therefore, the producers of Tofu industrial must profitably produce Tofu to survive and meet consumer needs. Currently, there is only one size of Tofu produced and sold in Nabire District at an affordable price of IDR 8,000 / slice with a size of 8x8x10 cm. With the high price of soybeans, the production of processed soybean must have a significant value-added to compensate for the input factor in Tofu production. *Soybean* processing in the Tofu industry is an alternative form of business to increase this commodity's value-added. Tofu is one of the processed products made from soybean as a food favoured by all people regardless of regional origin or social status.

Tofu has a reasonably high protein content at a relatively lower price compared to other protein sources. Like other processed soy products, processing soybeans to Tofu will also create value-added and increase the use-value of the product. (Cahyadi, 2007). Some aspects in the processed soy products need to be considered,

including processing soybeans to become Tofu, absorption of labour, increasing skills, increasing income and the involvement of marketing agencies in the production process until soybean processed products in the form of Tofu are enjoyed by consumers. The research objectives were to determine the value-added obtained from the processing of the soybean industry into Tofu, to know the cost and production produced in processing soybeans into Tofu so that the industry experienced break-even point (BEP), and to know the large profits obtained in the processing of the soybean industry into Tofu.

RESEARCH METHOD

This research used a survey method through interviews with the owner of the soybean processing industry into Tofu or what is known as a home industry Tofu factory and observations on the processing process. The survey was conducted on the processing industry in District City Nabire Regency from September to December. Other supporting data were obtained from Tofu seller in the central market, which distributes or sell Tofu directly to consumers. The data collected was primary data taken from the soybean processing business into Tofu, which includes input factors of production, labour, production costs, production quantities, product prices, and profits, while secondary data was from literature, other sources and related agencies. The collected data were analyzed to obtain value-added for Tofu products. Break-even point (BEP) analysis and profit or efficiency in the Tofu processing business were also carried out. The amount of value-added was calculated using the Hayami method. The value-added of Tofu as the soybean processing product in each production process was gotten. Break-even point Analysis (BEP) was calculated to determine BEP Production and Costs, while profits are analyzed by RCR (revenue cost ratio). To answer the first objective in this study, namely knowing the value-added Tofu as the soybean processing product, the Hayami Method was used (Hayami et al., 1987 in Slamet, 2005). It was described based on the results of primary data processing obtained from the Tofu industry and entered in the following table using the calculation of value-added

Table 1. Value Added Analysis Based on the Hayami Method

Variable	Value	Way of calculation
Output, Input and Price		
• Tofu Production Output (kg/slices)	1	
• Soya bean Input (kg)	2	
• Labour (person)	3	
• Conversion factor	4	= 1/2
• Labour coefficient	5	= 3/2
• Tofu Product prices (Rp/kg/ptg)	6	
• Labour wages (Rp/person)	7	
Revenue and Profits		
• The price of soybeans (Rp/kg)	8	
• Other input contributions (Rp/kg)	9	
• Tofu Production value (Rp/kg/slices)	10	= 4x6
• Value-added (Rp/kg)	11a	=10-9-8
• Value added ratio (%)	11b	=(11a/10)x100%
• Employee benefits (Rp/kg)	12a	=5x7
• Share of workforce (%)	12b	=(12a/11a)x100%
• Profits (Rp/kg)	13a	=11a-12a
• Profit rate (%)	13b	=(13a/11a)x100%
Production factor remuneration		
• Margin (Rp/kg)	14	=10/8
• Employment benefits (%)	14a	=(12a/14)x100%
• Other input contributions (%)	14b	=(9/14)x100%
• The owner's profit (%)	14c	=(13a/14)x100%

Then, to answer the second objective of this study, break-even point analysis of both costs and production was done by using the following formula. The break-even point of production (BEP-production) was calculated by the formula:

$$\boldsymbol{BEP - Production = \frac{TFC}{P - \Delta VC}}$$

Meanwhile, the cost break-even point (BEP-cost) was obtained based on the equation:

$$\boldsymbol{BEP - Cost = \frac{TFC}{1 - TVC/TR}}$$

π = TR – TC
TC = TFC + TVC
TR = P x Q

Where:
TC = total cost; TFC = total fixed costs;
TVC = total variable costs (not fixed); π = net income;
TR = revenue; Q = the number of products produced;
P = product price per slice.

