

An Investigation of Production Risk, Marketing Risk, and Financial Risk on Broiler Farming in Regency of Minahasa Utara-Indonesia

Erwin Wantasen¹, Jein R Leke², Anneke K Rintjap¹

¹Department of Socio economic Faculty of Animal Science, Sam Ratulangi University, Manado, Indonesia

²Department of Animal Production Faculty of Animal Science, Sam Ratulangi University, Manado, Indonesia

Abstract— The purpose of this study was to investigate risks source, threat potency of risk and risk management strategy in managing risk production, marketing risk, and financial risk of broiler farm in Regency of Minahasa Utara. The research's site was selected purposively in three Villages, representing three Districts as center of broiler production in Regency of Minahasa Utara. Those three Villages were Village of Dimembe, Village of Kauditan Satu and Village of Kolongan. In detail, 59 respondents of broiler's breeders were selected by total of sampling. Data regarding on source of production risk, marketing risk, and financial risk of broiler farming was gained through in-depth interview addressed to breeders guided by a list of questions. Value of risks was then analyzed by using Failure Mode and Effect Analysis (FMEA). Results study showed sources of production risk on broiler farming on the study sites comprise of: inclination to utilize chemical medicine, disease outbreak, bad weather and utilization of conventional tools. Marketing risks dealt by broiler's breeders consist of broiler's mortality, sold broilers in lived condition, most price determined by partner and performance index target-based profit. Financial risks, then, faced by broiler's breeders are minimal capital, fearsome to lend to bank and higher input price. Based on the value of Risk Priority Number (RPN), sources of primary risk becoming inhibiting factors on success of broiler farm in Regency of Minahasa Utara, consecutively, are performance index target-based profit, disease outbreak, broiler's mortality, sold broilers in lived condition and risk of capital loan from banking sector.

Keywords— Risk, production, marketing, financial, risk value.

I. INTRODUCTION

In general, livestock sub-sector holds a significant role in Indonesian agriculture. One of types of livestock-agribusiness sufficiently cultivated is broiler. The need of chicken's meat assumedly will still increase in accordance with improvement of income and population, as depicted in 2016, 2017, and 2018. Those years were a period where Indonesian consumption pattern against chicken's meat experienced increasing as of 3,947 kg/year/capita, 4,835 kg/year/capita, and 5,668kg/year/capita respectively [1]. Therefore, productivity of chicken's meat should be necessarily improved in order to balance demand increasing against chicken's meat.

Chicken's meat has a better quality, but, in fact, there are variously complex issues dealt by broiler farming, either internal or external. Such issue can result serious risk and uncertainty for breeders [2,3]. In Indonesia, most breeders are

dominated small-scale farming, non-company structure, and have highly limited opportunity to diversify their business. A consequence of existing structure, many business risks are concentrated in small-scale breeders performed individually [4,5]. This circumstance requires a better understanding from breeders concerning on business risk derived from either causing factors or mechanism to solve such risk.

Price fluctuation of chicken's meat indicates that there are risk factors in broiler farm. It shows that development of broiler business has potential risk causing loss. Hence, this condition is necessarily analyzed since it causes loss charged by breeder. For every process of broiler production, breeders should consider how much risk they have to bear on. Typically, risk suffered by broiler business farm comprises of production, marketing, and financial risk [6,7].

Specifically, Regency of Minahasa Utara is the biggest region of broiler producer in Province of North Sulawesi with

total of population of 4,806,552 heads in 2018 [8]. However, breeders sometimes experience difficulty in production, marketing and financial aspect, such as disease outbreak, fluctuate price of input and output, so that it causes instability of their income. It is common risk dealt by breeders in Regency of Minahasa Utara, urgently requiring solution. Some previous researches regarding on broiler farm have been analyzed, but they are limited on production risk; while, marketing and financial risk still demonstrate limited information. Therefore, this research aims to know risks source, threat potency of risk and risk management strategy in managing risk production, marketing risk, and financial risk of broiler farm in Regency of Minahasa Utara.

