

Analysis of snakehead fish (*Channa striata*) cultivation business in peatland Dadahup village Kapuas agency

Khairul Anwar¹, Muhammad Faiq Naufal^{2*}, Hany Handajani², Soni Andriawan²

¹Balai Perikanan Air Tawar Mandiangin, Banjar Regency, South Kalimantan, Indonesia

²Aquaculture Department, Faculty of Agriculture and Animal Science, University of Muhammadiyah Malang, Indonesia

*faiq.6661@gmail.com

*corresponding author

ARTICLE INFO

Keywords:

Break even point
 Catfish
 R/C ratio
 Total cost

ABSTRACT

Snakehead fish (*Channa striata*) is a popular freshwater commodity with high market demand in Indonesia, especially in Central Kalimantan. Kapuas Regency, there is a group of farmers who utilize the productivity of peatland to be used as a medium of cultivation of snakehead fish through a biological approach. This research aims to analyze the efforts of members of the fish cultivation group Bahtera Handal Dadahup (BHD), Kapuas Regency based on business analyze to determine the net profit value (π), R/C ratio, Payback Period (PP), and Break Even Point (BEP). BHD group obtained a value ranging from Rp 11 935 000 to Rp 46 022 500; R/C > 1, i.e. ranging from 2.96 to 4.29. Payback Period or return period of capital (investment) lasts for 5 to 10 months; and break even point (BEP) values range from Rp 9 318.3 kg⁻¹ to Rp 13 477.7 kg⁻¹. Based on the calculation of the analysis of the business, the business of fish cultivation group Bahtera Handal Dadahup, deserves to be run and developed.

How to cite:

Anwar K, Naufal MF, Handajani H, Andriawan S. 2020. Analysis of Snakehead Fish (*Channa striata*) cultivation business in peatland Dadahup village, Kapuas Regency. *IJOTA*, 3(2): 59–69.
 DOI: <https://doi.org/10.22219/ijota.v3i2.13409>

Copyright © 2020, Anwar et al.
 This is an open access article under the CC-BY-SA license



1. Introduction

Indonesia has a variety of potential natural resources, one of which is the potential of aquatic resources. The potential that Indonesia has in water resources is a potential resource because it is spread from offshore areas to land-based or freshwater areas. With abundant water potential, the nutritional needs of animal protein can be overcome by empowering the fishery sector. The fishery sector also has the potential to increase economic and business needs, where the fishery sector can

provide jobs in Indonesia through cultivation. Land-based fish cultivation is quite much in demand, as it is easy to control directly. However, not all types of land are optimal as cultivation containers, for example, peatland. Peatland is considered less maximal to be used as a cultivation medium, especially traditional or natural cultivation. This is because peatlands tend to have a pH of ± 3 (acid), where water commodities generally live at a pH level that tends to be neutral, i.e. with pH ranging from 7-8 (Huwoyon & Gustiano, 2013). To solve the problem of low peatland pH, a biological approach is needed in cultivation, namely using certain commodities or fish that can adapt to acidic pH environments. For example using fish that can breathe or take air directly on the surface of the water, such as snakehead fish (*Channa striata*) (Huwoyon and Gustiano, 2013). Snakehead fish cultivation (*Channa striata*) is one of the most potential land-based cultivations. In the wild, snakehead fish have still considered pests for some due to their natural nature as predators. Although considered a pest by some, corks fish have a high economic value because it is considered a profitable commodity rather than other fresh fish commodities because it contains high animal protein.

The demand for snakehead fish in local and overseas markets is quite high and increases year on year. This refers to the total production of snakehead fish by 5,448 tons in 2003, then increased by 11,498 tons in 2004 (FAO, 2008). In many parts of the world, the price of snakehead fish appears to have economic value, such as in Singapore, *Channa micropeltes*, *C. striata*, and *C. lucius*, which are a type of fish consumed there, in a fresh state priced from \$ 10 – \$ 20 per kilogram, or about Rp. 65,000 to Rp. 130,000 (Listyanto and Andriyanto, 2009). While in the local market, the price of snakehead fish is quite varied, ranging from Rp. 35,000 per kilogram to Rp. 50,000 per kilogram depending on the size or number of fish on each kilogram (Heptarina, 2018). In addition to the economic value of consumption demand, snakehead fish has an economic value in the field of medicine or health, as it contains albumin, which is useful to accelerate post-surgery wound recovery (Sofian et al. 2019).

