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The Business Prospect of Climbing Perch Fish Farming with Biofloc Technology at De' Papuyu Farm Banjarbaru

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Abstract**—** *This research aimed at investigating the business prospect of climbing perch (Anabas testudineus) fish farming with biofloc system at De' Papuyu Farm, Banjarbaru of Indonesia, as well as providing the business development strategy by mean of SWOT analysis. Total cost required for this business was IDR 165,218,200 per year and the income gained was IDR 7,880,700 per month with the Payback Period (PBP) value was 2.67. On the basis of 7 % and 9 % of interest rates, the Net Present Value (NPV) value was greater than 0, and the Net Benefit Cost Ratio (Net BCR) was greater than 1. While the Internal Rate of Return (IRR) value obtained was 57.04 %. The business provides the profit more than three times higher than the province minimum wage; thus it is considered feasible and profitable for the future strategic choices. The business has the favorable prospect and the biofloc system for the culture of climbing perch is applicable for other fish farmers.*

Keywords**— *Climbing perch, biofloc, business feasibility, NPV, Net BCR, IRR, SWOT.***

I. INTRODUCTION

The climbing perch (*Anabas testudineus* Bloch, 1792), in South Kalimantan locally called "papuyu" is a very important indigenous fish species not only in Indonesia (Akbar *et al*., 2016) but also in Malaysia (Zalina *et al*., 2012), Vietnam (Van and Hoan, 2009), Lao PDR (Sokheng *et al*., 1999), Cambodia (Sverdrup, 2002), Thailand (Chotipuntu and Avakul, 2010), the Philippines (Bernal *et al*., 2015), India (Kumar *et al*., 2013) and Bangladesh (Hossain *et al*., 2015; Uddin *et al*., 2017). It plays a significant role in fisheries and aquaculture practices due to its high nutrition value as well as for great taste and flavor. It is rich in iron and copper that support hemoglobin synthesis (Sarma *et al*., 2010) and has high quality poly-unsaturated fats and many essential amino acids (Kohinoor *et al*., 1991). It also provides 4.4% of lipid and 19.50% of protein contents (Wimalasena and Jayasuriya, 1996; Ahmed *et al*., 2012). The demand of this species is very high not only for local consumption but also for restaurants and small enterprises of fish processing. It is a native air-breathing fish, typically found in swamps, rivers, streams, lakes, canals, reservoirs, and estuaries (Sarkar *et al*., 2005; Chotipuntu and Avakul, 2010; Rahman and Marimuthu, 2010). It can survive in adverse environmental conditions such as low oxygen due to its air breathing ability, wide range of temperature and other poor water conditions (Rahman and Monir, 2013). However, the presence of them is threatened by the ecological degradation, indiscriminate fishing, use of pesticides and fertilizers, habitat modification, obstruction to breeding migration, and management failure (Misra, 1994, Kalita and Deka, 2013; Hossain *et al*., 2015). Considering the importance of them, the breeding technologies of this species have been developed with varying degrees of success (Kohinoor *et al*., 1991; Sarkar *et al*., 2005; Marimuthu *et al*., 2009; Zalina *et al*., 2011), as well as the attempts to improve the culture management system of ponds or cages with different culture strategies (Mondal *et al*., 2010; Habib *et al*., 2015; Putra *et al*., 2016; Ali *et al*., 2016). All these studies outlined above more or less describing on ecological and biological aspects of this species.

To date, biofloc technology application in aquaculture system is also introduced and had been successfully used for some commercial fish species such as African catfish *Clarias gariepinus* (Ekasari *et al*., 2016), nile tilapia *Oreochromis niloticus* (Nahar *et al*., 2015; Ekasari *et al*., 2015) as well as for shrimp culture such as pink shrimp *Farfantepenaeus duorarum* (Emerenciano *et al*., 2013), the pacific white shrimp *Litopenaeus vannamei* (Da Silva *et al*., 2013), Malaysian prawn *Macrobrachium rosenbergii* (Perez-Fuentes *et al*., 2013). Meanwhile the use of biofloc technology for air-breathing species cultured like climbing perch is still rarely done. Moreover in term of economic importance, very little literature is available describing how the business prospect being executed in these culture systems. The current research will elucidate the secret behind successful of climbing perch culture business of De' Papuyu Farm on the basis of biofloc technology application. To get clear picture, we analyzed the total cost, profit, and the feasibility of business, as well as provided the business development strategies for this species.