II. RESEARCH METHODS

2.1 . Site and Sampling Methods

The research’s site was selected purposively in three Villages, representing three Districts as center of broiler production in Regency of Minahasa Utara along with their breeders having conducting business partnership with PT Charoen Pokphand Jaya Farm for the last five years. Those three Villages were Village of Dimembe in District of Dimembe, Village of Kauditan Satu in District of Kauditan, and Village of Kolongan in District of Kalawat. In detail, respondents were broiler’s breeders and selected by total of sampling [9,10]. There were 59 breeders, comprising of 13 breeders from Village of Kolongan, 27 breeders from Village

of Dimembe, and 19 breeders in Village of Kauditan Satu. Data regarding on source of production risk, marketing risk, and financial risk of broiler farming was gained through in-depth interview addressed to breeders guided by a list of questions during March–April 2020. Further, sources of risk identified are analyzed by Failure Mode and Effect Analysis (FMEA), so the amount of respective source of risk can be known [11]

2.2. Failure Mode and Effect Analysis

To calculate how much risk dealt with, each source of risks, resulted from identification obtained from breeders, was analyzed using Failure Mode and Effect Analysis (FMEA) [11]. Then, each source identified was determined its rating value of Severity, Occurrence, and Detection. Rating is taken from some breeders acknowledged having a better analytical capacity. Therefore, in this research, respondent was selected based on some criteria, such as an experienced in broiler farm business and b) having critical thinking and better analysis. The result of each breeder’s rating was averaged subsequently.

Severity is quantification on how severe condition is happened, resulted by each source of risks. It is valued from rating 1 up to 10. The more severe the effect resulted, the higher the severity value (its danger). Specifically, criteria of value determination or severity rating is shown in following Table 1.

Table 1. Severity scale

Rating	Effect	Verbal Criteria
10	Dangerous	The most superior severity as potentially failure mode results on the halt of farm without notice
9	Serious	A higher severity as potentially failure mode results on the halt of business with notice
8	Extreme	Cultivation cannot operate with failure resulting cycle damage without halting broiler farm business
7	Mayor	Cultivation cannot operate without cycle damage
6	Significant	Cultivation cannot operate with small cycle damage
5	Moderate	Cultivation cannot operate without cycle damage
4	Minor	Cultivation can operate along with significantly decreasing performance
3	Easy	Cultivation can operate along with decreasing performance
2	Simple	Cultivation can operate with small obstruction
1	Not available	No impact occurred

The possibility of risk occurring (occurrence) is displayed within 10 levels. It starts from never happen (1) up to inevitable (10). Below, possibility criteria of risk occurrence is shown in Table 2.

Table 2. Occurrence scale

Rating	Effect	Verbal Criteria
10	Inevitable	Risk occurred is inevitable
9	Higher	Risk occurred is higher
8	High	Risk occurred is high
7	Quite high	Risk occurred is quite high
6	Medium	Risk occurred is medium
5	Low	Risk occurred is low
4	Small	Risk occurred is small
3	Little	Risk occurred is little
2	Seldom	Risk occurred is seldom
1	Never happen	Risk occurred is never happened

The possibility of risk controlling (Detection) is depicted in 10 levels, where 1 shows possibly uncontrollable or greatly controlled and 10 is possibly less controlled.

Criteria of controlling or detection is then displayed in Table 3.

Table 3. Detection scale

Rating	Effect	Verbal Criteria
10	Always uncertain	No controlling tools are able to detect causes of failure and subsequent failure mode
9	Minor	Controlling tools have minor ability to detect causes of failure and subsequent failure mode
8	Small	Controlling tools have small ability to detect causes of failure and subsequent failure mode
7	Very low	Controlling tools have very low ability to detect causes of failure and subsequent failure mode
6	Low	Controlling tools have low ability to detect causes of failure and subsequent failure mode
5	Moderate	Controlling tools have moderate ability to detect causes of failure and subsequent failure mode
4	Incline to be High	Controlling tools inclines to be high to detect causes of failure and subsequent failure mode
3	High	Controlling tools have high ability to detect causes of failure and subsequent failure mode
2	Higher	Controlling tools have higher ability to detect causes of failure and subsequent failure mode
1	Barely certain	Controlling tools have barely certain ability to detect causes of failure and subsequent failure mode

