

The Structure of costs and income of broiler chicken farming in different partnership patterns in Sukabumi Regency, West Java, Indonesia

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ABSTRACT: In Indonesia, poultry farmers are faced with increasing input prices, especially feed prices, even though the feed is the largest component of broiler chicken production costs, while on the other hand broiler chicken prices fluctuate. This research aimed to analyze cost structure, cost unit, and income broiler chicken on different partnership patterns (PIR and Makloon patterns). The research location is in Sukabumi Regency, which is one of the centers for broiler chicken farming in West Java Province, after Bogor and Ciamis Regencies. The number of respondents was selected based on the partnership pattern, each of which was 130 units using the PIR pattern and 116 units using the Makloon pattern. The results showed that feed costs were the largest of the broiler chicken production costs in the two patterns, respectively 66.64 % in the PIR and 66.08 % in the Makloon pattern. The second biggest production cost is DOC, 26.10 % on the PIR pattern and 25.51 % on the Makloon pattern. The costs of main inputs are more than 90 % of the total production costs, while the operational costs of farmers are less than 10%. Labor costs are the largest costs incurred by farmers. The operational costs incurred by farmers on the PIR pattern are lower than the Makloon pattern, but the fixed costs are the opposite. Although the cost unit (average costs) of broiler chicken farming with the PIR pattern is higher than the Makloon pattern, but the income for the PIR pattern is higher than the PIR pattern. The difference between the total costs of the PIR pattern and the Makloon pattern is 4.40 %, while the difference in total income is 146.59%.

Keywords: Partnership; PIR; Makloon; Feed; Cost unit; Operational cost

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INTRODUCTION

The poultry broiler chicken farming industry showed the highest growth compared to other livestock farming. During the period 1991 - 2020, the population growth rate of broiler chickens reached 9.2% per year (DGLAH, 2021). The structure of the broiler chicken farming industry is the most complete compared to other livestock industries, both upstream and downstream. The contribution of broiler chicken meat to national meat production is the highest (70.05%) compared to other types of livestock. The per capita consumption of chicken meat is the highest compared to other livestock meat consumption, with a growth rate of 9.87% per year (DGLAH, 2021). The rapid growth of farming was supported by the broiler chicken farming characteristics itself, such as the relatively fast production process, the only need for small land, cultivation technology, and the market being available, and the price of chicken products was cheaper than other livestock products. Besides, the industrial structure of poultry broiler chicken farming is the most comprehensive compared to other livestock industries, both upstream and downstream industries.

Poultry broiler chicken farming industries, both upstream and downstream, were generally managed by large and multinational companies, while the on-farm activities were managed by smallholder farmers. Almost all of the poultry production inputs, such as DOC, feed, equipment, medicines, and vitamins were obtained from the external parties, except labor and the cage. This makes the farmers very dependent on external parties. In addition, the farmers were also very dependent on traders. Those conditions cause the farmers to have low bargaining power for setting up the inputs and products price. Besides the production risk, the farmers also faced the risk of inputs and products price. The input market structure of broiler chicken farming was an oligopoly

market, thus the price was set up by the input industries. West Java Province is the center of the national broiler chicken industry, with a share of 25.59 percent, then Central Java at 19.49 %, East Java at 14.29 %, and Banten at 6.36 % (DGLAH 2021). Sukabumi Regency is a broiler chicken production center in West Java, ranking third after Bogor and Ciamis Regencies. Sukabumi Regency is also one of the centers of chicken breeding companies (breeders) in addition to Purwakarta and Subang Regencies. Sukabumi Regency is also a broiler chicken farming area for integrator companies, as well as a center for middle-class broiler chicken cultivation companies (FSLA-WJP 2020).