Next, to answer the third objective, the profit and the RC/ratio were calculated by using this equation:

$$\boldsymbol{RC/ratio = \frac{Revenue(TR)}{Cost\ (TC)}}$$

RESULTS AND DISCUSSION

Development of Tofu Industry

The Tofu industry in Nabire Regency has existed since the 70s era. It was started with the arrival of national transmigrants who entered the district in Nabire. At that time, The Tofu industry was only for those who come from Java island because of the Javanese food culture. Besides, the transmigrants who are farmers also grow soybeans. Along with time, the increasing recognition of typical foods from various regions increases the nationalist tastes of the people. Therefore, Tofu and Tempeh, which were initially typical Javanese food, are now the favourite foods of all Indonesians. In line, the need for Tofu has increased so that business people interested in the Tofu industry develop the Tofu industry in Nabire Regency. This situation also increased the development of soybean farming in the Nabire Regency. This development has caused the Tofu industry to grow since the 1980s in this district. In 2012, there were 17 Tofu industries in Nabire Regency. The 11 industries were in the City District in Nabire. However, there was a decrease in the number of Tofu industries in 2016. They did not get operational permits from related agencies, both the Department of Industry and Cooperatives as well as National Agency of Drug and Food Control (BPOM), because they were not feasible in terms of cleanliness of production tools used, inadequate industrial locations because they were close to people's settlements and offices. Some industries experience limitations in financial capital and bankruptcy due to poor management. The existence of the Tofu industry since 2012 can be seen in table 2.

Table 2. Names of Tofu Industry in Nabire district, 2017

Name of industry owner	Address	Status
Untung F. Ali	Frankisepo Street	Still in Production
Subono	Kusumabangsa Street	Still in Production
Supomo	Ujung Pandang Street	Still in Production
Sambara PA	Nabarua	No Production
Edi suhaedi	Pongtiku Street	No Production

Trisno wiyono	Karang Mulia Street	No Production
Achmad Rifai	Karang Mulia Street	Still in Production
Muhammad Sholokin	Poros Pania Street	No Production
Suryanto	S. Mangaraja Street	No Production
Sunarti	Nabarua	No Production
Darmedi	Wonorejo	No Production

Source: Department of Industry and Cooperatives of Nabire Regency, 2017

In its development, the Tofu industry has occurred to be four (4) Tofu industries remaining in the City District of Nabire Regency. Only two factories have received permits from the government of the four Tofu factories that are still producing. They are Tofu factory "sederhana" with No. Business Place Permit 503/225/XI/2017 and Business Permit Number 503.1/476/PM/IX-B/KOPERINDAG while the Tofu factory "sumber gizi" with Business Place Permit Number 503/1702X/2012 and Business Permit Number 503.1/ 368/PM/KOPERINDAG, while the other two factories are in the process and waiting to get business permits.

Tofu Making Process

Based on the results of the research, it shows that the process of making Tofu in the four Tofu industries in Nabire City District goes through the same process from soybeans to be Tofu which can be explained as follows :

a. Immersion. This immersion stage, the soybeans are soaked in a soaking tub made of cement. The first step is to put the soybeans into a plastic bag, then tie and soak for about 3 hours (for one sack containing 15 kg of soybeans). The amount of water needed depends on the number of soybeans. In essence, all of the soybeans must be submerged. This immersion stage aims to facilitate the milling process so that a thick soy pulp is produced. In addition, soaking can also help reduce anti-nutritional substances (antitrypsin) present in soybeans. The anti-nutritional substances present in soybeans can reduce the digestibility of the protein in Tofu products so that the levels need to be lowered.

b. Soy washing. The washing process is an advanced process after soaking. Before the washing process is carried out, the soybean inside the sack is removed from the washing tub, opened, and put in plastic buckets to be washed with running water. This washing stage aims to clean the soybean seeds from impurities so as not to interfere with the grinding process so that dirt does not mix into the Tofu mixture. After the washing process is finished, the soybeans are drained in a large bamboo sieve.

c. Milling. The milling process is carried out using a soybean grinder machine with the driving force of an electric motor. The purpose of milling is to obtain soybean porridge which is then cooked to a boil. During the grinding process, water should be flowed to obtain the desired slurry thickness.

d. Boiling / Cooking. This boiling process is carried out in a round tub made of cement with a steam heater at the bottom. Hot steam comes from a steam boiler at the back of the Tofu-making process, flowing through an iron pipe. The fuel used as a heat source is firewood. The purpose of boiling is to denature the protein from soybeans to coagulate the protein when the acid is added quickly. The endpoint of boiling is marked by the emergence of hot bubbles and the thickening of the soybean solution/slurry. The boiling tub capacity is about 7.5 kg of soybeans.

e. Filtering. After the soybean porridge is boiled and thickens, the filtering process is carried out using a filter cloth. This filtering process aims to separate the dregs or solid waste from the soybean slurry with the desired filtrate. In this filtering process, the boiled and thickened soybean porridge flows through a faucet at the bottom of the heating bath. The slurry flows through the filter cloth above the reservoir. After all the slurry is burned, the heater runs out, and the filtering process begins. In filtering, water is added continuously by pouring it on the filter's edge so that no solids remain in the filter. The water pouring ends when the resulting filtrate is sufficient. Then the filter containing the pulp is squeezed out until it is scorched. The dregs resulting from filtering are called dry dregs. The dregs are transferred to sacks. The dregs are used for animal feed or sold as a base for making Tempeh *gembus*/*bongkrek*.