Each scale or criteria, then, is given rating by breeders selected by researcher based on breeders' analytical ability. Based on rating obtained from each criteria or scale in Failure Mode and Effect Analysis (FMEA) then, Risk Priority Number (RPN) is calculated. It is multiplication of rating from severity, occurrence, and detection.

$$RPN = S \times O \times D$$

Where:

- RPN = Risk Priority Number
- S = Severity
- O = Occurrence
- D = Detection

Risk priority number (RPN) is calculated to ease risk classifying in order to determine scale of priority in its management. The result of risk priority number, then, is classified into three classes, such as low, moderate and high to know risk going to be handled promptly. Any risk including in high class is the most significant effect in business risk of broiler farm, so it becomes reference for breeders to anticipate in future to mitigate and minimize any risk possibly occurred.

2.3 Designing Risk Management Strategy

Based on the finding of the most determining risk source in broiler farm in Regency of Minahasa Utara in accordance with effect priority resulted from FMEA, it is necessary to design applicable strategy to control risk sources. Such designing is based on literature study by considering condition and ability of the research's site.

III. RESULTS AND DISCUSSION

3.1. Production Risk

Based on the research's findings by in-depth interview addressed to breeders as respondents, four production risks were identified, containing production input, resources, environment, and technical factor. Particularly, input factor was identified since breeders inclined to use chemical substances potentially resulting on decreasing production output. Medicine or vaccine used by breeders in the research's site had weakness, such as not having maximal productivity. It was in accordance with [12] reporting that profitability derived from small-scale broiler farm was influenced by usage of medicine input. However, even though breeders in the research's site used chemical medicine, organic medicines could press down declining number of broiler's productivity.

Resource factor identified was conventional tools. The finding of identification displays that there were no cage's temperature and automatic temperature controller. It resulted on broiler's higher mortality due to open-cage construction system used by breeders, causing cage's internal condition not suitable in accordance with rapid weather change. This condition caused broiler more susceptible infected by disease and non-maximal productivity. According to [13], environment, such as incompatible weather with broiler's growth like lower or higher rainfall, resulted on disturbed broiler's growth, so that there was a gap of broiler's weight; and, if there was no correct management, many broilers would die, producing declining harvest quantity of broiler. One of currently urgent necessity is to determine existing diseases

in broiler farm. Despite deadly contagious diseases, simply common diseases also required attention by taking into account that such diseases also provided moderately economic loss. Sanitation in broiler farm is the cheapest technique of disease prevention [14].

Lastly, technical risk was heavily influenced by imbalance medicine usage that resulted on broiler's poor immunity and non-existence of modern equipment against broiler cultivation caused non-maximal production obtained by breeders.

3.2. Marketing Risk

From the research's findings, there are 3 factors of marketing risk dealt by broiler's breeders in Regency of Minahasa Utara. It includes product, market, and partnership risk. Specifically, product risk contained broiler's mortality during cultivation, resulting on declining total of broilers. There was no supplementary of total of broilers, so the result of ready-to-sell products experienced decreasing from initial total of DOC. Moreover, product sold in the form of lived broilers was another issue of breeders, so added-value obtained by them was classified as low product. Then, its selling price was lower and it correlated with income earned. This result is similarly in line with [15], stating that causing factors dealt by breeders were lower selling price of broiler, having positive correlation with performance of broiler farm in the Southwest region of Parana, Brazil, where the lower the selling price of broilers, the more declining the broiler farm performance.

Regarding market factor, it demonstrates that product marketing performed was under partnership program, so that breeders' bargaining power was minimal in determining their product price. According to [16], agribusiness structure of Indonesian broiler farm could be classified as three dispersal, characterized by non-functional organization relationship along its business level and most price determined by main company by contract, where breeders felt that their profit was relatively low.

Partnership factor targeted or required Performance Index (PI). Such requirement made breeders, aiming to obtain greater profit, had to seize such performance index. If they did not achieve such requirement, they would get small profit. Oppositely, income earned by plasma breeders (partner) under farming contract apparently was lower than non-contractual breeders [17]. However, main company guaranteed marketing all products of its plasma breeders (partner).