Based on a survey of the farmers in Sukabumi Regencies, there are two patterns of partnership broiler chicken farming, namely PIR (Perusahaan Inti Rakyat) and Makloon. In both cases, the company is obligated to supply main inputs (DOC, feed, medicines, vitamins, and vaccines), while farmers carry out cultivation by providing cages, equipment, and operational costs (labor, husks, gas, electricity, disinfectants). In the PIR pattern, farmers pay for the main input on credit through deductions from production at harvest, while in the PIR pattern, the main input costs are the responsibility of the company. In the PIR pattern, operational financing is the responsibility of the breeder, while in the Makloon pattern, the company provides IDR 2,000/head of DOC which is given at the start of production. The income of farmers in the PIR pattern comes from production income (production value minus main input costs), FCR incentives, depletion, and market price incentives, while in the Makloon pattern comes from operational costs (IDR 2,000/head DOC) plus FCR incentives and performance incentives. In the Makloon pattern, all components of the farmer's income are paid by the company after harvest, about 5-7 days by transfer to the farmer's account, while in the Makloon pattern, it is paid at the

beginning of production (IDR 2,000/head DOC) and after harvest for performance incentives. The amount of incentive for the performance of FCR and depletion depends on the difference between the actual FCR value and the standard depletion and FCR. Incentives will be obtained if the FCR and actual depletion are lower than the standard FCR. The amount of the FCR incentive ranges from IDR 120/kg live weight to IDR 180/kg live weight, while the incentive is IDR 30/kg live weight. For market price incentives, if the market price is greater than the contract price, the incentive value is 30% of the difference between the market price and the contract price. Broiler chicken farming is generally faced with limited capital and marketing (Bakal and Penkar 2016; Sally 2015; Swain 2014). Smallholder farmers are relatively difficult to access capital from formal financial institutions such as banks due to limited collateral as the main requirement. Smallholder farmers generally have limited market access so farmers generally act as smallholder farmers to be very vulnerable to price risk, both input prices, and output prices. Parties, and broiler chicken farming activities are faced with a relatively high production risk because broiler chickens are very susceptible to environmental conditions (North and Bell 1990).

oultry farmers are faced with increasing input prices, especially feed prices, while on the other hand broiler chicken prices fluctuate (ICASEPS 2015). The increase in feed prices is because feed ingredients are still dependent on imports, such as soybean meal and corn. This increase in feed prices will certainly increase production costs so that will impact the income of broiler chicken farmers. Based on those conditions, the objective of the study is to analyze the cost structure, cost unit, and income of farmers with PIR and Makloon patterns.

MATERIALS AND METHODS

Location and Sampling

Sukabumi Regencies was purposively selected as the location of study

with the consideration that this location is one of the broiler chicken production centers in West Java Province, after Bogor and Ciamis Regencies. West Java province itself is the main center of broiler chicken production in Indonesia, then East Java and Central Java (DGLAH 2021). The sample/respondent consisted of 30 farmers using the PIR pattern and 30 farmers using the Makloon pattern. The selection of respondents was carried out purposely, namely, those who partnered with PT X (PIR pattern) and PT Y (Makloon pattern), carried out broiler chicken cultivation in the last year (2021), and used open cages (open house). The average production period for a year is in the PIR pattern of 6 periods, while the Makloon pattern is 5 periods. However, when the survey was conducted, there were breeders who had not reached the average for that period due to various reasons, including being a partner for less than a year, being stopped cultivating for reasons of avoiding the risk of loss due to the previous period experiencing losses, delays in operational cost assistance (specifically the Makloon pattern). In order to be able to compare the two patterns, the analysis uses the average per production period.

The characteristics of farmers between the two patterns are relatively the same, except that the number of family members in the Makloon pattern is greater than in the PIR pattern. The average livestock population in the Makloon pattern is higher than the PIR pattern, but for the performance of FCR, depletion, and PI, the PIR pattern is better than the Makloon pattern (Table 1).

Method of Data Analysis

Cost structure, cost unit, and income were analyzed using quantitative and qualitative descriptive analysis, such as mean, deviation standard, proportion, and minimum and maximum value which were shown in tables. Furthermore, the structure of cost, unit cost, and income were also divided into variable and fixed costs. Variable costs are the costs of main inputs (DOC, feed, medicines, vitamins, and vaccines), and operational costs (labor costs, husks, electricity, heating/gas, harvesting,

and other costs (disinfectants, safety environment). Fixed costs are only borne by the farmer, including the cost of cage depreciation and equipment depreciation. Cost unit is production cost per unit of

output produced or also known as average cost. The cost equation and cost unit refer to Doll and Orazem (1984), Debertain (1986), and Rasmussen (2010), Ruhel and Sinha. 2010.