II. MATERIALS AND METHODS

Study site

De' Papuyu Farm Banjarbaru was selected purposely for the study area due to the following reasons i.e. climbing perch cultured with biofloc system was commercially introduced first in this city; secondly, many farmers around interested to learn and have adopted such biofloc technology in their fish farming; and De' Papuyu Farm can be a good model for small-scale culture business development in advance. The total land area for fish farming was about 624 m^2 (24×26 m) including for pond area, recycle pond, security house/warehouse, audience hall, park area and space area. The lay-out of De' Papuyu Farm can be seen in Figs. 1, 2. A total of 24 pond units used for the growth-out of climbing perch culture business. The circle-shaped pond made of tarpaulin with the diameter of 3 m, 120 cm height and 90-100 cm depth of water. The fish growth-out period in the ponds appropriated eight months starting from seeding to harvesting. The sorting process was undertaken after rearing for three months, and the only female fish were selected to be grown (50-60 %) due to rapid growth and having the greater size when harvested. The seeds sourced from fish hatchery of Gunung Manau Balangan, about 120 km from Banjarbaru. The research activity was carried out in October 2017 until May 2018.

Data collection and analysis

The data collected comprising primary and secondary data. Primary data obtained from farm owner by interview and questionnaires as well as direct observation related to the culture system, fish production, operational cost, profit, distribution and marketing. While secondary data in the forms of annual report, literature, and other document related. The followings are formulas used to estimate the total cost, total revenue, and total profit.

$$TC = FC + VC \qquad (1)$$

Where TC is total cost, FC is fixed cost, and VC is variable cost

$$TR = Q \times P \qquad (2)$$

Where TR is total revenue, Q is quantity (kg), and P is price (IDR)

$$\Pi = TR - TC \qquad (3)$$

Where Π is profit, TR is total revenue, and TC is total cost. The profit gained is then compared to the minimum wage of South Kalimantan province, which is equal to IDR 2,455,671 per month in accordance with Governor Decree Number 188.44/0492/KUM/2017 about the Minimum Wage of Regency and City, 2018). The feasibility of business is analyzed using four investment criteria, namely Payback Period (PBP), Net Present Value (NPV), Net Benefit Cost Ratio (Net BCR), and Internal Rate of Return (IRR) with the following formulas:

$$PBP = \frac{InCap}{AnnualCF} \qquad (4)$$

Where *PBP* is payback period, *In Cap* is investment value, and *Annual CF* is annual cash flow

$$NPV = \sum_{t=1}^{n} \frac{(B_t - C_t)}{(1+i)^t} \qquad (5)$$

Where *NPV* is net present value, B_t is benefit of year-t, C_t is *cost of year-t*, *i* is interest rate, and *t* is investment time.

$$NetBCR = \frac{\sum_{t=1}^{n} NPV^+}{\sum_{t=1}^{n} NPV^-} \qquad (6)$$

Where NPV^+ is positive net present value, and NPV^- is negative net present value

$$IRR = i_1 + \frac{NPV^+}{NPV^+ - NPV^-}(i_2 - i_1) \qquad (7)$$

Where IRR is internal rate of return, NPV^+ is positive net present value, NPV^- is negative net present value, i_1 is interest rate when NPV positive and i_2 is interest rate when NPV negative.

It is assumed that if $NPV \leq 0$; $Net\ BCR \leq 1$; and $IRR \leq 9\%$, indicating the business is unreasonable. Otherwise, if $NPV > 0$; $Net\ BCR > 1$; $IRR > 9\%$, it is therefore the business is reasonable to be developed.