a. Precipitation and Addition of Vinegar

A white filtrate like milk is obtained from the filtering process, which will then be further processed. The filtrate obtained is then added with a certain amount of vinegar. The function of adding vinegar acid is to precipitate and coagulate the Tofu protein so that there is a separation between the whey and the Tofu clumps. After adding the vinegar acid, two layers are formed: the upper layer (whey) and the lower layer (filtrate/sediment of Tofu). These deposits occur due to protein coagulation caused by a reaction between the protein and the added acid. This sediment

is the primary material to be printed Tofu. The top layer (whey) in liquid waste is the primary material that will be processed into *Nata De Soya.*

b. Printing and Pressing

The printing and pressing process is the final stage of making Tofu. The mould used is made of wood measuring 70 x 70 cm with a small hole around it. The hole is intended to make it easier for water to come out during the pressing process. Before the printing process, what must be done is to put a thin filter cloth on the print's surface. After that, the sediment generated in the previous stage is slowly removed using a pan-like tool. Then, the filter cloth is closed tightly and then a wood that is almost the same size as the mould is placed on it. After that, the top of the mould is loaded to help speed up the pressing process of Tofu. The time for this pressing process is not precisely determined. The partner owner only estimates and opens the filter cloth at a specific time. The owner has a parameter that the Tofu is ready to be removed from the mould when the Tofu is hard enough and does not crumble when shaken.

c. Cutting Tofu

After the printing process is complete, the finished Tofu is removed from the mould by turning the mould over and then opening the filter cloth covering the Tofu. After that, the Tofu is transferred to a tub filled with water so that the Tofu is not crushed. Before it is ready to be marketed, the Tofu must first be cut to size. The cutting is done in water and done quickly so that the Tofu is not crushed.

Value-Added Analysis

The value-added of one slice of Tofu from the Tofu industry uses the Hayami method with the calculation model presented in table 3:

Table 3. Results of Value Added Analysis Based on the Hayami Method in Industry

know in the City District of Nabire Regency

Variable	**Value**	**Calculation Method**
Output, Input and price:		
a. Tofu Product Result (slice)	1	= 2.850 slices
b. Soybean Raw Material (kg)	2	= 612,5 kg
c. Labour (person)	3	= 9 org
d. Conversion Factor (1/2)	4	= 4,65
e. Labour Coefficient (3/2)	5	= 0,015
f. Selling price of Tofu products (IDR /slice)	6	= 6.000
g. Labour Wages (IDR / HOK)	7	= 97.495
Revenue and Profits:		
a. Price of Soybean Beans (IDR / kg)	8	= 8.000
b. Other input contributions (IDR / ltr)	9	= 12.000
c. Value of Tofu Products (4x6)	10	= 27.840
d. Value Added (Rp / ptg) (10-8-9)	11.a	= 7.840
e. Value Added Ratio (11.a / 10) x100%	11.b	= 28,16 %
f. Employee Profits (5x7)	12.a	= 1.462,43
g. Share of Labour (12.a / 11.a) x100%	12.b	= 18,65 %
h. Profits (11.a - 12.a)	13.a	= 6.377,57
i. Profit Rate (13.a x 11.a)x100%)	13.b	= 81,35 %
Production Factor Remuneration:		
a. Margin (10-8)	14	= 19.840
b. Employment Profits (12.a / 14) x100%)	14.a	= 7,37 %
c. Other Input Contribution (9/14) x100%)	14.b	= 60,48 %
d. Profits of Capital Owner (13.a/14)x100%)	14.c	= 39,52 %

The results of the analysis of value-added based on the Hayami method seen in table 3, showing that the value-added is IDR 7.840. This value shows the gross income from one slice of Tofu cultivated by the Tofu

industry with a value-added ratio of 28.16% of the value of the Tofu product of IDR 27.840 obtained from the conversion factor of Tofu production with the raw material price of soybeans of 4.65. The conversion value of 4.65 indicates that 1 kg of soybean raw material processing will produce Tofu as many as 4.65 slices of Tofu. This means that the cost of 1 kg of soybeans of IDR 8.000 will result in an income of IDR 27.900. The amount of labor compensation of IDR 1.462.43 is obtained from the comparison of the coefficients value of labor, which is 0.015 with the amount of raw materials used, so that the labor benefits based on the contribution given to the amount of raw materials used to produce Tofu are 2,850 slices of Tofu. The share of labor in the Tofu industry is quite low, namely 18.65 % of the average use of labor in the Tofu industry of 9 people—the HOK wage of IDR 97.495 is close to the Papua regional minimum wage (UMRP) of IDR 100.000 / day. The profit rate is considerable, namely 81.35% with a profit value of IDR 6.377.57 from the employee profit with value-added obtained. Based on the results of value-added, it turns out that the owner of the capital will get a profit of 39.52 %, in which the remaining 60.48 % is the contribution of other inputs which are a necessity in the production process to produce Tofu by the Tofu industrial company. The amount of profit and the value of the revenue cost ratio can be seen in table 4.

