Paper 53

Supply Chain Contract for Retailer at Poultry Farm

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Abstract - **This study aimed to design a supply contract at a poultry farm. In this farm, Price fluctuation of eggs creates problems between farm-retailer which is fluctuation retrieval between each retailer that results in a buildup of eggs averaging 138 bonds worth 49,68 million. Currently, the farm just uses trusted-based for the egg distribution procedure. if the retailer does not come to acquire the eggs, the owner attempt to locate another supplier to purchase the eggs. This condition causes the fluctuation in egg sales. Observations were made of large retailers totaling four retailers. The work was observed using a questionnaire and direct interview with the supervisor, inventory and warehousing manager, and owner. This study uses the current reality tree to analyze the root cause of the problem that faces the farm and uses the analytical hierarchy process to construct a supply contract selection based on justification. The results showed that the farm implemented a quantity flexibility contract for four large retailers. Based on calculation Implementing a quantity flexibility contract will enhance the supply chain profit equals Rp. Rp48.021.322,- for Retailer A, Rp.17.669.702,- for Retailer B, Rp 26.403.667,- for Retailer C and Rp.44.379.203,- for Retailer D.**

Keywords – **Distribution procedure, effectiveness, price fluctuation, supply chain contract,**

I. INTRODUCTION

Chicken eggs are one of the commodities sources of staple food; the Government observes the development cost. Through the Minister of Trade of the Republic of Indonesia No. 58 of 2018, the Government set about Fixing the Reference Prices for the Purchase of breeders and the Reference Price of Sales in the Consumer. It is necessary to do to protect breeders and consumers from price volatility. For consumers, the stabilization of prices is essential because of the concerns about their ability to meet the household's food needs[1].

Based on data from the basic needs Market Monitoring System (SP2KP, 2022), the national average price of purebred chicken eggs in January 2022 was above the Ministry of trade's reference price of Rp27 709/kg. The price of purebred chicken eggs increased by 5.31 percent compared to the average price of purebred chicken eggs in December 2021, amounting to Rp 26,313/kg. Compared with the price in the same period last year (January 2021) of Rp 26,713/kg, the price of purebred chicken eggs in January 2022 increased by 3.73 percent [2]. Figure 1 shows the fluctuation of chicken egg prices between 2018-2022.

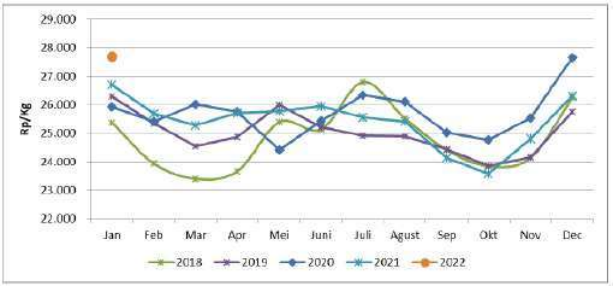

Fig. 1. Development of Chicken Eggs Price (Rp/Kg)

Source : Statistic, 2021

This price fluctuation shows that the production of eggs has not increased because many farms are not full because the chicken farmer cannot do rejuvenation. On the other hand, it is suspected that the Close House (CH) and semi-close house cages rose significantly. They are upper-middle-class farmers and PMDN and PMA entrepreneurs who do cultivation with CH and SCH cages. Many small-scale farms are not filled because, at this time (December - April 2022), small-scale farms do early feed on laying hens, and chick in is delayed. Small farms only have a stock of feed for about 1-2 weeks with KA 17% -19%, So it is not durable stored. Small-scale farm businesses with low efficiency can not withstand the pressure of high input prices and low consumer purchasing power.

Meanwhile, on a medium to large scale, having a stock of feed for 2-4 months is not possible to change the production schedule, meaning the business continues to run. In medium and large-scale businesses, the use of cages CH and SCH efficiency is quite good, not much wasted feed because of the machine's provision, while the feed manually feed wasted 1% -3%. Labor CH and SCH cheaper where 10,000 tail enough one person of power, while in the cage open house need 3-4 people of Labor. The involvement of medium and large scale causes the population of laying hens to shift from small to large medium enterprises. The population can remain or rise, but entrepreneurs become few and do medium and large scale [3].