The SWOT analysis is used to formulate the strategy for business development of De' Papuyu Farm starting from the collection of valuable data-information related and internal problems being faced, as well as the external factors that may inhibit the development progress. SWOT Analysis is a tool used effectively to build organizational strategy and competitive strategy. SWOT Analysis has two dimensions: Internal and external. Internal dimension includes organizational factors, also strengths and weaknesses; external dimension includes environmental factors, also opportunities and threats (Gurel and Tat, 2017). SWOT Analysis is a simple but powerful tool for sizing up an organization's resource capabilities and deficiencies, its market opportunities, and the external threats to its future (Thompson *et al*., 2007).

III. RESULTS AND DISCUSSION

Cost Structure and Profit

Investment cost is the initial-capital of De' Papuyu Farm to purchase long-term goods and assets for the climbing perch culture business (more than one year). To run this business, the total investment cost required was IDR 167,634,000 with depreciation cost of IDR 24,337,800 per year. The highest investment cost was for procurement of 24 ponds reached IDR 72,000,000 (Table 1). Total cost for the business was IDR 165,218,200 comprised the IDR 24,337,800 for fixed costs and IDR 140,880,400 for variable costs. Fixed cost is the regular outcome regardless of the production volume (e.g. depreciation cost, salary expense, capital rate). While variable cost is the cost variance depends on the production volume (e.g. wages, seeds, feed, and labor). It was clear from Table 2, the pay for 120,000 fish seeds (50-80 mm total length) was the top rank of variable costs reaching IDR 36,000,000 (46.10 %), followed by the feed expenses of IDR 29,700,000 (40.41 %). About 13.49 % pay for other variable costs regardless employee's wage. The total revenue obtained from the selling of the fish was IDR 228,000,000 per cycle of production (Table 3). There are two types of revenue: (1) the main revenue from the fish being cultured for 8 months and (2) the additional revenue from the selling of male fish after rearing for three months. The main fish were sold to outside of South Kalimantan, especially Central Kalimantan, while the remaining fish were marketed around Banjarbaru City and Banjar Regency. The profit sharing system was 50% for De' Papuyu Farm's owner and 50% for the employees, which is equal to IDR 62,781,800 per cycle of production or IDR 7,880,700 per month. Since total revenue was greater than total cost, it meant that this business was considered effective and profitable. This income is more three times higher than the province minimum wage of IDR 2,454,671 per month.

Feasibility Analysis

The payback period is a measure of profitability and liquidity (Hajdasinski, 1993). In the present study, the payback period (PBP) value obtained for climbing perch culture business was 2.67, showing that the investment capital can return after having three times of productions within two years. It is generally accepted that investments with shorter payback periods are considered to have lower risk (Lohmann and Baksh, 1993; Lin, 2010). It is also considered reasonable that the shorter the PBP, the more liquid and the more viable the business (Kim *et al*., 2013). The values of NPV investigated at 7 % and 9 % of interest rates were IDR 568,915,905 and IDR 502,791,869 respectively (Table 4), indicating that the business was very feasible. The feasibility of business can also be seen from the Net BCR values of 4.39 at 7 % and 4.00 at 9 % of interest rates. Final evaluation revealed that the IRR value obtained for 10 years of investment period was 57.04 %. It means that this culture business provides financial growth by 57.04 % per year. This IRR value was higher than MARR (minimum attractive rate of return) 9 %. In other word, a business will be acceptable if IRR is greater than opportunity cost of capital. It was clear from our study that the climbing perch culture business with biofloc technology was feasible and profitable.

Business Development Strategy

The internal factor (strength and weakness) and external factor (opportunity and threats) of De' Papuyu Farm have been identified using a SWOT matrix as presented in Table 5. By Quantified SWOT analysis and revealing of the coordinates (1.15:0.4), we found that the position of De' Papuyu Farm was in the first quadrant (Fig. 3), indicating that the farm has external opportunities for business development (e.g. market expansion, job creation, network building) and internal competing strength (e.g. capacity building, entrepreneur, corporate culture), thus are in the best position for facing future business competition. In line with this, Chang and Huang (2006) suggested that enterprises in the first quadrant can use their strengths to adopt strategies, such as market penetration, market development, and product development to form competitive strength. In this position, enterprise has extra resources, forward, backward and horizontal integration may be efficient strategies. We used the SWOT matrix to systematically prepare for the future strategic choices, such as: (1) the local government should establish the certified community hatchery units to support the high demand of climbing perch fish production, as well as to reduce transportation cost; (2) improvement of business management by training and internship program; (3) network building with other businessmen related to the hatchery, fish processing and marketing business; (4) product advertising of climbing perch culture business with biofloc system through social media should be encouraged.

