

## Feasibility of catfish *Pangasius hypophthalmus* enlargement business in the former of small-scale community gold mining, Indonesia

Kartika Bungas<sup>1\*</sup>, Petrus<sup>2</sup>, Maria Magdalena Eka Asi<sup>3</sup>, Yuli Ruthena<sup>4</sup>

1. Department of Aquaculture, University of Palangka Raya, Palangka Raya-73112, Indonesia

2. Department of Fisheries Product Technology, University of Palangka Raya, Palangka Raya-73112, Indonesia

3. Department of Natural and Environmental Resource Management, University of Palangka Raya Postgraduate Program, Palangka Raya-73112, Indonesia

4. Department of Aquatic Resources Management, University of Palangka Raya, Palangka Raya-73112, Indonesia

\* Corresponding author's Email: [kartikabungas@gmail.com](mailto:kartikabungas@gmail.com)

### ABSTRACT

The business activities of small scale community gold mining are quite promising, namely exploring or exploiting natural resource resources without regard to environmental damage. The purpose of the study was to analyse the business feasibility of catfish (*Pangasius hypophthalmus*) enlargement in a former of small scale community gold mining in Katingan Regency, Indonesia. The results showed: The value of the *Net Benefit Cost Ratio* of catfish enlargement business in the former of small scale community gold mining from 2010 to 2018 with a BCR value = 1,037. This business is feasible to conduct with Net BCR > 1 or profitable and financially feasible. NPV value equal to 56,303,246, or this business is feasible because it produces NPV > 0; and 3) The IRR calculation value shows a positive result, i.e., the IRR value of 23.69%.

**Keywords:** Business feasibility, Catfish; Former, Gold mining.

**Article type:** Research Article.

### INTRODUCTION

The business activities of small scale community gold mining are quite promising, namely exploring or exploiting natural resources without regard to environmental damage. This business is indeed able to drive the wheels of economic growth and open up business opportunities. However, a significant negative impact on changes in the environment and topography takes place, i.e., the emergence of mine pits (tailing and over burden), the occurrence of natural ecosystems disruption, loss of vegetation and land degradation which potentially causes soil erosion, loss of biodiversity, loss of habitat for aquatic animals, and degradation of water storage area (Inonu *et al.* 2010). Efforts of the use and management of the former of small-scale community gold mining with the business of catfish (*Pangasius hypophthalmus*) enlargement is to make the business as the main livelihood to increase income and family welfare, as well as efforts to preserve the environment in utilizing the land of ex-mining areas that have been damaged, become productive again. This catfish enlargement business is carried out business feasibility to obtain benefits and recommend becoming an alternative sustainable business (Beveridge *e al.* 1994; Supangat & Kamiso 2000; Charles 2001; Britz 2006; Ahmad *et al.* 2007; FAO 2009; Savitri *et al.* 2015; Lee 2015). This study aimed to analyze the technical studies and business feasibility of catfish, *P. hypophthalmus* enlargement in the former of small-scale community gold mining in Katingan Regency, Indonesia.

### MATERIALS AND METHODS

Data analysis was performed on the data collected on catfish enlargement business in the former of small scale community gold mining, then used the business feasibility analysis, including *Net Present Value* (NPV), *Benefit Cost Ratio* (BCR), and *Internal Rate of Return* (IRR), which described as follows:

#### Business Benefit/profit

Business benefit/profit ( $\pi$ ): calculated by the difference between total revenue and total costs.

Caspian Journal of Environmental Sciences, Vol. 23 No. 4 pp.1095-1099 Received: Feb. 13, 2025 Revised: May 26, 2025 Accepted: July 02, 2025  
DOI: 10.22124/cjes.2024.7444 © The Author(s)



$$\pi = TR-TC$$

where :

TR = Total Revenue

TC = Total Cost

**Net Present Value (NPV)**

$$NPV = \left[ \frac{B_1}{(1+i)} + \frac{B_2}{(1+i)^2} + \dots + \frac{B_n}{(1+i)^n} \right] - \left[ \frac{C_1}{(1+i)} + \frac{C_2}{(1+i)^2} + \dots + \frac{C_n}{(1+i)^n} \right]$$

or

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

where :

C<sub>t</sub> = Gross social costs associated with fish enlargement business in year t, and it is not seen whether these costs are considered capital (land, equipment purchases, construction) and routine;

B<sub>t</sub> = Gross social benefits associated with fish enlargement business in year t;

n = The economical age of fish enlargement business;

i = Social opportunity cost of capital which designated as Social Discount Rate (SDR).

t = year.