Kapuas Regency is one of the contributors to snakehead fish production in Kalimantan. Snakehead fish is popular because it is commonly used as a meal of the day, especially eaten at breakfast. Generally corks fish is served as the main side dish in some dishes such as *katupatandangan* and *nasi kuning khas banjar*. This can mean that the cultivation of snakehead fish is very promising to implement because of the impact of economic value. One of the famous snakehead fish production villages in Kapuas Regency is Dadahup Village. In this village, there is a group of fish cultivation snakehead fish named *Bahtera Handal Dadahup*, which is this group fostered by *Balai Perikanan Budidaya Air Tawar Mandiangin*. The production or cultivation of snakehead fish in this village optimizes peatland around the yard of the house to be used as a medium of cultivation. Looking at the actions or efforts of this group to carry out snakehead fish cultivation activities in peatland, the authors are interested to research Snakehead Fish Cultivation Business Analysis (*Channa striata*) in Peatland, Dadahup Village, Kapuas Regency, Central Kalimantan.

2. Material and methods

The research was conducted in Dadahup Village, Kapuas Regency, Central Kalimantan Province. The location of the study was chosen deliberately based on the results of considerations between the authors and the relevant agency, BPBAT Mandiangin. The research was conducted on August 15, 2020. The types of data used in the implementation of research are observations, interviews, and questionnaires. The respondents who participated in the study were 11 people.

2.1 Methods

The method used in analyzing the data is a mixed-method, which is a qualitative and quantitative method. Qualitative methods are performed descriptively, i.e., used to describe characteristics in a condition. The purpose of descriptive research is to describe the relevant and interesting aspects of an individual or group (Nazir, 2005). As for quantitative methods use the following methods:

Total Cost

Total cost is the total amount of business capital consisting of cash costs and operating expenses. Calculation of total cost can use the following formula (Normansyah et al. 2014):

$$TC = FC + VC$$

TC = Total Cost

FC = Fixed Cost

VC = Variable Cost

Net Profit (π)

Profit is the difference between revenue and total cost. Acceptance in profit analysis is a multiplication between the amount of production and the selling price. Calculation of net profit can use the following formula (Soekartawi, 2006):

$$\pi = TR - TC$$

π = net profit

TR = Total Revenue

TC = Total Cost

R/C Ratio

R/C ratio or benefit-cost ratio is the acceptance of business income to generate a relative level of profit in a business. In analyzing the R/C ratio, there are the following business feasibility assessment criteria: if the value of R/C ratio > 1 , then the effort is worth continuing; if the R/C ratio value = 1, then the business is at break-even; and if the R/C ratio value is < 1 , then the effort is not worth continuing (Hariance et al. 2018). Calculation of R/C ratio can use the following formula (Fitriadi et al. 2008):

$$R/C = TR : TC$$

TR = Total Revenue

TC = Total Cost

Payback Period

The payback period is an analysis of the calculation of the period of return on venture capital. The sooner the return period, the better business will be. Calculation of payback period can use the following formula (Rachadian et al. 2013):

$$PP = \frac{I}{\pi} \times 1 \text{ tahun}$$

I = Investment

π = Profit per year

Break-Even Point

Break-even point is an analysis of calculations used to obtain breakeven point values (Mamodol, 2016). Break-even points can be used for several things, including profit planning, cost changes, price changes, and selling price determination (Lumintang, 2013).

$$BEP = \frac{\text{Total cost}}{\text{Total production}}$$

3. Results and Discussion

3.1 Characteristics of respondents

The study used the help of 11 respondents. Based on data obtained through observation, interviews with members of the Bahtera Handal Drughup fish cultivation group acquired data of respondents in the form of age, cultivation experience, the number of ponds owned, and the amount of initial investment in cultivation.