IV. CONCLUSION

1. The climbing perch fish culture business with biofloc system provides the profit more than three times higher than the province minimum wage.
2. The business feasibility can be seen from the following criteria: NPV > 0, Net BCR > 1, PBP and IRR value were 2.67 % and 57.04 % respectively.

3. The fish farming with biofloc system has the favorable prospect due to high demand and the biofloc technology package can be adopted by small-medium scale enterprises and other fish farmers.

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REFERENCES

[1] Ahmed, S., Rahman, A.F.M.A., Mustafa, M.G., Hossain, M.B. and Nahar, N. (2012). Nutrient composition of indigenous and exotic fishes and rain fed waterlogged paddy fields in Lakshmipur, Bangadesh. World Journal of Zoology 7: 135-140.

[2] Akbar, J., Mangalik, A. and Fran, S. (2016). Application of fermented aquatic weeds in formulated diet of climbing perch (*Anabas testudineus*). International Journal of Engineering and Research Science 2(5): 240-243.

[3] Ali, H., Haque, M.M., Murshed-e-Jahan, K., Rahid M.L., Ali, M.M., Al-Masud, M. and Faruque, G. (2016). Suitability of different fish species for cultivation in integrated floating cage aqua-geoponics system (IFCAS) in Bangladesh. Aquaculture Reports 4: 93-100

[4] Bernal, R.A.D., Aya, F.A., de Jesus-Ayson, E.G.T. and Garcia, L.M.B. (2015). Seasonal gonad cycle of the climbing perch *Anabas testudineus* (Teleostei: Anabantidae) in a tropical wetland. Ichthyology Research 62(4): 389-395.

[5] Chang. H.H. and Huang, W.C. (2006). Application of a quantification SWOT analytical method. Mathematical and Computer Modelling. 43(1–2): 158-169. https://doi.org/10.1016/j.mcm.2005.08.016

[6] Chotipuntu, P. and Avakul, P. (2010). Aquaculture potential of climbing perch, *Anabas testudineus*, in brackish water. Walailak Journal of Science Technology 7(1): 15-21. https://doi.org/10.2004/wjst.v7i1.48

[7] Da Silva, K.R., Wasielesky, W. and Abreu, P.C. (2013). Nitrogen and phosphorus dynamics in the biofloc production of the pacific white shrimp, *Litopenaeus vannamei*. Journal of World Aquaculture Society 44: 30-41

[8] Ekasari, J., Zairin, M., Putri, D.U., Sari, N.P., Surawidjaja, E.H. and Bossier, P. (2015). Biofloc-based reproductive performance of Nile tilapia *Oreochromis niloticus* L. broodstock. Aquaculture Research 46: 509-512.

[9] Ekasari, J., Suprayudi, M.A., Wiyoto, W., Hazanah, R.F., Lenggara, G.S. and Sulistiani, R. (2016). Biofloc technology application in African catfish fingerling production: the effects on the reproductive performance of broodstock and the quality of eggs and larvae. Aquaculture 464: 349-356.

[10] Emerenciano, M., Cuzon, G., Paredes, A. and Gaxiola, G. (2013). Evaluation of biofloc technology in pink shrimp *Farfantepenaeus duorarum* culture: growth performance, water quality, microorganisms profile and proximate analysis of biofloc. Aquaculture International 21: 1381-1394

[11] Gruel, E. and Tat, M. (2017). SWOT analysis: A theoretical review. The Journal of International Social Research 10(51): 994-1006. http://dx.doi.org/10.17719/jisr.2017.1832

[12] Habib, K.A., Newaz, A.W., Badhon, M.K., Naser, M.N. and Shahabuddin, A.M. (2015). Effects of stocking density on growth and production performance of cage reared climbing perch (*Anabas testudineus*) of high yielding Vietnamese stock world. Journal of Agricultural Sciences 11(1): 19-28.