If the value of NPV > 0, means that the catfish enlargement business in the pond of the former of small scale community gold mining is feasible to run. If NPV = 0, it means that the project returns an exact result equal to *Social Opportunity Cost of Capital*, also declared feasible to be conducted. If the value of NPV < 0 means that the fish enlargement business in the former of small scale community gold mining is rejected, because it brings a loss.

**Benefit Cost Ratio (BCR)**

$$BCR = \frac{\sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t} \quad \text{for } (B_t - C_t > 0)}{\sum_{t=1}^n \frac{C_t - B_t}{(1+i)^t} \quad \text{for } (B_t - C_t < 0)} \quad \text{Net} \quad (2)$$

where:

C<sub>t</sub> = Gross social costs associated with fish enlargement business in year t, and it is not seen whether these costs are considered capital (land, equipment purchases, construction) and routine;

B<sub>t</sub> = Gross social benefits associated with catfish enlargement business in year t;

n = The economical age of catfish enlargement business;

i = Social opportunity cost of capital which designated as Social Discount Rate (SDR).

t = year.

If the value of *Net BCR* > 1 means the value of NPV > 0. If the value of *Net BCR* ≥ 1 means the fish enlargement business in the former of small scale community gold mining is feasible to be conducted. If the value of *Net BCR* < 1, means the value of NPV < 0, means the fish enlargement business in the former of small scale community gold mining is not feasible to be conducted.

**Internal rate of return (IRR)**

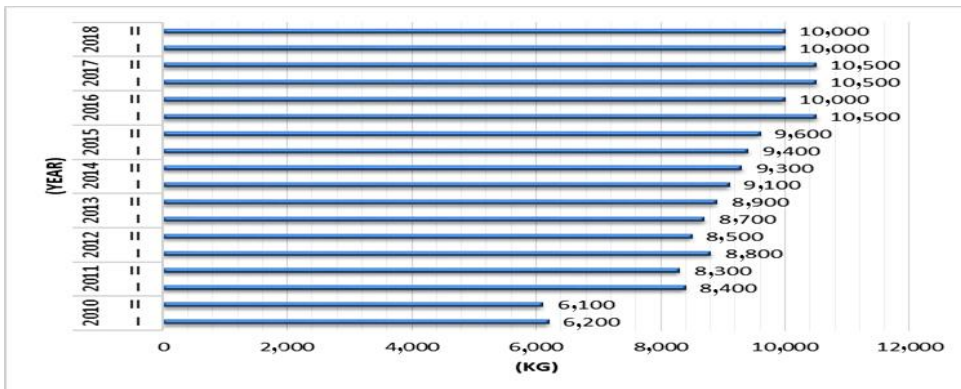
The third investment criterion is the IRR that is the value of the discount rate i which makes the NPV value of the project equal to zero, namely:

$$\sum_{t=1}^n \frac{B_t - C_t}{(1 + IRR)^t} = 0 \quad \text{----- (3)}$$

$$IRR = i_1 + \frac{NPV_1}{NPV_1 - NPV_2} (i_2 - i_1). \quad \text{----- (4)}$$

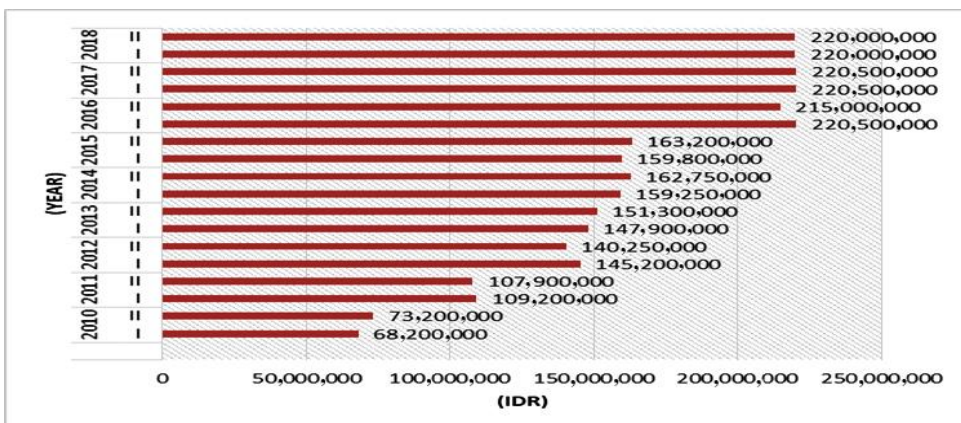
**RESULTS AND DISCUSSION**

Catfish enlargement business activities were analyzed for nine years, i.e., successively from 2010 to 2018 as well as recapitulation of catfish enlargement costs for these years. The total production (kg) of catfish harvest from 2010 to 2018 is presented in Fig. 1.



**Fig. 1.** Total Production (kg) of Siamese Catfish Harvested from 2010 to 2018.

Fig. 1 shows that catfish production obtained during the catfish enlargement business period from 2010 to 2018 continued to experience an increase in total weight ranging from 6,100 kg to 10,500 kg. Total production of catfish per year is considered low when compared to the stocking density for each of the maintenance seasons, namely reached 10,000 head of catfish seed. The highest total production achieved during the period 2010 to 2018 was only 10,500 kg/semester, which was due to the high mortality at the beginning of maintenance, and the frequency of feeding was still not regular (Zonneveld *et al.* 1991; Syafe'i, 2000; Bunasir *et al.* 2002; Ghosh & Das 2004; Cholik *et al.* 2005; Bungas, 2009; Zulkarnain *et al.* 2013; Lee, 2015). The results of catfish sales from 2010 to 2018 are presented in Fig. 2.



**Fig. 2.** Proceeds from the sale of catfish for the period of 2010 to 2018.

The sale result of catfish during the period 2010 to 2018 obtained that the highest sales in 2016 to 2018 ranged from Rp. 215.000.000, - up to Rp. 220.500.000, - The lowest sales obtained in 2010 or the beginning of the catfish enlargement business namely Rp. 68.200.000,-Based on the graph, it is known that the sales results from year to year are increasing. The difference between the sales proceeds and the cost of catfish enlargement for the period 2010 to 2018 is presented in Fig. 3.

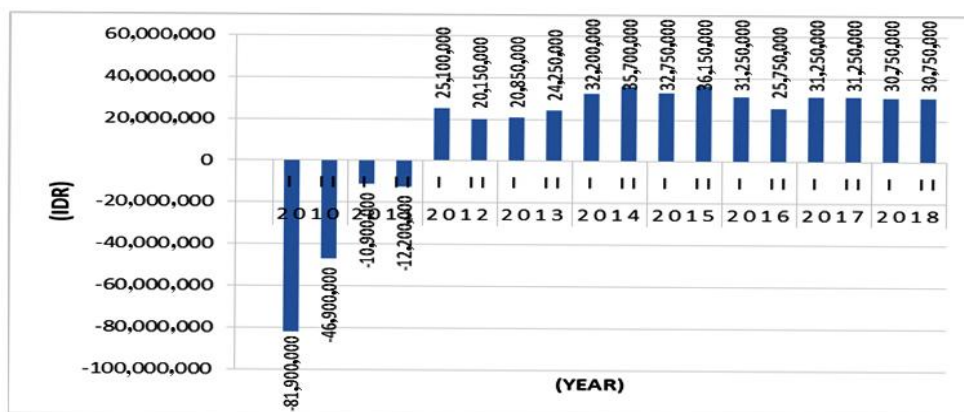


Fig. 3. Difference in Sales Results with Siamese Catfish Enlargement Costs Period 2010 to 2018.