Al-Ikhlas Farm is one of the Small and Medium Industries (IKM) laying hens in West Sumatra, which was established in 2000 with distribution areas covering Pekanbaru, Jambi, Bengkulu, and Jakarta. Due to the business competition,

currently, Al-Ikhlas farm is facing problems related to the fluctuating price of eggs. The issue that often occurs is a mismatch between supply and demand, the problem between owner and retailer, and this problem is frequently faced every year. Figure 2 show the mismatch between supply and demand in Al-Ikhlas Farm

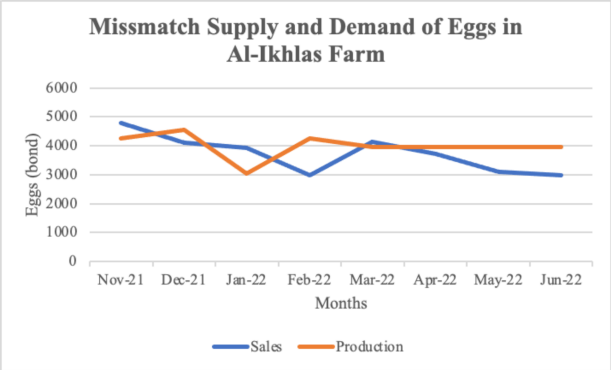

Fig. 2. Mismatch Supply and Demand of Eggs in Farm

Source: Author,2022

Based on this background, the company needs to analyze the root causes of the problem and choose the proper solution of this root cause

II. METHODOLOGY

This study aimed to analyze the root cause of the problem faced by the farm and find the proper solution to that. we will utilize the Current Reality Tree (CRT) to discover the root cause and find the source of the problem. The fluctuation in egg sales is an issue that Al-Ikhlas farm has always had. This fluctuation impacts the buildup of eggs averaging 138 bonds worth 49,68 million rupiahs. The fluctuation in egg sales can be attributed to two factors. In the current situation, the reservation of eggs between the owner and the retailer is based on trust between the two parties; if the retailer does not come to acquire the eggs, the owner attempts to locate another supplier who is interested in purchasing the eggs. This condition causes the fluctuation in egg sales. The variation in egg sales is caused by this circumstance. Furthermore, an individual's incapacity to understand a situation and make the correct option influences the fluctuation in egg sales. Figure 3 show the current reality tree based on the problem faced by the farm.

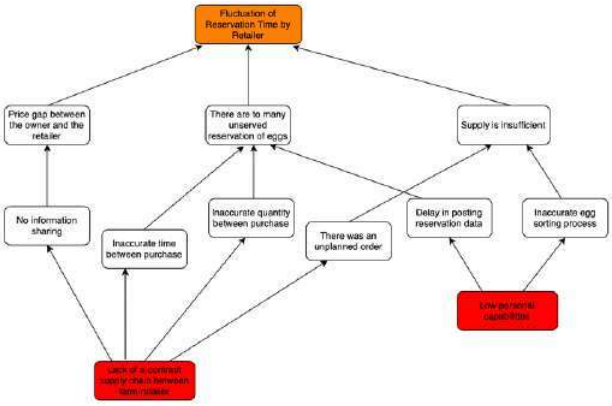

Fig. 3. Development of Chicken Eggs Price (Rp/Kg)

Source : Author

Based on the Current Reality Tree, there are two root causes of fluctuation of egg sales: lack of a contract supply chain between owner-retailer and low personnel capabilities. The solution for the first root cause is to discuss the focus of each contract supply chain, then choose the contract that is suitable for the firm. With implementing a supply contract for distributing eggs, the quantity, and time will be structured periodically with estimated minimum and maximum of product. And the delivery schedule is determined by the control of two parties. Low personnel capabilities are the second root cause. The solution to these underlying issues is to develop proper training to enhance worker abilities. The following Table 1 gives the descriptions of two root causes.

Table 1 - ROOT CAUSES EXPLANATION

Source: Author

No	Root Cause	Description
1	Lack of contract supply chain between owner-retailer	Root cause analysis results show that no sharing of information between two parties, the inaccurate time between sales, and inaccurate quantity between sales were caused by no contract supply chain applied on the farm. The reservation of eggs between the owner and the retailer is based on trust between the two parties; if the retailer does not come to acquire the eggs, the owner attempts to locate another supplier interested in purchasing the eggs.
2	Low personnel capabilities	The reservation of eggs between the owner and the retailer is based on trust between the two parties; if the retailer does not come to acquire the eggs, the owner attempts to locate another supplier interested in purchasing the eggs.