[13] Hajdasinski, M.M. (1993) The payback period as a measure of profitability and liquidity. The Engineering Economist 38(3): 177-191. https://doi.org/10.1080/00137919308903096

[14] Hossain, M.Y., Hossen, M.A., Pramanik, M.N.U., Ahmed, Z.F, Yahya, K., Rahman, M.M. and Ohtomi, J. (2015). Threatened fish of world: *Anabas testudineus* (Bloch, 1792) (Perciformes: Anabantidae). Croatian Journal of Fisheries 73: 128-131. https://doi.org/10.14798/73.3.838

[15] Kim, B.C., Shim, E. and Reinschmidt, K.F. (2013). Probability distribution of the project payback period using the equivalent cash flow decomposition. The Engineering Economist 58(2): 112-136. https://doi.org/10.1080/0013791X.2012.760696

[16] Kohinoor, A.H.M., Akhteruzzaman, M., Hussain, M.G. and Shah, M.S. (1991). Observations on the induced breeding of koi fish, *Anabas testudineus* (Bloch) in Bangladesh. Bangladesh Journal of Fisheries 14(1-2): 73-77.

[17] Kumar, K., Lalrinsanga, P.L., Sahoo, M., Mohanty, U.L., Kumar, R. and Sahu, A.K. (2013). Length-weight relationship and condition factor of *Anabas testudineus* and *Channa* species under different culture systems. World Journal of Fisheries and Marine Science 5(1): 74-78. https://doi.org/10.5829/idosi.wjfms.2013.05.01.6420 1

[18] Kalita, T. and Deka, K. (2013). Ornamental fish conservation in the flood-plain wetlands of Lower Brahmaputra Basin. Advance Applied Science Research 4: 99-106.

[19] Lin, H.J. (2010). Why should managers like Payback Period? Available at SSRN: https://ssrn.com/abstract=1688730 or http://dx.doi.org/10.2139/ssrn.1688730

[20] Lohmann, J.R. and Baksh, S.N. (1993). The IRR, NPV and Payback period and their relative performance in common capital budgeting decision procedures for dealing with risk. The Engineering Economist 39(1): 17-47. https://doi.org/10.1080/00137919308903111

[21] Marimuthu, K., Arumugam, J., Sandragasan, D. and Jegathambigai, R. (2009). Studies on the fecundity of native fish climbing perch, *Anabas testudineus* in Malaysia. American-Eurasian Journal of Sustainable Agriculture 3(3): 266-274.

[22] Mondal, M.N., Shahin, J., Wahab, M.A., Asaduzzaman, M. and Yang, Y. (2010). Comparison between cage and pond production of Thai climbing perch (*Anabas testudineus*) and tilapia (*Oreochromis niloticus*) under three management systems. Journal of Bangladesh Agriculture University 8(2): 313-322

[23] Nahar, A., Abu, M., Siddik, B. and Rahman, M.M. (2015). Biofloc technology in aquaculture systems generates higher income in mono-sex Nile tilapia farming in Bangladesh. Advances in Biological Research 9(4): 236-241. https://doi.org/10.5829/idosi.abr.2015.9.93142

[24] Perez-Fuentes, A., Perez-Rostro, C.I., Hernandez-Vergara, M. (2013). Pond-reared Malaysian prawn *Macrobrachium rosenbergii* with the biofloc system. Aquaculture 400: 105-110

[25] Rahman, M.A. and Marimuthu, K. (2010). Effect of different stocking density on growth, survival and production of endangered native fish climbing perch (*Anabas testudineus*, Bloch) fingerlings in nursery ponds. Advances in Environmental Biology 4(2): 178-186

[26] Rahman, S. and Monir, M.S. (2013). Effect of stocking density on survival, growth and production of Thai *Anabas testudineus* (bloch) fingerlings under nursery ponds management in northern regions of Bangladesh. Journal of Experimental Biology and Agricultural Sciences 1(6): 465-472

[27] Sarkar, U.K., Depak, P.K., Kapoor, D., Negl, R.S., Paul, S.K. and Singh, S. (2005). Captive breeding of climbing perch *Anabas testudineus* (Bloch, 1792) with Wova-FH for conservation and aquaculture. Aquaculture Research 36: 941-945. https://doi.org/10.1111/j.1365-2109.2005.01281.x

[28] Sarma, K., Pal, A.K., Ayyappan, S., Das, T., Manush, S.M., Debnath, D. and Baruah, K. (2010). Acclimation of *Anabas testudineus* (Bloch) to three test temperatures influences thermal tolerance and oxygen consumption. Fish Physiology and Biochemistry 36: 85-90.