Table 1. The number of samples based on the partnership pattern in Sukabumi Regency, 2021

Description	PIR	Makloon
Sample :		
1. Number of farmers	30	30
2. Number of production period	130	116
Farmers' characteristics :		
1. Age (year)	46.66 ± 9.79	45.73 ± 6.61
2. Broiler chicken farming experience (year)	10.73 ± 5.68	10.26 ± 7.41
3. Education (year)	10.70 ± 4.17	11..26 ± 2.07
4. Number of a family member (person)	2.70 ± 0.95	3.50 ± 1.41

$$C = \sum_{i=1}^9 TVC_i + \sum_{j=1}^2 TFC_j \dots\dots\dots(1)$$

$$AC = C/Y = \left(\sum_{i=1}^9 AVC_i\right) + \sum_{j=1}^2 AFC_j \dots\dots\dots(2)$$

where:

- C = total cost (IDR/kg live weight)
- TVC_i = total variable costs (IDR/kg live weight)
- i : 1 = DOC; 2 = feed; 3 = medicine + vaccine + vitamin, 4 = labor; 5 = husk; 6 = heating/gas, 7 = electricity; 8 = harvest; 9 = others (disinfectant, safety environment)
- TFC_j = total fixed costs (IDR/kg live weight);
- j : 1 =cage depreciation; 2=equipment depreciation
- AC = average cost = unit cost (IDR/kg of live weight)
- AVC = average variable cost (IDR/kg of live weight)
- AFC = average fixed cost (IDR/kg live weight);
- Y = broiler chicken production (kg live weight)

Income (Π) refers to the difference between revenue (R) and cost (C):

$$\Pi = R - C \dots\dots\dots(3)$$

$$= P.Y - \left(\sum_{i=1}^9 TVC_i\right) + \left(\sum_{i=1}^2 TFC_i\right) \dots\dots\dots(4)$$

where:

- R = revenue (IDR/kg live weight)
- P = price of broiler chicken at farmers level (IDR/kg of live weight)

To determine whether there is a difference in income between PIR and Makloon pattern, a different test was carried out using the mean difference test, as follows (Walpole 1982):

$$t = \frac{(x_1 - x_2) - d_0}{Sp \sqrt{\left(\frac{1}{n_1}\right) + \left(\frac{1}{n_2}\right)}} \dots\dots\dots(5)$$

$$Sp = \frac{\sqrt{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}}{(n_1 + n_2 - 2)} \dots\dots\dots(6)$$

where:

- x₁ = average income of PIR pattern
- x₂ = average income of Makloon pattern
- n₁ = number of samples of PIR pattern
- n₂ = number of samples of Makloon pattern

Hypothesis:

- H₀: PIR pattern income = Makloon pattern income
- H₁: PIR pattern income > Makloon pattern income
- Hypothesis H₀ is rejected if P value < α; H₀ is accepted if P value > α (α=0.05).

RESULT AND DISCUSSION
Cost structure and cost unit of broiler chicken farming

Cost structure of broiler chicken farming shown in Table 2. The cost of feed is the largest cost of the total production cost of broiler chickens, each with a proportion of 66.64 % in the PIR pattern and 66.08 % in the Makloon pattern. Its as revealed by the results of the study Putri et al (2020), where feed costs account for 65.09 % of broiler chicken production costs.

The same was said by Abda and Amin (2011), Maisukawa and Jabo (2011), and Oladebo and Ojo (2012). Feed cost of the PIR pattern was higher than Makloon farmers. DOC costs are the second largest after feed in the two patterns, with the respective proportions 26.10 % in the PIR pattern and 25.51 % in the Makloon pattern. The same thing was expressed by Putri *et al* (2020), where the proportion of DOC costs reached 28.23 %. The total costs borne by the company reached 95.12 % in the PIR pattern and 93.01 % in the Makloon pattern. Putri's research results (2020) show the same thing, that the costs incurred by the company reach 93.79 %.

Labor costs are the largest operational costs incurred by farmers in the two partnership patterns, with a proportion of 1.53 percent in the PIR pattern and 2.27 % in the Makloon pattern. The same thing was expressed by Putri *et al* (2020), that

labor costs are the biggest costs incurred by breeders, reaching 1.74 percent. Labor costs in the Makloon pattern are higher than the PIR pattern. The second biggest cost incurred by farmers in the PIR pattern is litter husk, but in the Makloon pattern it is heating/gas costs.