According to the previous chapter, the critical issue is sales egg fluctuations. The main reason for this issue is a lack of a contract supply chain between the owner and the retailer and a lack of employee capabilities. with a focus on the first root cause because Al-Ikhlas farm is already joined with a third party to develop a clear and structured job desc, job spec, and training program. Choosing the best supply contract is regarded as a beneficial activity for improving and smoothing out the distribution process. A supply contract's issue is determining which suppliers can meet its demands, which includes defining decision rights, price, minimum purchase commitments, quantity flexibility, buyback or returns policies, allocation rules, lead time, and quality.

Cai Jianhu [4] defined flexibility contracts after studying a variety of supply chain contracts: the supply chain contract that could achieve entire supply chain coordination while having the capability of distributing the supply chain's gross profit among supply chain members in any way, and further illustrated that the Order Quantity Contract, Buy Back Contract, and Revenue Sharing Contract, Quantity Discount are flexible contracts. Numerous studies show that using such contracts as the Quantity Contract, Buy Back Contract, and Revenue Sharing Contract, Quantity Discount to achieve supply chain system coordination is an effective strategy, regardless of whether analyzing from the perspective of the manufacturer and wholesaler or the perspective of a multi-stage or multi-level supply chain. As the "war" between customers escalated, the connection between supply chain participants evolved from the initial straightforward division of profit to mutual benefit and win-win outcomes[5].

Yuliawati [6] implemented buy back contract for maximizing profit and involved supply chain participants' profit on IKM Batik Siduarjo. Vincent [7] presents an outline of the best option a supplier that manufactures apparel with its retailer may make when deciding between a buyback and a revenue-sharing contract. Lee et al.[8] outline the genesis of QF contracts as a reaction to specific supply chain inefficiencies. Huang et.al. [9] solve profit-maximizing effort level chosen by the retailer is always smaller than the one determined from the standpoint of the supply chain. This is inefficient since the supply chain profit is finally divided between the retailer and the supplier. The cause of this issue is that the merchant suffers the entire expense while only reaping a portion of the benefit of lowering the number of false failure returns.

According to alternative business solutions, there are 4 types of contracts that can be utilized for supply contracts at Al-Ikhlas Farm. In this study, the author focuses on selecting the best contract that is suited to be applied to the organization farm, so that the supply contract must be selected. The AHP approach is one sort of method that may be used to solve MCDM issues. AHP is used to explain comprehensive choice arguments, as well as to engage in a multi-level hierarchy structure of goals, criteria, sub-criteria, and choices[10]. The AHP process involves the evaluation of criteria and sub-criteria by qualified specialists in their respective fields. One of the most important contributions of AHP is its ability to find the most dominating criterion and sub-criteria for any given objective. The first stage of AHP is to create a hierarchical framework of goals, criteria, and sub-criteria. The AHP model will next be constructed using a pair-wise questionnaire that will be evaluated by specialists. Following that, the questionnaire results will be computed and the geometric mean determined before being built into a matrix structure and the weight of each criteria acquired. The AHP approach, in particular, can evaluate the extent to which responses are consistent or inconsistent through the consistency index[11]. From this, the AHP approach may assist businesses in clearly and efficiently determining the important part of the unique problems considering the final decision.

Data will be acquired through key management interviews as well as a simple questionnaire. As mentioned in the previous chapter, the methodology described in AHP will be used for this research.

A. Identifying Primary and Secondary Supply Contract Selection Criteria

An in-depth interview with owner of farm is conducted to identify the primary and secondary criteria for supply contract selection. AHP criteria for supply contract selection can be seen in Table 2.

Table 1 - AHP CRITERIA

Source: Author

No	Criteria	Sub-criteria	Reference
1	Flexibility	Efficiency Easiness	[12]; [13]; [14]
2	Impact	Risk Benefit	[15]; [13]; [16]
3	Data Completeness	Purchase commitment Warranty Quality	[15]; [17]; [16]
4	Management and Organization	Responsiveness Discipline After sales service	[12]; [15]; [10]
5	Cost	Transportation cost Cost of service	[19]; [17]; [13]; [16];

B. Determining Structure of Hierarchy Model

This phase entails creating the AHP hierarchy model and calculating the weights of each level of the supplier selection model. Based on the identified criteria and sub-criteria, the developed AHP model has five levels: the goal, the criteria, and alternatives. Following the collection of the necessary sub-criteria, they were identified and averaged. As shown in Figure 4 the contract selection model, ten sub-criteria were chosen for level (3).