3.3. Financial Risk

The finding shows that there were three factors of financial risk, including fund sources, cost and income. Sources of financial risk identified in fund sources were that breeders always dealt with capital limitation since they heavily relied on their personal capital individually. Further, there was fear felt by breeders in utilizing capital loan from banking sector. These issues also created difficulty in developing their broiler farm.

Cost became one factor in determining the number of profit breeders earned. Based on the research’s findings, cost expended by breeders was relatively higher. It was due to a higher cost of production infrastructure and input price of production [18]. Also, under partnership system, there were some deficiencies. Such shortages were that over supply could be experienced by main company if broiler’s harvest occurred jointly. Meanwhile, for plasma breeders, selling price of broiler by main company caused breeders could not achieve maximal profit, breeders could not sell their products to other parties since breeders were under agreement with main company, input price (DOC, feed, vitamin, medicine) was higher, and, breeders have not provided soft credit from main company to establish cages and purchase tools. The last factor of financial risk is income. There was a higher dependency of breeder’s daily life fulfillment toward broiler farm. If they faced failure in their broiler business, breeders would find an issue in fulfilling their family’s daily needs.

3.4. Business Risk Analysis of Broiler Farm in Regency of Minahasa Utara

The result of risk sources identification, subsequently, was analyzed using Failure Mode and Effect Analysis (FMEA). In determining its rating, a better analysis ability was highly required. Based on such criteria, of 59 respondents, eight respondents were selected to give rating related to severity, occurrence, and detection in each identified risk. Then, rating obtained from such criteria was averaged and analyzed by FMEA. As the result, Risk Priority Number (RPN), multiplication result of rating derived from severity, occurrence, and detection, was

achieved. The result of rating can be seen from following Table 4.

Based on Table 4, the value of RPN becomes indicator of risk sources, having main priority of management, so breeders did not suffer from loss or failure in their business. It, thus, requires class classification of risk comprising of low, medium, and high, based on the value of RPN-a basic calculation of each risk. It is known that the range value (the biggest value of RPN was deduced by the smallest value of RPN) was 296. Next, data of risks was classified into three classes (low, medium, and high risk). Class interval (range was divided by total of classes) was 99. Hence, low-risk class was known, consisting of utilization of chemical medicine, no modern tools applied, imbalance use of medicine, no technology applied in cultivation, and individual marketing, and minimal capital. It was due to dependency on capital. While, medium-risk class was bad weather, most price determined by main company, determination of contract price, higher input price, and higher cost of production infrastructure, and income relied on broiler farm. Lastly, high-risk class was disease outbreak, broiler’s mortality causing declining productivity, products sold in lived condition, profit depending on performance index target, and capital utilization from banking sector.

According to above research’s findings and details, it can be seen that all risks identified, generally, comprised of higher risk source by RPN of 392 (profit depending on Performance Index target). Respectively, then, the values of RPN were 384 (disease outbreak), 336 (broiler’s mortality resulting declining productivity), 324 (broilers sold in lived condition), 288 (fearful to lend in banking sector). Those results are in line with [19, 20, 21], arguing that disease risk, antibiotic utilization, chemical medicine and vaccine, quality of Day Old Chick (DOC), equipment utilization of out-of-dated feed processor and non-standard products resulted, were sources of risk dealt by breeders and poultry industry, including broiler farm.

Table 4. Rating of severity (S), occurrence (O), and detection (D) on business risk of broiler farming in regency of Minahasa Utara

Sources of risk			Rating			
			S	O	D	RPN
A. Production risk						
Production input	A	Incline to use chemical medicine	4	8	4	128
Environment	B1	Disease outbreak	8	6	8	384
	B2	Bad weather	6	5	7	210
Resources	C	No modern tools applied	4	8	3	96