The average fish cultivation experience is only two years old, it because POKDAKAN Bahtera Handal Dadahup has just started cultivation. The initial reason this group started cultivation, specifically as a side business when the previous primary income, in other words, farmers did not meet daily needs. Besides, when being a farmer often fail to harvest due to the prolonged dry season. This is following with Masganti (2003) statement that soil acidity levels are the main factor causing limited agricultural development in peatlands. In addition, according to Masganti et al. (2017) peatland can store carbon content on a large scale, carbon content will disappear in the event of a fire during the drought, but on the other hand cause crop failure in the agricultural sector.

3.2 Cultivation group member investment

the average investment value of all cultivation Bahtera Handal Dadahup members is Rp 24 000 000; Total Revenue or receipt amounted to Rp 30 545 454.54; Fixed Cost or fixed fee of Rp. 1 235 909.09; and variable cost of Rp 7 284 545.45.

Table 1. Investment of Cultivation Bahtera Handal Dadahup Group member

Name	Investment (Rp)	TR (Rp)	FC (Rp)	VC (Rp)
Lahmudin	22 000 000	36 000 000	1 280 000	8 380 000
Rahman	20 000 000	18 000 000	1 117 500	4 940 000
Rahmadi	20 000 000	30 000 000	1 180 000	6 970 000
Halidi	40 000 000	60 000 000	1 517 500	12 460 000
Rahmad	20 000 000	18 000 000	1 105 000	4 960 000
Budiman	20 000 000	18 000 000	1 105 000	4 960 000
Iman	30 000 000	36 000 000	1 315 000	8 420 000
Ahmad H.	20 000 000	18 000 000	1 110 000	4 940 000
Sidik	22 000 000	30 000 000	1 140 000	7 340 000
Nordin	25 000 000	36 000 000	1 365 000	8 380 000
Miat	25 000 000	36 000 000	1 360 000	8 380 000
TOTAL	264 000 000	336 000 000	13 595 000	80 130 000
AVERAGE	24 000 000	30 545 454	1 235 909	7 284 545

3.3 Business Analysis

Business Analysis of Respondents 1

Table 2. Details of business analysis of respondents 1

Details	Value
Investment (I)	Rp 22 000 000
Total Revenue	
- Total Production (kg)	900
- Selling Price per kilogram (Rp)	4 000
Total Revenue	Rp 36 000 000
Production Cost	
1. Fixed Cost	
- 1 unit Boat Fullset Equipment	Rp 10 000 000
- 1 unit fish farm pool (10 x 12 m)	Rp 5 000 000
- 2 rolls black gauze	Rp 1 200 000
- 1.5 rolls green gauze	Rp 675 000
- 2 units bucket	Rp 70 000
- 2 units scoop net	Rp 20 000
- 20 meters hose	Rp 100 000
- 2 units lamp	Rp 50 000
- 1 unit water pump	Rp 4 000 000
Total	Rp 21 115 000
2. - Depreciation Cost per Cycle	Rp 1 280 000
- Depreciation Cost per Year	Rp 2 560 000
Variable Cost	
- 6,000 juvenile about 10 cm	Rp 6 000 000
- 4 sacks dolomite powder	Rp 200 000
- 2 sacks salt	Rp 500 000
- 4 sacks manure	Rp 40 000
- 4 L probiotic	Rp 120 000
- 2 packs baking soda	Rp 20 000
- 150 L gasoline	Rp 1 500 000
Total	Rp 8 380 000

Total Cost

$$\begin{aligned}
 TC &= FC + VC \\
 &= \text{Rp } 1\,280\,000 + \text{Rp } 8\,380\,000 \\
 &= \text{Rp } 9\,660\,000
 \end{aligned}$$

The total cost is incurred cost in 1 cultivation cycle. The total cost required by Respondent 1 or Mr. Lahmudin is Rp. 9,660,000 per cycle.