Based on Fig. 3 exhibiting the results in 2010 and 2011, the sale result of catfish was smaller than the cost of enlargement, and began experiencing improvements in sales results from 2012 to 2018. The calculation of *Net Benefit Cost Ratio* (Net BCR) of catfish enlargement business on the former of small-scale people's gold mining from 2010 to 2018 showed positive results at DF 15% (Umar & Husein 2001; Ceni *et al.* 2018), with the value of BCR = 1,037. DF 15% shows that this business is feasible because Net BCR > 1. Business that feasible has BCR > 1. Catfish cultivation enlargement business in the former of small scale community gold mining is profitable and financially feasible (Ahmad *et al.* 2007; Hishamunda *et al.* 2009; Kusumawardani *et al.* 2012; Lindawati *et al.* 2013; Little *et al.* 2013). Based on the analysis results and calculation on the catfish enlargement business in the former of small-scale community mining toward Discount Factor (DF) 15% obtained the value of NPV = 56,303,246. Thus this business is feasible because it produces NPV > 0. NPV can show that at the end of the business period there is still a greater value than the investment value. The rate of production and revenue of catfish enlargement business significantly influence on the business feasibility. This calculation uses the present value over the flow of benefits and costs during the life of the running business. Catfish enlargement business in the former of small-scale community mining is profitable and financially feasible (Hishamunda *et al.* 2009; Kusumawardani *et al.* 2012; Lindawati *et al.* 2013; Little *et al.* 2013). The results of IRR calculation of catfish enlargement business in the former of small scale community gold mining show positive results at DF 15%, i.e., with an IRR value of 23.69% which means greater than 15% bank interest per year. Since it reaches the value of IRR > SDR, then the investment is feasible to be conducted, or is an indicator of the level of efficiency of an investment. IRR is the level/rate of net profit on investment, where positive net benefits are replanted in the following year for the remaining life of the business (Hishamunda *et al.* 2009; Kusumawardani *et al.* 2012; Lindawati *et al.* 2013; Little *et al.* 2013). The analysis results on the catfish enlargement business in the former of small-scale community gold mining in this study indicate profitable business results, so this business is feasible to be conducted and financially feasible.

## CONCLUSION

The research results of the feasibility of catfish enlargement business in the former of small-scale community gold mining show: The value of the *Net Benefit Cost Ratio* of catfish enlargement business in the former of small scale community gold mining from 2010 to 2018 with a BCR value of 1,037. This business is feasible to conduct with Net BCR > 1 or profitable and financially feasible. NPV value equal to = 56,303,246 or this business is feasible because it produces NPV > 0. The IRR calculation value shows a positive result, i.e., the IRR value = 23.69%.

## REFERENCES

- Ahmad, T, Sofiarsih, L & Rusmana 2007, The growth of Patin (*Pangasius hypophthalmus*) in a close system tank. *Journal Aquaculture*, 2: 67-73.
- Asche, F & Khatun, F 2006, Aquaculture: issues and opportunities for sustainable production and trade. International Trade and Sustainable Development Series Issue, p. 5, International Centre for Trade and Sustainable Development, Geneva, Switzerland.
- Beveridge, CM, Ross, LG & Kelly, LA 1994, Aquaculture and Biodiversity. *Ambio*; 23: 497-502.