[29] Sokheng, C., Chhea, C.K., Viravong, S., Bouakhamvongsa, K., Suntornratana, U., Yoorong, N., Tung, N.T., Bao, T.Q., Poulsen, A.F. and Jørgensen, J.V. (1999). Fish migrations and spawning habits in the Mekong mainstream: a survey using local knowledge (basin-wide). Assessment of Mekong fisheries: Fish Migrations and Spawning and the Impact of Water Management Project (AMFC). AMFP Report 2/99. Vientiane, Lao, P.D.R.

[30] Sverdrup, J.S. (2002). Fisheries in the lower Mekong basin: status and perspectives. MRC Technical Paper No. 6, Mekong River Commission. Phnom Penh, pp.8-23.

[31] Thompson, A.A., Strickland, A.J. and Gamble, J.E. (2007). Crafting and executing strategy-concepts and cases, (15th Edition), USA: McGraw-Hill/Irwin.

[32] Uddin, S., Hasan, M.H., Iqbal, M.M. and Hossain, M.A. (2017). Study on the reproductive biology of Vietnamese climbing perch (*Anabas testudineus*, Bloch). Punjab University Journal of Zoology 32(1): 1-7.

[33] Van, K.V. and Hoan, V.Q. (2009). Intensive nursing climbing perch (*Anabas testudineus*) in hapas using pellet feed at different protein levels. Journal of Science and Development 7: 239-242.

[34] Wimalasena, S. and Jayasuriya, M.N.S. (1996). Nutrient analysis of some freshwater fish. Journal of the National Science Council of Sri Langka 24(1): 21-26.

[35] Zalina, I., Saad, C.R., Rahim, A.A., Christianus, A. and Harmin, S.A. (2011). Breeding Performance and the effect of stocking density on the growth and survival of climbing perch, *Anabas testudineus*. Journal of Fisheries and Aquatic Science 6: 834-839. https://doi.org/10.3923/jfas.2011.834.839

[36] Zalina, I., Saad, C.R., Christianus, A. and Harmin S.A. (2012). Induced breeding and embryonic development of climbing perch (*Anabas testudineus*, Bloch). Journal of Fisheries and Aquatic Science 1-16. https://doi.org/10.3923/jfas.2012.

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Table.1: Investment cost and fixed cost of climbing perch culture business for eight months (IDR. 000)

Cost items	Unit	Unit Price	Total Price	Economic life (year)	Depreciation Cost
Investment cost					
Ponds	24	3,000	72,000	5	14,400
Aerator (100 watt)	4	1,500	6,000	5	1,200
Pipe 1/2 inch (rod)	28	24	672	3	224
Roof frame (wood)	1	4,500	4,500	10	450
Tarpaulin roof (8x10)	4	320	1,280	1	1,280
Hapa (roll)	1	375	375	1	375
Electric cable 2×1.5 mm (roll)	1	195	195	5	39
Security house	1	25,000	25,000	10	2,500
Recycle pond	1	6,000	6,000	10	600
Concrete panel fence	100	400	40,000	20	2,000
Jet pump	1	750	750	5	150
Washbasin	2	55	110	2	55
Plastic bucket-cover 40 l	2	75	150	2	75
Plastic bucket-cover 20 l	2	16	32	2	16
Scoop nets	2	45	90	2	45
Filters	2	13	26	1	26
Fish sorter	2	20	40	1	40
Generator set	1	1,300	1,300	5	260
Aerator tube (50 m roll)	3	50	150	2	75
Reservoir 1500 l	1	1,850	1,850	10	185
Frame of reservoir	1	2,000	2,000	10	200
Water pipe 1 inch	17	42	714	5	143
Training certification	1	400	400		
Land (26×24 m^2)	1	4,000	4,000		
Total investment cost			167,634		
Fixed cost					
Total investment depreciation					24,337.8