Electricity, harvest and other in the Makloon pattern are higher than the PIR pattern, so the total operational costs incurred by farmers in the Makloon pattern are higher than the PIR pattern. The total operational costs of farmers in the Makloon is IDR 1,202.50/kg live weight, while in the PIR pattern, it is IDR 830.93/kg. This shows the cost efficiency of broiler chicken farming with PIR pattern is better than the Makloon pattern.

For fixed costs, cage depreciation is the largest cost in both patterns and the proportion is higher than equipment depreciation. The cage depreciation was 0.37 % in the PIR pattern and 0.32 % in the Makloon pattern, while equipment depreciation was 0.20 % in the PIR pattern and 0.16 % in the Makloon pattern. In contrast to these results, equipment depreciation was greater than cage depreciation (Putri *et al* 2020), respectively 0.71 % for equipment depreciation and 0.39 % for cage depreciation. The total costs for farmers using the PIR pattern are higher than the Makloon pattern. Although the total operational costs of the PIR pattern are

greater than the Makloon pattern, the total farmer's costs in the Makloon pattern are greater than the PIR pattern. If the total costs of main inputs and the operational costs of farmers are added up, then the total production costs of the PIR pattern are greater than the Makloon pattern.

This is because the prices of DOC, feed, medicines, vaccines, and vitamins in the PIR pattern are more expensive than in the Makloon pattern. The prices of DOC, feed, and medicines, vaccines, and vitamins in the PIR pattern are more expensive than

in the Makloon pattern. In the PIR pattern, the average prices for DOC, feed, and medicines, vaccines, and vitamins were IDR 7,500.00/head, IDR 7,785.00/kg, and IDR 629.56/head, while in the Makloon pattern it is IDR 6,362.39/head, IDR 7,688.59/kg, and IDR 360.61/head. Prices for DOC, feed, medicines, vaccines, and vitamins are determined by the company and delivered to farmers prior to production. The costs of DOC, feed, medicines, vaccines, and vitamins are paid by farmers from broiler chicken production after harvest.

Table 2. Cost structure and cost unit of broiler chicken farming based on partnership pattern in Sukabumi Regency, West Java

Description	PIR pattern		Makloon pattern	
	IDR/kg	%	IDR/kg	%
1 Variable cost of main inputs				
(1) DOC	5,039.39 ± 1,040.34	26.10	4,713.86 ± 2188,02	25.51
(2) feed	12,867.55 ± 1,347.41	66.64	12,211.30 ± 1,417.38	66.08
(3) medicine + vaccine+vitamin	461.03 ± 161.73	2.39	263.12 ± 151.29	1.42
total	18,367.97 ± 2,128.35 ^a	95.12	17,188.28 ± 3,209.18 ^a	93.01
2 Operational cost				
a. variable cost:				
(1) labor	296.05 ± 145.36	1.53	418.66 ± 196.79	2.27
(2) litter husk	167.98 ± 34.68	0.87	172.19 ± 78.68	0.93
(3) electricity	83.99 ± 17.34	0.43	110.29 ± 69.47	0.60
(4) gas (heating)	153.70 ± 81.58	0.80	315.79 ± 189.30	1.71
(5) harvest	95.61 ± 82.26	0.50	99.65 ± 2.84	0.54
(6) others (desinfectan, environment safety)	33.60 ± 6.94	0.17	85.93 ± 93.94	0.46
total	830.93 ± 221.01 ^a	4.30	1,202.50 ± 348.32 ^a	6.51
b. fixed cost:				
(1) cage depreciation	71.80 ± 33.33	0.37	59.71 ± 39.72	0.32
(2) equipmentn depreciation	38.64 ± 22.90	0.20	30.20 ± 23.66	0.16
total	110.44 ± 28.12 ^a	0.57	89.92 ± 31.69 ^a	0.49
Total operational costs	941.37 ± 231.78 ^a	4.88	1,292.42 ± 393.50 ^a	6.99
3 Average Total Cost (cost unit)	19,309.34 ± 2,196.97 ^a	100.00	18,480.70 ± 3,483.02 ^a	100.00