Net Profit π

$$\begin{aligned}
 \pi &= TR - TC \\
 &= \text{Rp } 36\,000\,000 - \text{Rp. } 9\,660\,000 \\
 &= \text{Rp } 26\,340\,000
 \end{aligned}$$

Net profit from one of the business members of the snakehead cultivation group Bahtera Handal Dadahup in 1 cycle gets a profit of Rp. 26,340,000 which is the business owned by respondent number 1 is profitable because the value of TR criteria = TC or revenue is greater than the total cost. Respondent number 1 business can carry out 2 cycles of cultivation and the estimated profit gained in 1 year amounting to Rp. 52,680,000.

R/C Ratio

$$\begin{aligned}
 R/C &= TR : TC \\
 &= \text{Rp } 36\,000\,000 : \text{Rp } 9\,660\,000 \\
 &= 3.72
 \end{aligned}$$

R/C ratio or benefit-cost ratio obtained by Respondent number 1, a member of the fish cultivation group Bahtera Handal Dadahup amounted to 3.72. That is, every single outturn will spend Rp. 1, will result in Rp. 3.72. It means the business of respondent number 1 is worth developing because it enters into the criteria $R/C > 1$ it means the business is worth developing.

Payback Period

$$\begin{aligned}
 PP &= \frac{I}{\pi \text{ tahun}} \times 1 \text{ year} \\
 &= \frac{\text{Rp. } 22\,000\,000}{\text{Rp. } 52\,680\,000} \times 1 \text{ year} \\
 &= 0.41 \text{ year}
 \end{aligned}$$

description:

I = Investment

π = net profit a year

Payback Period or period of return on capital or investment from respondent number 1 is for 0.41 years. 0.41 is calculated in months, i.e., $0.41 \times 12 \text{ months} = 4.92 \text{ months}$. Then, 0.92 is used as a day to $0.92 \times 30 \text{ days} = 27.6 \text{ days}$ or rounded to 28 days. So, the time required by Respondent number 1 member of Bahtera Handal Dadahup group to get capital or re-investment, i.e., lasts in 4 months 28 days.

Break Even Point

$$\begin{aligned}
 \text{BEP} &= \frac{\text{TC}}{\text{Total Production}} \\
 &= \frac{\text{Rp } 9\,660\,000}{900 \text{ kg}} \\
 &= \text{Rp } 10\,733.33/\text{kg}
 \end{aligned}$$

Break-Even Point of the business owned by Respondent 1 member of Bahtera Handal Dadahup group amounting to Rp. 10,733.33/kg. That is, the sale of snakehead fish per kilogram will reach break-even if sold for Rp. 10,733.33/kg, while the price of snakehead fish sold by Respondent 1 is Rp. 40,000/kg. At this point, the selling price of snakehead fish is greater than the break-even point value, it means the business belongs to Respondent 1, the member of Bahtera Handal Dadahup group is declared profitable.

*Business Analysis of Respondents 2***Table 3.** Details of Business Analysis of Respondents 2

Details	Value
Investment (I)	Rp 20 000 000
Total Revenue	
- Total Production (kg)	450
- Selling Price per kilogram (Rp)	Rp 40 000
Total Revenue	Rp 18 000 000
Production Cost	
1. Fixed Cost	
- 1 unit Boat Fullset Equipment	Rp 10 000 000
- 1 unit fish farm pool (6 x 8 m)	Rp 2 500 000
- 2 rolls black gauze	Rp 1 200 000
- 1 roll green gauze	Rp 300 000
- 2 units bucket	Rp 70 000
- 2 units scoop net	Rp 20 000
- 20 meters hose	Rp 100 000
- 2 units lamp	Rp 50 000
- 1 unit water pump	Rp 4 000 000
Total	Rp 18 240 000
2. - Depreciation Cost per Cycle	Rp 1 117 500
- Depreciation Cost per Year	Rp 2 235 000
Variable Cost	
- 3.000 juvenile about 10 cm	Rp 3 000 000
- 2 sacks dolomite powder	Rp 100 000
- 2 sacks salt	Rp 250 000
- 2 sacks manure	Rp 20 000
- 2 LProbiotic	Rp 60 000
- 1 pack baking soda	Rp 10 000
- 150 L gasoline	Rp 1 500 000
Total	Rp 4 940 000