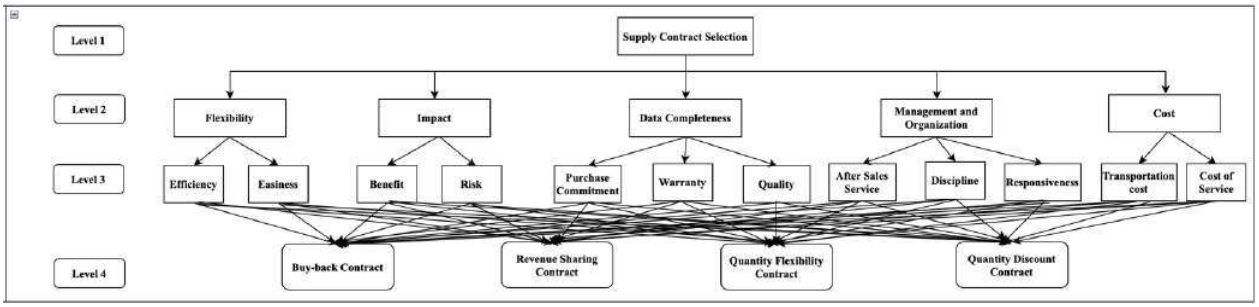

Fig. 4. An Illustrative Decision Hierarchy for Contract Selection

Source : Author

Based on Fig.4 the author illustrates an example four level hierarchy for the contract selection problem. To select the contract for Al-Ikhlas Farm, the first level of the hierarchy is Cost, Flexibility, Data Completeness, Impact, and Management and Organization, which are included in the second level (criteria). The third level contains sub-criteria which are Efficiency, easiness, benefit, risk, etc. The lowest level of the hierarchy contains the supply contract type namely various contracts to be evaluated to select the supply contract.

C. Construct a Set of Pairwise of Comparison Matrix

In level two, the pair-wise comparison judgments were used to identify the important criteria. This method has proven to be very effective in data collection. The pair-wise comparisons function by determining the relative importance of the criteria and sub-criteria, which is rated using Saaty's (1980) in Alsuwehri [20] nine-point scale, as shown in Table 3, indicating the level of relative importance from equal, moderate, strong, very strong, to extreme by 1, 3, 5, 7, and 9, respectively. The numbers 2, 4, 6, and 8 represented the intermediate values between two adjacent arguments.

Table 1 - MEASUREMENT SCALE

Source: Saaty (1980)

Verbal Judgment or Preference	Numerical Rating
Extremely Preferred	9
Very Strongly Preferred	7
Strongly Preferred	5
Moderately Preferred	3
Equally Preferred	1
Intermediate values between two adjacent judgments (when compromise is needed)	2, 4, 6 and 8

The survey was carried out by interviewing subject matter experts in the form of an interview to explain the numerical rating scale and the criterion for the judgments.

Based on the initial interview with the owner of the farm and direct observation by the author, we found that only three experts that compatible with this interview The following is the outcome of three expert interviews:

Table 2 - EVALUATOR LIST

Name	Numerical Rating
Hen	Supervisor
Fauzan	Inventory and Warehousing Manager
Zil	Owner

Based on the results of discussions with the owner, three compatible experts were chosen to be experts in contract selection interviews for the supply chain contract selection process at Al-Ikhlas farm. This selection was based on educational background, position, and experience of experts in egg distribution at the company. Expert Hen was chosen based on his 17-year experience as a farm supervisor in charge of managing the purchasing and selling of eggs, as well as serve as a liaison between the retailer and the owner. Expert Fauzan was chosen based on his 8-year experience managing warehouses and monitoring eggs in and out. and the owner was chosen because the Al-Ikhlas farm owner operates as a retailer locator and determines the pricing of eggs every day

D. Determining Weight for Each Criteria

The weight of each criterion was determined through pairwise comparison using AHP methodology. A questionnaire was used to perform a pairwise comparison.

The respondents held the positions of supervisor, inventory and warehouse manager, and owner. The questionnaire results were then entered into the Expert Choice 11 program.