Technical	D1	Imbalance usage of medicine	4	8	4	128
	D2	No technology applied in cultivation	5	8	3	120
B. Marketing Risk						
Product	E1	Broiler's mortality	6	8	7	336
	E2	Selling lived broilers	4	9	9	324
Market	F1	Individual marketing	4	9	4	144
	F2	Price fixing by main company	7	7	4	196
Partnership	G1	Performance index (PI) target-based profit	8	7	7	392
	G2	Determining of contract price	5	9	4	180
C. Financial Risk						
Fund sources	H1	Minimal capital	4	8	4	128
	H2	Capital sourced from banking	4	9	8	288
Cost	I1	Higher input price	7	6	5	210
	I2	Higher production infrastructure price	5	5	8	200
Income	J	Income depends on broiler farm	7	6	6	252

Where:

S: Severity (severity of risk effects)

O: Occurrence (occurrence frequency of risk sources)

D: Detection (controlling ability of risk sources)

RPN: Risk Priority Number, or multiplication result of S,O, and D

3.5. Risk Management Strategy

After determining successful sources of primary risk on broiler farm in the research's site, risk management strategy should be considered. In Regency of Minahasa Utara, breeders consciously realized that there were many risks related to broiler farm. Therefore, breeders have to have risk management strategy. Breeders, basically, in Regency of Minahasa Utara had not applied risk management strategy correctly. It was due to their limited knowledge regarding such issue. They only anticipated business risk by learning based on previous experience, without calculating the amount of business risk going to be born. In dealing with business risk in agriculture, breeders can perform following strategies to reduce loss. Some risk management strategies can be taken by 1) enterprise diversification, 2) vertical integration, 3) production contract, 4) marketing contract, 5) hedging, and 6) insurance [4, 22].

To provide risk management strategy in broiler farm located in Regency of Minahasa Utara, sustainably institutional counselling is required in the form of Village-Owned Entity (BUMDES). It (BUMDES) can be developed into several business units.

3.6. Broiler Management

Mostly, breeders marketed their broiler's product in lived condition. It had not been able to improve sufficiently breeder's welfare. Thus, it requires manufacturing industry to produce added-value for broiler's product. Various manufactured products can be resulted from broiler in the form of frozen, fillet, canned, smoked, shredded and nugget. Thus, if broiler's products are well-managed, broiler's commodity along with its derivative products has highly economical value.

3.7. Micro Financial Institution

Micro Financial Institution formed in Village-Owned Enterprises (VOE) assigns and functions as financial institution to distribute capital under simple and directed credit system for villagers. Also, it avoids villagers from trapping of moneylenders operating in village. When VOE could operate, it have created equal distribution of business opportunity for low-economic class and provided service to villagers, particularly for breeders in procuring capital through credit system directed in improvement of their business activity.

III. CONCLUSION

Sources of production risk on broiler farm located in Regency of Minahasa Utara comprise of: inclination to

utilize chemical medicine, disease outbreak, bad weather, utilization of conventional tools, imbalance use of medicine, and no modern tools applied in cultivation.

Marketing risks dealt by broiler's breeders consist of broiler's mortality resulting declining productivity, sold in lived condition, individual marketing, most price determined by partner, performance index target-based profit, and contract pricing.

Financial risk, then, faced by broiler's breeders are minimal capital due to individual capital, fearsome to lend to bank, higher input price, higher price of production infrastructure, broiler farm-based most income.

Based on the value of Risk Priority Number (RPN), sources of primary risk becoming inhibiting factors on success of broiler farm in Regency of Minahasa Utara, consecutively, are performance index target-based profit, disease outbreak, broiler's mortality resulting declining productivity, sold in lived condition, risk of capital loan from banking sector.

As solution, some strategies that can be taken to mitigate those sources of risk in broiler farm located in Regency of Minahasa Utara are product diversification of broiler and institution strengthening by establishing Village-Owned Entity (VOE).