Total Cost

$$\begin{aligned}
 TC &= FC + VC \\
 &= \text{Rp } 1\,117\,500 + \text{Rp } 4\,940\,000 \\
 &= \text{Rp } 6\,057\,500
 \end{aligned}$$

The total cost is incurred cost in 1 cultivation cycle. The total cost required by Respondent 2 or Mr. Rahman is Rp. 6,057,500 per cycle.

Net Profit π

$$\begin{aligned}
 \pi &= TR - TC \\
 &= \text{Rp } 18\,000\,000 - \text{Rp } 6\,057\,500 \\
 &= \text{Rp } 11\,942\,500
 \end{aligned}$$

Net profit from one of the business members of the snakehead cultivation group Bahtera Handal Dadahup in 1 cycle gets a profit of Rp 11 942 500 which is the business owned by respondent number 2 is profitable because the value of TR criteria = TC or revenue is greater than the total cost. Respondent number 2 business can carry out 2 cycles of cultivation and the estimated profit gained in 1 year amounting to Rp. 23,885,000.

A. R/C Ratio

$$\begin{aligned}
 R/C &= TR : TC \\
 &= \text{Rp } 18\,000\,000 : \text{Rp } 6\,057\,500 \\
 &= 2.97
 \end{aligned}$$

R/C ratio or benefit-cost ratio obtained by Respondent number 2, a member of the fish cultivation group Bahtera Handal Dadahup amounted to 2.97. That is, every single outturn will spend Rp. 1, will result in Rp. 2.97. It means the business of respondent number 2 is worth developing because it enters into the criteria $R/C > 1$ it means the business is worth developing.

B. Payback Period

$$\begin{aligned}
 PP &= \frac{I}{\pi \text{ tahun}} \times 1 \text{ year} \\
 &= \frac{\text{Rp } 20\,000\,000}{\text{Rp } 23\,885\,000} \times 1 \text{ year} \\
 &= 0.83 \text{ year}
 \end{aligned}$$

Payback Period or period of return on capital or investment from respondent number 2 is for 0.83 years. 0.83 is calculated in months, i.e., $0.83 \times 12 \text{ months} = 9.96 \text{ months}$. Then, 0.96 is used as a day to $0.96 \times 30 \text{ days} = 28.8 \text{ days}$ or rounded to 29 days. So, the time required by Respondent 2 of POKDAKAN Bahtera Handal Dadahup to get capital or re-investment, i.e., lasts in 9 months 29 days.

C. Break Even Point

$$\begin{aligned}
 BEP &= \frac{TC}{\text{Total Production}} \\
 &= \frac{\text{Rp } 6\,057\,500}{450 \text{ kg}} \\
 &= \text{Rp } 13\,461.1 / \text{kg}
 \end{aligned}$$

Break-Even Point of the business owned by Respondent 2 member of Bahtera Handal Dadahup group amounting to Rp 13 461.1/kg. That is, the sale of snakehead fish per kilogram will reach break-even if sold for Rp 13 461.1/kg, while the price of snakehead fish sold by Respondent 2 is Rp. 40 000/kg. At this point, the selling price of snakehead fish is greater than the break-even point value, it means the business belongs to Respondent 2, the member of Bahtera Handal Dadahup group is declared profitable.