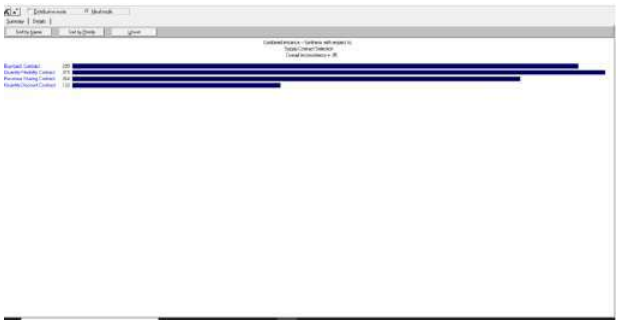

Fig. 2. Ranking on Type of Supply Contract Selection

Source : Author

The inconsistency is 0,05. It signifies that the data is correct because the inconsistency is less than 1. There are three evaluator to select the best contract for supply contract selection. Figure 3 can be seen inconsistency each evaliuator.

Fig. 3. Ranking on Type of Supply Contract Selection

Source : Author

The inconsistency is 0,0451. It signifies that the data is correct because the inconsistency is less than 1. Table 3 shows the global weighted score with their scoring.

Table 5 - GLOBAL WEIGHTED SCORE WITH SCORING

Source: Author

No	Criteria	Local Weight	Sub-criteria	Local Weight	Global Weight
1	Flexibility	0,422	Efficiency	0,797	0.
			Easiness	0,203	0.
2	Impact	0,122	Risk	0,799	
			Benefit	0,201	0,025
3	Data Completeness	0,134	Purchase commitment	0,492	0,066
			Warranty	0,344	0,046
4	Management and Organization	0,151	Quality	0,163	0,022
			Responsiveness	0,492	0,074
			Discipline	0,251	0,038
			After sales service	0,256	0,039
5	Cost	0,171	Transportation cost	0,84	0,144
			Cost of service	0,492	0,084

The ranking list of criteria shows that cost and flexibility factors are at the top of the list, with the top rank being effiency (0.280), followed by percentage transportation cost (0.144), and risk (0,097) and purchase commitment in 7th position with percentage (0.066). Figure 3 can be seen AHP Final Result.

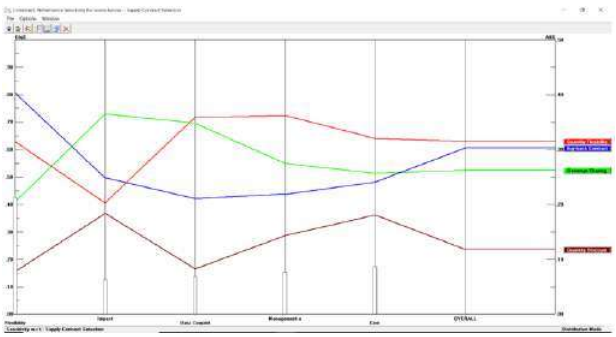

Fig. 4. AHP Final Result

Source : Author

The Analytic Hierarchy Process's goal is to choose the best supply contract options. The most significant influencing criteria are flexibility, and the appropriate supply contract option is the Quantity Flexibility Contract.

III. FINDING AND DISCUSSION

A. Quantity Flexibility Contract Implementation

Based on calculation before, the author will construct supply contract using quantity flexibility contract, which means commitments of both parties. These contracts are more successful than buyback contracts when the supplier sells to multiple retailers because they allow the seller to aggregate uncertainty across multiple retailers, decreasing the quantity of excess inventory. When properly implemented, quantity flexibility contracts increase the average amount purchased by retailers and may boost total supply chain profits. There are 8 step to implemented quantity flexibility contract

First, Define demand for product

Table 6 - DEMAND FOR EGGS DURING PREVIOUS SIX MONTHS

Source: Author

Type Size (pts)	Retailer A	Retailer B	Retailer C	Retailer D
11/21	152	58	28	158
12/21	153	57	69	112
01/22	132	46	71	19
02/22	132	46	71	19
03/22	152	54	30	110
04/22	133	48	86	111
05/22	148	49	15	25
05/22	158	57	21	8
Average	144,97	51,86	48,82	70,16
Stdev	10,95	5,15	27,79	58,44

Based on the demand data, and assuming that the demand data is normally distributed, the average retail demand is between 360 bonds/months.