REFERENCES

- [1] Direktorat Jederal Peternakan (2019). Konsumsi perkapita daging ayam di Indonesia, Kementerian Pertanian RI, Jakarta.
- [2] Umboh, S.J.K., Hakim D.B, Sinaga B.M. Karyasa K. (2014). Impact of domestic maize price changes on the performance of small scale broiler farming in Indonesia. *Media Peternakan* 37 (3), 198-205
- [3] Yemima. (2014). Analisis usaha peternakan ayam broiler pada peternakan rakyat di desa Karya Bakti Kecamatan Rungan Kabupaten Gunung Mas Provinsi Kalimantan Tengah. *Jurnal Ilmu Hewani Tropika* 3 (1), 87-94.
- [4] Ishag, Kh.H.M. (2019). Broiler production systems risk management sustainability and feed subsidy policy analysis. *IOSR Journal of Agriculture and Veterinary Science* 12 (9), 33-44
- [5] Setiadi D. (2015) Faktor-faktor yang mempengaruhi risiko usaha ternak ayam ras pedaging di Kecamatan Pamijahan, Kabupaten Bogor. *Jurnal Ilmu Ternak* 15 (1), 1-7
- [6] Nabradi, A and Madai, H. (2007). Risk and risk management in Hungarian sheep production. *Applied Studies in Agribusiness and Commerce*. 1 (1), 61-65
- [7] Hayran, S and Gül, A. (2015). Risk perception and management strategies in diary farming: A case of Adana province Turkey. *Turkish Journal of Agriculture-Food Science and Technology* 3 (12), 952-961
- [8] Badan Pusat Statistik Sulut. (2019). Minahasa utara dalam angka, Manado.
- [9] Taherdoost, H. (2016). Sampling methods in research methodology; How to choose a sampling technique for research. *International Journal of Academic Research in Management*, 5 (2), 18-27
- [10] Sugiono, *Metode penelitian kuantitatif kualitatif dan R&D* (Bandung, Alfabeta, 2013).
- [11] Wang, Y.M., Chin, K.S, Poon, G. K.K, Yang, J.B. (2009). Risk evaluation in failure mode and effects analysis using fuzzy weighted Geometric Mean. *Expert Systems with Applications* 36, 1195-1207.
- [12] Rana, K., Rahman, M, Sattar, M. (2012). Profitability of small scale broiler production in some selected areas of Mymensingh. *Progressive Agriculture*, 23, 101-109.
- [13] Nayak, G.D., Behura, N.C, Sardar, K.K, Mishra, P.K. (2015). Effect of climatic variables on production and reproduction traits on colored broiler breeder poultry. *Veterinary Word*. 8(4), 472-477
- [14] Budi, E.S., Yektiningsih, E, Priyanto, E. (2015). Profitabilitas usaha ternak itik petelur di desa Kebonsari Kecamatan Candi, Sidoarjo. *Jurnal Agraris*, 1(1), 32-37
- [15] Mendes, A.S, Gudoski, D.C, Cargnelutti, A.F, Silva, E.J, Carvalho, E.H, Morello, G. (2014). Factors that impact the financial performance of broiler production in Southern State of Parana, Brazil. *Brazilian Journal of Poultry Science*, 16 (1), 113-119
- [16] Nurtini, S. Mujtahidah, A.U.M, Haryadi, F.T, Hakim, A. (2017). Performance of broiler farmer in partnerships system at Surakarta, Indonesia. *Journal of Advanced Agricultural Technologies* 4(2), 196-199
- [17] Yulianti, F. (2012). Kajian analisis pola usaha pengembangan ayam broiler di Kota Banjar Baru. *Jurnal Socioscientia* 4 (1), 65-72.
- [18] Achoja, F.O. (2014). Financial risk threshold determination in broiler enterprise in Delta State, Nigeria. *Agricultura Tropica Et Subtropica*, 46 (4), 111-117
- [19] Nikpay, A.A., Zaghi, D, Kohan, I.Z, Tavakol, M. (2014). Using failure mode and efdect analysis (FMEA) in the risk analysisof industrial poultry production for decreasing threats of poultry by analyzing point of failure. *International Journal of Poultry Sciece* 13 (12), 718-728
- [20] Wessiani, N.A., and Sarwoko, S.O. (2015). Risk analysis of poultry feed production using fuzzy FMEA. *Procedia Manufacturing* 4, 270-281
- [21] Sekarrini, R., M Harisudin, M, Riptandi, E.W. (2016) Manajemen resiko budidaya ayam broiler di Kabupaten Boyolali. *Agrisita* 4 (3), 329-340
- [22] Iheke, O.R and Igbelina, C.A. (2016). Risk management in poultry production in Ikeduru local government area of Imo State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment* 12 (1), 67-74