3.3.3 Group Business Analysis Parameters

Table 4. Business Analysis Parameters of Cultivation Group Members

Name	Π (Profit)	R/C Ratio	Payback Period	Break Even Point
Lahmudin	Rp 26 340 000	3.72	4 months 28 days	Rp 10 733.33/kg
Rahman	Rp 11 942 500	2.97	9 months 29 days	Rp 13 461.1/kg
Rahmadi	Rp 21 850 000	3.68	5 months 12 days	Rp 10 866.6/kg
Halidi	Rp 46 022 500	4.29	5 months 5 days	Rp 9 318.3/kg
Rahmad	Rp 11 935 000	2.96	9 months 29 days	Rp 13 477.7/kg
Budiman	Rp 11 935 000	2.96	9 months 29 days	Rp 13 477.7/kg
Iman	Rp 26 265 000	3.69	6 months 25 days	Rp 10 816.6/kg
Ahmad H.	Rp 11 950 000	2.97	9 months 29 days	Rp 13 444.4/kg
Sidik	Rp 21 520 000	3.53	6 months 4 days	Rp 11 306.6/kg
Nordin	Rp 26 255 000	3.69	5 months 19 days	Rp 10 827.7/kg
Miat	Rp 26 260 000	3.69	5 months 19 days	Rp 10 822.2/kg

Net Profit π

The profit of all members of the business of the fish cultivation group Bahtera Handal Dadahup in 1 cycle gets a varied profit, which ranges from Rp. 11,935,000 to Rp. 46,022,500. It means the lowest profit found in the business of respondents 5 and 6, specifically Mr. Rahmad and Mr. Budiman, who get a net profit or profit of Rp. 11,935,000 / cycle. While the highest profit found in the business owned by respondents 4, specifically Mr. Halidi, which is his business gets a profit of Rp. 46,022,500. The business belongs to each member of the fish cultivation group Bahtera Handal Dadahup declared profitable business, because the value of the criteria $TR > TC$ or receipt is greater than the total cost.

R/C Ratio

R/C ratio or benefit-cost ratio obtained from all members of bahtera handal dadahup cultivation group has a varied value, ranging from 2.96 to 4.29. That is, every Rp. 1 spent on production, will result in Rp. 2.96 – Rp. 4.29. Where, the lowest R/C ratio is found in the business properties of respondents 5 and 6, namely Mr. Rahmad and Mr. Budiman, get an R/C ratio of 2.96. While the highest R/C ratio is found in the business owned by respondents 4, namely Mr. Halidi, get an R/C ratio of 4.29. It can be said that the business belongs to every member of the snakehead fish cultivation group Bahtera Handal Dadahup is worth developing, because it belongs to the criteria $R/C > 1$, which means the effort is worth developing.

Payback Period

The Payback Period or capital return period of all members of bahtera Handal Dadahup cultivation group is ranging from 5 to 10 months. The fastest payback period is found in businesses owned by respondents 1 or Mr. Lahmudin, i.e. with a capital return period of 4 months 28 days or rounded to 5 months. While the longest Payback Period is found in the business owned by respondents 2 (Mr. Rahman), 5 (Mr. Rahmad), 6 (Mr. Budiman), and 8 (Mr. Ahmad Hairullah), i.e. with a capital return period of 9 months 29 days or rounded to 10 months.

Break Even Point

The Break Even Point value obtained from all members of the fish cultivation group Bahtera Handal Dadahup has a varied value, ranging from Rp 9 318.3 kg⁻¹ - Rp 13 477.7 kg⁻¹. the lowest break-even point value is found in the business owned by respondent 4 or Mr. Halidi, which is Rp. 9,318.3/kg. That is, the sale of snakehead fish per kilogram will reach break-even if sold for Rp. 9,318.3/kg. While the highest break-even point value is found in the business of respondents 5 and 6, namely Mr. Rahmad and Mr. Budiman, get a break-even point of Rp. 13,477.7/kg, that is, the sale of snakehead fish per kilogram a will reach break-even point if sold for Rp. 13,477.7/kg. The price of cork fish sold by the fish cultivation group Bahtera Handal Dadahup generally sold Rp. 40,000/kg. At this point, the selling price of cork fish is greater than the break-even value, where the business belongs to all members of the cultivation Bahtera Handal Dadahup is declared profitable.