Second, Define customer service level for each retailer

The Quantity Flexibility Contracts model for the Al-Ikhlas farm supply chain structure above shows that the farm produces eggs at the cost of v per bond and then sets the selling price to retail at c, then retails sell eggs to consumers at market prices. Farm set a manufacturing cost (v) of Rp. 330.000,- per bond, with a sale price to retailer (c) of Rp 335.000- Rp.350.000,- per bond. Additionally, Retail offers eggs to customers (p) for Rp.660.000,-. If there is an excess product at the conclusion of the selling period, it is presumed that it has no residual value under this system. ( )and ( )are assumed to have the same value. (Retailer A)

$$CSL = \frac{p-c}{p} \quad (1)$$

$$CSL = \frac{660.000-335.000}{660.000}$$

$$CSL = 0{,}34$$

Based on calculation, customer service level from Retailer A around 34%.

Third, Define number of retail order

If known demand is normally distributed with the average , standard deviation and the CSL value, then the optimal number of orders can be calculated using the formula: (retailer A)

$$O = F^{-1}(CSL; \mu; \sigma) \quad (2)$$

$$O = F^{-1}(0,34; 144,97; 10,95)$$

$$O = 137\ bond$$

From the calculation, number of order from retailer A equal to 137 bonds.

Fourth, Calculate the Number of Expected Purchases by the Retailer Q_R

If there are excess products at the end of the selling period, it is assumed that products do not have a residual value under this system. and value is expected to be the same.

The number of expected purchases by retailer that =0,2 equals, (retailer A)

$$Q_R = qF(q) + Q\,[1 - F(Q)] + \mu\left[F_s\left(\frac{Q-\mu}{\sigma}\right) - F_s\left(\frac{q-\mu}{\sigma}\right)\right] - \sigma\left[f_s\left(\frac{Q-\mu}{\sigma}\right) - f_s\left(\frac{q-\mu}{\sigma}\right)\right] \quad (3)$$

$$Q_R = 118 * 0,02 + 176\,[1 - 0,2] + \left[F_s\left(\frac{176-144,97}{10,95}\right) - F_s\left(\frac{118-144,97}{10,95}\right)\right] - \sigma\left[f_s\left(\frac{176-144,97}{10,95}\right) - f_s\left(\frac{118-144,97}{10,95}\right)\right]$$

$$Q_R = 145\ bond$$

Based on equation (3), the author can conclude that for =0,2 and c=435.000 for expected quantity purchased by Retailer A around 14T5 bond.

Table 7 shows the complete findings for each retailer's calculation,

Fifth, Calculate Expected Quantity Sold by Retailer D_r

$$D_R = Q\,[1 - F(Q)] + \mu\, F_s\left(\frac{Q-\mu}{\sigma}\right) - \mu\, f_s\left(\frac{q-\mu}{\sigma}\right) \quad (4)$$

$$D_R = 176\,[1 - 0,2] + 144,97\, F_s\left(\frac{176-144,97}{10,95}\right) -$$

$$144,97\, f_s\left(\frac{118-144,97}{10,95}\right)$$

$$D_R = 138\ bond$$

Based on equation (4), the author can conclude that for =0,2 and c=435.000 for expected quantity sold by Retailer A around 138 bond.

Sixth, Calculate the Expected Profit for Retailer (Retailer A)

$$Expected\ Retailer\ Profit = D_R\, x\, p + (Q_R - D_R)S_R - Q_R\, x\, c \quad (5)$$

S_R=0 because the author assumed in this research that there is no item left in retail.

$$Expected\ Retailer\ Profit$$

$$= 138\, x\, 660.000 - 145\, x\, 335.000$$

$$= Rp.28.005.000,-$$

Seventh, Calculate Expected Profit for Manufacture (Retailer A)

$$Expected\ Manuf\ Profit = Q_R\, x\, c + (Q - Q_R)S_M - Q\, x\, v \quad (6)$$

S_M=0 because the author assumed in this research that there is no item left in manufacture.

$$Expected\ Manufacture\ Profit$$

$$= 145\, x\, 335.000 - 176\, x\, 303.000$$

$$= Rp.9.624.226,-$$

Eight, Calculate Supply Chain Profit

Last the author can calculate expected supply chain profit based on retailer profit and manufacture profit, the number of expected supply chain profit equals,

$$\textit{Expected SC Profit} = \textit{Manufacture Profit} + \textit{Supplier Profit.} \quad (7)$$

$$\textit{Expected SC Profit} = Rp.9.624.226,- + Rp.28.005.000,- = Rp.27.629.226,-$$