^asignificant at $\alpha=0.05$

The income of broiler chicken farming based on the partnership pattern in the location were presented in Table 3. Revenue from broiler chicken farming comes from production (maintenance) and performance incentives. Performance incentives in the PIR pattern consist of production incentives, depletion incentives, and market price incentives. Farmers get production and depletion incentives if they meet the FCR, depletion, and performance index (PI) standards set by the company. The FCR and

depletion values are standard, while PI is 350. Market bonus will be obtained if the market price > broiler chicken contract price, with a bonus amount of 20-30 % of the price difference. Farmers receive production yields and performance incentives after harvesting, usually 5-7 days after harvesting, by transferring them to the farmer's bank account. Farmers get records of production results and performance incentives from the company. For the Makloon pattern, performance incentives

consist of production and depletion incentives (if FCR and depletion values \leq standard, and $PI \geq 300$.), and no market price incentives. Payments for receipts under the Makloon pattern are made partly at the beginning of production (operational costs), and partly after harvest (production and depletion incentives). The operational cost for maintenance is IDR 2,000.00/DOC (chick in), while the performance incentive depends on the achievement of FCR, depletion, and PI.

The income from the PIR pattern of broiler chicken farming is higher than that of the Makloon pattern for both sources. For production results, the difference between the PIR and Makloon patterns is relatively small, IDR 8.10/kg live weight (IDR 18,008.36 – IDR 18,000.26), but for performance incentives, the difference is quite large, at IDR 1,594.95/kg live weight (IDR 2,601.96 – IDR 1,008.01). Although the total production costs (unit cost) of the PIR pattern are higher than the Makloon

pattern, the income for the PIR pattern is greater than the Makloon pattern. The difference between PIR and Makloon patterns is IDR 773.41/kg (IDR 1,300.98 – IDR 1,300.98).

If viewed from the value of the R-C ratio, then broiler chicken farming is feasible, because the R-C value > 0 , R-C ratio 1.07 for PIR and 1.03 for Makloon pattern. Likewise, the profitability ratio value is 6.74, and 2.85, which means that the profit of broiler chicken farming is 6.74 % for the PIR pattern, and 2.85 percent for the Makloon pattern. Thus, the cost/economic efficiency of the PIR pattern is better than the Makloon pattern. The value of the R-C for the PIR pattern is identical to the results of Bana *et al* (2021) dan Mulatsih *et al* (2018), but lower than the results of the study by Putri *et al* (2020). When compared with bank interest rates (percent per month), the profitability ratio of broiler chicken farming is still higher, so broiler chicken farming is still profitable.

Table 3. Income of broiler chicken farming based on partnership pattern in Sukabumi Regency

No	Description	PIR pattern (IDR/kg live weight)	Makloon pattern (IDR/kg live weight)
1	Revenue		
	(1) production yield	18,008.36 ± 2,203.61	18,000.26 ± 3,481.96
	(2) performance incentives	2,601.96 ± 296.72 ^a	1,008.01 ± 189.98 ^a
	Total	20,610.32 ± 2,500.33 ^a	19,008.27 ± 3,671.94 ^a
2	Total production cost	19,309.34 ± 2,196.97 ^a	18,480.70 ± 3,483.02 ^a
3	Total Income	1,300.98 ± 148.02 ^a	527.57 ± 99.43 ^a
	R-C ratio (total)	1.07 ± 0.06	1.03 ± 0.03
	Profitability ratio (percent)	6.74 ± 0.87 ^a	2.85 ± 0.95 ^a

^asignificant at $\alpha=0.05$

CONCLUSIONS

The feed cost was the largest cost of the structure cost of broiler chicken farming for each partnership pattern, PIR and Makloon.

The proportion of production costs incurred by the company in the PIR pattern is higher than in the Makloon pattern. Labor costs are the largest cash costs incurred by farmers, where the proportion in the PIR pattern is lower than in the Makloon pattern. The cash costs incurred by farmers under the

PIR pattern are lower than the Makloon pattern, but the non-cash costs are the opposite. Although the cost unit of broiler chicken farming with the PIR pattern is higher than the PIR pattern, but the income for the PIR pattern is higher than the PIR pattern.

The difference between the total production costs of the PIR pattern and the Makloon pattern is 4.40 %. While the difference in total income is 146.59%.

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