4. Conclusion.

The number of members of the Fish Cultivation Group of Bahtera Handal Dadahup is 11 people. 8 of them have one unit of fish farm pool, and 3 of them have two units of fish farm pool. The results of the business analysis of members of the Fish Cultivation Group Bahtera Handal Dadahup get a net profit cycle ranging from Rp 11 935 000 to Rp 46 022 500; R/C Ratio ranges from 2.96 to 4.29, Payback Period ranges from 5 to 10 months, and Break-Even Point or breakeven point ranges from Rp 9 318.3/kg to Rp 13 477.7/kg.

References

- FAO. 2008. *Species Fact Sheet: Channa striata (Bloch, 1793)*. FAO Fisheries & Aquaculture. <http://www.fao.org/fishery/species>. Serial online 2000—2008. 2 pp.
- Fitriadi F, Nurmalina R. 2008. Analisis Pendapatan dan Pemasaran Padi Organik Metode System of Rice Intensification (SRI) : Kasus di Desa Sukagalih, Kecamatan Sukaratu, Kabupaten Tasikmalaya. *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian*. 11 (1): 94–103.
- Hariance R, Annisa N, Budiman C. 2018. Kelayakan Finansial Agroindustri Olahan Pepaya (*Carica papaya* L.) Di Nagari Batu Kalang Kecamatan Padang Sago Kabupaten Padang Pariaman. *Jurnal AGRIFO*. 3(1): 1–9.
- Heptarina D. 2018. Gabus Si Penyumbang Inflasi Sumatera Selatan. Balai Riset Perikanan Budidaya Air Tawar dan Penyuluhan Perikanan. *Jurnal riset budidaya perairan*. 6(2): 12–19.

- Huwoyon GH, Gustiano R. 2013. Peningkatan Produktivitas Budidaya Ikan di Lahan Gambut. *Media Akuakultur*. 8(1): 22–28.
- Listyanto N, Andriyanto S. 2009. Ikan Gabus (*Channa striata*) Manfaat Pengembangan dan Alternatif Teknik Budidayanya. *Media Akuakultur*. 4(1): 18–25.
- Lumintang FM. 2013. Analisis Pendapatan Petani Padi di Desa Teep Kecamatan Langowan Timur. *Jurnal EMBA*. 1(3): 991–998.
- Mamodol MR. 2016. Analisis Kelayakan Ekonomi Usahatani Padi Sawah Di Kecamatan Pamona Puselemba. *Jurnal Envira*. 1(2): 1–10.
- Masganti. 2003. Kajian Upaya Meningkatkan Daya Penyediaan Fosfat dalam Gambut Oligotrofik. Disertasi. Program Pascasarjana UGM, Yogyakarta.
- Masganti, Anwar K, Susanti MA. 2017. Potensi dan Pemanfaatan Lahan Gambut Dangkal untuk Pertanian. *Jurnal Sumberdaya Lahan*. 11(1): 43–52.
- Nazir M. 2005. Metode Penelitian. Jakarta: Ghalia Indonesia.
- Normansyah D, Rochaeni S, Humaerah AD. 2014. Analisis Pendapatan Usahatani Sayuran Di Kelompok Tani Jaya, Desa Ciaruteun Ilir, Kecamatan Cibungbulang, Kabupaten Bogor. *Jurnal Agribisnis*. 8(1): 29–44.
- Rachadian FR, Agassi EA, Wahyudi S. 2013. Analisis Kelayakan Investasi Penambahan Mesin Frais Baru Pada Cv. Xyz. *Journal J@TI Undip*. 8(1): 16–22.
- Soekartawi. 2006. Analisis Usaha Tani. Jakarta: UI Press.
- Sofian, Anwar S, Saputra M. 2019. Kinerja Pertumbuhan Ikan Gabus (*Channa striata*) dengan Suplementasi Astaxanthin pada Level Berbeda. *Jurnal Akuakultur Rawa Indonesia*. 7(2): 77–85.