Table 7 - PROFIT CALCULATIONS USING QUANTITY FLEXIBILITY CONTRACT FOR RETAILER A

Source : Author

Retailer A														
alpha	Beta	c	o	Q	q	Expected Quantity Purchased by retailer	Expected Quantity Sold by retailer	Expected overstock at retailer	Expected Retailer Profit		Expected Manufactured Profit		Expected SC profit	
0,1	0,1	Rp 435.000	142	157	128	119	112	7	Rp	22.056.223	Rp	4.433.593	Rp	26.489.816
0,2	0,2	Rp 435.000	147	176	118	145	138	7	Rp	28.005.000	Rp	9.624.226	Rp	37.629.226
0,3	0,3	Rp 435.000	152	197	106	138	127	11	Rp	23.695.116	Rp	318.828	Rp	24.013.943
0,4	0,4	Rp 435.000	157	220	94	165	160	5	Rp	33.825.000	Rp	5.106.322	Rp	38.931.322
0,5	0,5	Rp 435.000	164	246	82	123	118	5	Rp	24.435.555	-Rp	20.977.503	Rp	3.458.052
0,6	0,6	Rp 435.000	174	279	70	112	105	7	Rp	20.775.102	-Rp	35.972.310	-Rp	15.197.208
0,1	0,1	Rp 478.500	139	153	125	117	115	2	Rp	25.005.000	Rp	4.523.896	Rp	29.528.896
0,2	0,2	Rp 478.500	144	173	115	136	129	7	Rp	25.980.000	Rp	6.833.703	Rp	32.813.703
0,3	0,3	Rp 478.500	149	193	104	128	120	8	Rp	23.520.000	-Rp	2.861.185	Rp	20.658.815
0,4	0,4	Rp 478.500	154	215	92	152	118	34	Rp	11.760.000	Rp	976.987	Rp	12.736.987
0,5	0,5	Rp 478.500	159	239	80	178	116	62	-Rp	870.000	Rp	5.070.901	Rp	4.200.901
0,6	0,6	Rp 478.500	167	267	67	181	111	70	-Rp	5.475.000	-Rp	2.027.331	-Rp	7.502.331

The author shows the impact of different quantity flexibility contracts on profitability for the eggs supply chain on retailer A in Table 5, The author assume that ( ) and ( ) are the same because if there is an excess of products at the end of the period, it is assumed that there is no residual value, because probability = a / b + CSL is used in the calculations, calculations a and b in retailer A are restricted to a value of 0.6.

When demand is normally distributed, with a mean of 145 and a standard deviation of 19. The author assumes calculations on a wholesale price of c=Rp. 435000 and a retail price of p=Rp. 660.000. All contracts under consideration are such that a = b. From the calculation, the author can conclude that ( )and ( )=0,4 will give the highest expected supply chain profit, equals to Rp.48.021.322,-. When ( )and ( )=0,4 and c=Rp.435.000,-, retailer profits are maximized for an order size O=157 bond. For this order size, the author obtain a farm commitment to deliver up to Q = 220 bond and a Retailer A commitment to buy at least q=94 bond. In author analysis, the author assume that farm produce Q=220 bonds and sends the precise number (between 94 and 190) demanded by retailer. For this contract Such a policy results in retailer profits of Rp.33,825.000, - and farm profit of Rp. 14.196.322, -

B. Sensitivity Analysis

The author considers the sensitivity of the final ranking of the alternatives to changes in the weights of the objectives at the first level of the decision hierarchy within the AHP framework [21]. Investigated ranking by sensitivity and discovered that tiny adjustments in the weight of criterion can affect the final ranking. As a result, it is critical to analyze the ranking's robustness. In this study, robustness was investigated by doing a sensitivity analysis on the final ranking of several supply chain contracts. Flexibility factors had the highest relative weight among the five assessment criteria in this study[22].

The weights of supply chain contract types have changed as the weights of assessment criteria have changed, as shown in Table. 4. Although the order of options stays same, the relative weights have shifted. It is obvious that when the weight of flexibility criteria increases, so do the weights of quantity flexibility type of supply chain contract.