Table 2: Variable cost of climbing perch culture business for eight months (IDR. 000)

Cost items	Unit	Unit Price	Total Cost/ Production
Electricity (kwh)	2,304	1.35	3,110,4
Fish seeds (50-80 mm)	120,000	0.3	36,000
Feed pf 500 (sack)	6	155	930
Feed pf 1000 (sack)	6	155	930
Feed Cargile 1 (sack)	100	297	29,700
Probiotic (l)	24	100	2,400
Molasses (l)	48	20	960
Lime (kg)	200	5	1,000
Salt (kg)	500	3	1,500
Water (m^3)	168	5.15	865,2
Pineapple	24	7	168
Litmus paper (pack)	1	35	35
Transportation	1	500	500

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Cost items	Unit	Unit Price	Total Cost/ Production
Total variable cost without labor wage			78,098.6
Labor wage (share profit system)			62,781.8
Total variable cost with labor wage			140,880.4

Table.3: Total revenue of climbing perch culture business (IDR. 000). The values in the brackets indicate the average fish production and total revenue per each pond achieved.

Type of revenues	Production (kg)	Unit Price	Total Revenue
1. The main revenue gained from fish cultured for eight months.	2,880 (120)	75	216,000 (9,000)
2. The additional revenue from the selling of male fish that sorted during three months cultivation.	1,200 (50)	10	12,000 (500)
Total	4,080 (170)		228,000 (9,500)

Table.4: Comparative NPVs that calculated at 7 % and 9 % of interest rates (IDR)

Year	NPV at 7 %			NPV at 9 %		
	Total Cost	Revenues	Profit	Total Cost	Revenues	Profit
0	167,634,000	-	(167,634,000)	167,634,000	-	(167,634,000)
1	154,409,533	213,084,112	58,674,579	151,576,330	209,174,312	57,597,982
2	267,358,372	398,288,060	130,929,688	257,637,068	383,806,077	126,169,009
3	134,867,266	186,115,916	51,248,650	27,578,765	176,057,833	48,479,069
4	233,521,156	347,880,217	14,359,060	216,847,965	323,041,896	106,193,931
5	117,798,293	2,560,849	44,762,556	107,380,494	148,184,356	40,803,862
6	203,966,422	303,852,054	99,885,632	182,516,594	271,897,901	89,381,307
7	102,889,591	141,986,941	9,097,350	90,380,013	124,723,808	34,343,795
8	178,152,172	265,396,152	87,243,980	153,620,566	228,851,024	75,230,458
9	89,867,754	124,016,893	34,149,139	76,071,049	104,977,534	28,906,485
10	155,605,007	231,807,277	76,202,271	129,299,357	192,619,328	63,319,971
Total	1,806,069,566	2,374,988,471	568,918,905	1,660,542,200	2,163,334,069	502,791,869

Table.5: Identification of internal and external factors that interplay the culture business of De' Papuyu Farm using SWOT analysis.

Internal Factor	**External Factor**
Strength	*Opportunity*
1. The only business of climbing perch fish farming with biofloc system in Banjarbaru city.	1. Public interest towards climbing perch fish farming business.
2. Low feeding rate	2. High demand for climbing perch fish from both local and regional.
3. Can be used in a limited area.	3. Fish farming can increase the role of the fishery sector.
4. Competence of skilled workers who have been trained and have certificate of expertise.	4. Creating business partnerships such as seeding, processing and marketing business.
5. The probiotics used are resistant to uncertain weather conditions	5. Creating jobs for local people
6. Production does not depend on the season.	
Weaknesses	*Threats*
1. Fish farming business with biofloc system is very dependent on the electricity.	1. The qualified seeds for fish farming activity are still limited in quantity.
2. Culture facilities not well maintained.	2. Negative paradigm due to the failure of fish culture business in the community.
3. The absence of business accounting records.	3. The newly seeds stocked in the pond is threated by wild bird.
4. Inexperience of workforce.	4. Unstable electricity causes production failure.
5. Location of fish hatchery is quite far from the fish farming (± 200 km).	