- Britz, PJ 2006, A review of aquaculture policy and institutional capacity in the Bclme region with recommended region policy options. report Bclme project LMR/MC/03/01. *Development of Responsibility Aquaculture Policy for the BCLME Region*. 52p.
- Bunasir, Fahmi, MN & Fauzan, TM 2002, Enlargement of climbing perch (*Anabas testudineus* Bloch) that is maintained in the pool as an alternative business (Engineering Report). South Kalimantan Freshwater Cultivation Site. Directorate General of Aquaculture. Department of Maritime Affairs and Fisheries. Banjarbaru.
- Bungas, K 2009, Phenotype diversity of climbing perch (*Anabas testudineus* Bloch) found in peat swamp waters. thesis. natural resources and environmental management study program. Lambung Mangkurat University Postgraduate Program. Banjarbaru 128 p.
- Sari, CFK Sawaki, ME & Sabarofek, MS 2018, Effect of investment analysis on feasibility of manganese mining in pt. berkat esa mining. *Jurnal Science Tech*, 4: 11-18.
- Charles, AT 2001, Sustainable fishery system. Blackwell Science Ltd, a Blackwell Publishing Company. Oxford UK.
- Cholik, F, Jagatraya., AG, Poernomo, RP & Jauzi, A 2005, Aquaculture. The Hope for the Nation's Future is published in collaboration with the Indonesian fisheries community and the freshwater aquaculture park. TMII, Jakarta, 415 p.
- FAO 2009, Ecosystem approach to fisheries and aquaculture: implementing the FAO code of conduct for responsible fisheries. FAO regional office for Asia and the Pacific, Bangkok, Thailand. RAP Publication, 48 p.
- Ghosh, M & Das SK 2004, Effect of dietary protein levels on the growth of *Anabas testudineus* (Bloch) fingerlings. *Indian Journal of Fisheries*, 51: 425-430.
- Hishamunda, N, Ridler, NB, Bueno, P, Yap, WP 2009, Commercial aquaculture in Southeast Asia: Some policy lesson. *Food Policy*, 102-107.
- Inonu, I, Budianto, D, Umar, M & Yakup, WA 2010, Use of local organic ingredients to improve physical and chemical properties of post-mining sand tailings on Bangka Island. Proceedings of the National Seminar of the Indonesian Soil and Water Conservation Society, pp. 315-328.
- Kusumawardani, IS, Gumila, I & Rostini, I 2012, Analysis of consumer surplus and fresh fish producer surplus in the city of Bandung. *Journal Perikanan dan Kelautan*, 3: 141-150.
- Lee, KK 2015, Sustainable aquaculture. *Journal of Aquaculture & Marine Biology*, 1: 1-2.
- Lindawati, L, Rahadian, R & Koeshendrajana, S 2013, Analysis of competitiveness of catfish commodities in Bogor regency. *Journal Sosial Ekonomi Perikanan*, 8: 93-101.
- Little, DC, Murray, FJ, Leschen W & Waley, D 2013, Socio-economic factors affecting aquaculture site selection and carrying capacity. FAO/Institute of Aquaculture, University of Stirling, Expert Workshop, 6-8 December 2010. Stirling, the United Kingdom of Great Britain and Northern Ireland. FAO *Fisheries and Aquaculture Proceedings*, 21: 103-115.
- Savitri, A, Husani, Q & Tarsim 2015, Growth of siamese catfish (*Pangasianodon hypophthalmus*) maintained with biofloc systems at different feeding rates. *Journal Rekayasa dan Teknologi Budidaya Perairan*, 4: 1. ISSN: 2302-3600. Hal 453-459.
- Supangat, A & Kamiso, HN 2000, Culture development. Universitas Terbuka, Indonesia.
- Syafe'I, LS 2000, Development of fish culture business in public waters. Universitas Terbuka, Indonesia.
- Umar, H 2001, Business feasibility study. PT, Gramedia Pustaka Utama, Jakarta, Indonesia.
- Zonneveld, N, Huisman EA & Boon, JH 1991, Principles of aquaculture. Main Library Gramedia, Jakarta, Indonesia.
- Zulkarnain, M, Purwanti, P & Indrayani, E 2013, Analysis of the influence of aquaculture production value on the gross domestic product of the fisheries sector in Indonesia. *Journal Ecosofim*, 1: 52-69.

---

***Bibliographic information of this paper for citing:***

Bungas, K, Petrus, P, Eka Asi, MM, Ruthena, Y 2025, Feasibility of catfish *Pangasius hypophthalmus* enlargement business in the former of small-scale community gold mining, Indonesia. *Caspian Journal of Environmental Sciences*, 23: 1095-1099.

---