Table 4 Average Production, Revenue, Costs and Profits of Tofu Industry in Nabire District, Nabire Regency, 2017

Description	**Total**	**Note**
Production	2,850 slices of Tofu	
The selling price at the manufacturer	IDR 6.000	
Revenue	IDR 17.100.000	Production multiple selling price
Variable costs	IDR 6.610.935	
Labor costs	IDR 877.455	
Depreciation cost for tools	IDR 9.018	
Total Fixed Costs	IDR 886.473	
Total expenses	IDR 7.497.408	TVC + TFC
Advantage	IDR 9.602.592	TR – TC
Revenue Cost Ratio	2,28	TR /TC

The average production based on table 4 above shows that the Tofu production produced by the Tofu industry in the City District of Nabire Regency is 2850 slices in one production with a selling price per slice of production IDR 6.000 so that it results in an income of IDR 17.100.00. Meanwhile, the total cost of production/total cost of expenses (TC) is IDR 7.497.408, consisting of variable costs of IDR 6.610.935 and fixed costs of IDR 886.473. The average Tofu industrial business earns a profit or income in one production of IDR 9.602.592. According to the results of the profit analysis followed by a feasibility analysis of the business or analysis of the revenue cost ratio (R / C), the value is 2.28. This value indicates that each additional input of 1 unit in the Tofu industry will increase the revenue by 2.28 units, or an additional One hundred will increase revenue by IDR 228. This value shows that the Tofu industry business in the city district of Nabire district is profitable and feasible to operate because the value of the R/C ratio is greater than one. The amount of the break-even point value, both in terms of production costs and the amount of Tofu production produced by the Tofu industry, is used to analyze or calculate the break-even point (BEP), to determine the amount of the break-even point both in terms of costs and the amount of production produced. The following table shows the amount of BEP value

Table 5. The amount of the break-even point for both the amount of production and the amount of production costs

Variable	**Value**	**Unit**
Q	2.850	Slice of tofu
P	6.000	IDR
TFC	3.545.890	IDR
TVC	6.610.935	IDR

AVC	2.320	IDR
BEP-Cost	5.780.760	IDR
BEP-Production	963	Slice of tofu

The Break-even Point (BEP) analysis of the Tofu industry in Nabire City District in table 5 above shows that the BEP - costs IDR 5.780,760, the amount of this cost shows that the Tofu industry is at the break-even point in which there is no profit or loss if the amount of production costs incurred is IDR 5.780,760 to produce Tofu in one production so that the Tofu industry must spend more than that cost to get profit and if the costs incurred for production smaller than this cost, the company will experience a loss or deficit. Meanwhile, the amount of BEP production is 963 slices of Tofu. The amount of Tofu production of this size is produced at the cost of IDR 5.780.760 so that the industry will experience the break-even point so that with more costs, the production will also exceed the BEP-production value in order to the industry can get profit from its production, and if production is less than the amount of production, the industry will suffer a loss.

CONCLUSION

Based on the description in the discussion of the results of the research conducted above, several conclusions can be drawn by the objectives of this study, namely :

1. The results of the analysis of value-added based on the Hayami method obtained a value-added of IDR 7.840. This value shows the gross income from one slice of Tofu cultivated by the Tofu industry with a value-added ratio of 28.16% of the value of the Tofu product is gotten from the conversion factor of Tofu production with soybean raw material prices.

2. The Break-even point (BEP) results obtained a value of IDR 5.780.760 for BEP and BEP production of 963 slices of Tofu. The tofu industry incurs a production cost of IDR 5.780.760; it will produce 963 slices of Tofu, which will break even. It means no profit and no loss. If it exceeds this value, it will experience a profit, and if the product is below that value, it will experience a loss.

3. The calculation of production costs and profits obtained an average profit of IDR 9.602,592 in one production with a significant production cost of Rp. 7.497,408 of the average production of 2,850 slices of Tofu with a selling price of Rp. 6,000 per slice. Therefore, it results in revenue of IDR 17.100.000. From these results, the value of the RC ratio is 2.28, which indicates that the Tofu industry is profitable and feasible to work. RC ratio value shows that if there is an additional input of 1 unit / IDR 1.00, it will increase the revenue by 2.28 units of output, or the revenue will increase by IDR 2.28.

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