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Internal Factor	External Factor
6. The price of probiotics making is expensive	5. Shared concern on fish farming business with biofloc system is still lacking

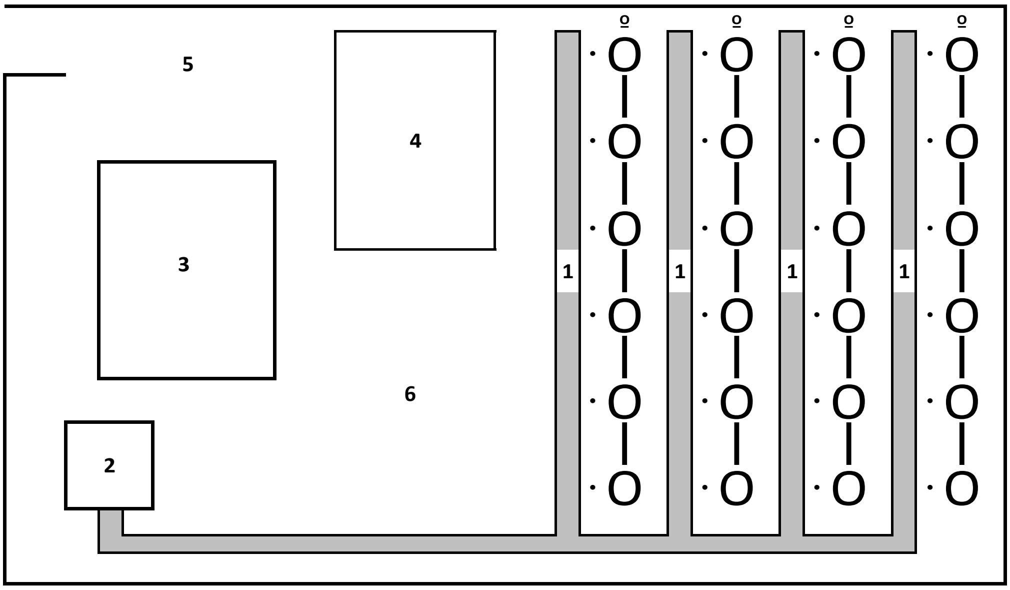

Fig.1: The lay-out of De' Papuyu Farm Banjarbaru
1. Culture pond area, 2. Recycle ponds, 3. Security house/warehouse, 4. Hall, 5. Park area, 6. Space area

Fig.2: De' Papuyu Farm's facilities: 1. Typical culture pond, 2. Recycle pond, 3. Climbing perch

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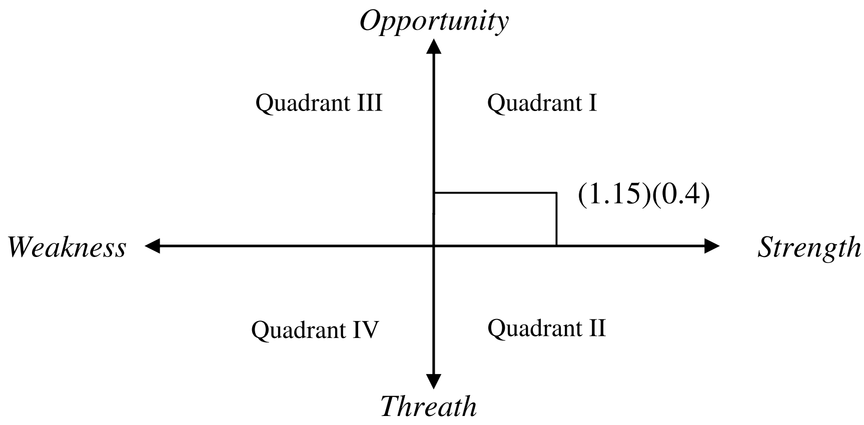

Fig.3: SWOT analysis presenting the position of De' Papuyu Farm was in the first quadrant