Table 8 - PERFORMANCE SENSITIVITY ANALYSIS CONTRACT SELECTION AFTER CHANGE THE SCORE OF FLEXIBILITY CRITERIA

Flexibility Criteria	Contract Rating
0,422	Quantity Flexibility>Buy-back>Revenue sharing>Quantity discount
0,01	Quantity Flexibility>Revenue sharing > Buy-back >Quantity discount
0,02	Quantity Flexibility>Revenue sharing > Buy-back >Quantity discount
0,1	Quantity Flexibility>Revenue sharing > Buy-back >Quantity discount
0,2	Quantity Flexibility>Revenue sharing > Buy-back >Quantity discount
0,3	Quantity Flexibility>Buy-back>Revenue sharing>Quantity discount
0,4	Quantity Flexibility>Buy-back>Revenue sharing>Quantity discount
0,5	Quantity Flexibility>Buy-back>Revenue sharing>Quantity discount
0,6	Quantity Flexibility>Buy-back>Revenue sharing>Quantity discount
0,7	Buy-back>Quantity Flexibility>Revenue sharing>Quantity discount
0,8	Buy-back>Quantity Flexibility>Revenue sharing>Quantity discount
0,9	Buy-back>Quantity Flexibility>Revenue sharing>Quantity discount

It shows in Table 3.8 that whether the flexibility criterion, which is 42,2%, is reduced to 1% or increased to 60%, the contract supply chain's ranking does not change. However, if the value of flexibility is increased from 70% to 90%, the contract supply chain will be ranked as follows: buyback contract, quantity flexibility, revenue sharing, and quantity discount.

IV. CONCLUSION

A. Conclusion

This research was conducted at Al-Ikhlas Farm to choose the appropriate contract that can solve the problem at farm. In doing this, the author developed a quantity flexibility contract that consist of defining decision rights, proce, minimum purchase commitments, quantity flexibility, buyback or return policy, allocation rules, and lead time. Futhermore, the primary discovery from this research will be elaborated and discussed by answering each of research question which is propsed at the beginning of this research.

RQ 1 : What are the root causes of reservation time fluctuation between each supplier at Al-Ikhlas Farm?

As mentioned in the beginning, Al-Ikhlas Farm faced problem fluctuation of retrieval time with four retailer. Based on current reality tree, it could be concluded that the root cause of the problem are lack of a contract supply chain between the owner and the retailer and a lack of employee capabilities. because Al-Ikhlas farm is already joined with third party to develop a clear and structured job desc, job spec, and training program, the author focus on the first root cause.

RQ 2 : What is the most suitable solution for these root causes?,

Based on calculation using analytical hierarchy process, decreasing reservation time fluctuation of eggs is to gradually apply quantity flexibility contract between farm and retailer at Al-Ikhlas Farm. Based on Emmon and Gilbert [22], In this case, we analyze the quantity flexibility contract. We show that the retail price that maximizes predicted retailer profits is greater than the price that maximizes profits if demand were constant. We then show that if the wholesale price is within a given range, the manufacturer would prefer a positive buyback fraction. In comparison, this choice is preferable than not signing into a quantity flexibility contract at all. Finally, in the scenario of price dependent demand, we demonstrate that the contract results in a win-win situation for both the producer and the store.

RQ 3 : How much supply chain profit is earned as a result of suitable solution?

Based on calculation using quantity flexibility contract that apply for four retailer in Al-Ikhlas Farm set a maximum and minimum limit for egg retrieval by Retailer A,B,C,D, ensuring that eggs are distributed consistently to each retailer. This will have an effect on the consistency of egg sales to each retailer, requiring the farm to measure egg output every month. The implementation of quantity flexibility contract will enhance the supply chain profit equals to Rp. Rp48.021.322,- for Retailer A, Rp.17.669.702,- for Retailer B, Rp 26.403.667,- for Retailer C and Rp.44.379.203,- for Retailer D. Therefore, quantity flexibility contract is beneficial for Al-Ikhlas Farm because the contract will make sure egg sales for each retailer.

B. Implication and Future Research

The implication of supply contract could be benefical for another poultry farm with adjustment and justification.

For future research, another author can more selection

criteria for supply chain contract assessment can be explored in the future, doing research regarding supply contract Al-Ikhlas's other product such as laying hen, chick, and in the future, the author can focus to implement the supply contract with monitoring the contract offering procedure till the contract is formed with the approval of both sides.

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