

# Financial feasibility analysis of ponyfish (*Photopectoralis bindus*) cracker in Gempolsewu village, Rowosari District, Kendal Regency

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**Abstract.** Kendal Regency is located on the northern coast of Java Island. Ponyfish (*Photopectoralis bindus*) is one of the important caught fish species in the coastal area of the Kendal Regency. To survive in an unfavorable economic situation, business in Indonesia must innovate to combat the economic negative effects of a Covid-19 pandemic. Making ponyfish into fish crackers will increase its selling price that increases people's income. Therefore, it is crucial to analyze the financial feasibility of the ponyfish cracker business. A quantitative descriptive method with purposive sampling was employed in this study. Respondent of this study is Dasri, she is actor of "UKM Mandiri" in Gempolsewu village. The raw ingredients for fish crackers include ponyfish, tapioca flour, flavoring, sugar, salt, and garlic. The initial investment required for the ponyfish cracker business is IDR 50,000,000 with a total cost of IDR 31,036,014 per year. Its yearly income is IDR 62,118,000 with an annual profit of IDR 31,081,986. The production of break even point (BEP) is 3,651 packs/year and the price of BEP is IDR 4,247/pack. The net present value (NPV) is IDR 85,946,066, the internal rate of return (IRR) is 57%, the benefit/cost ratio is 2.24, and the payback period (PP) is about 2 years, 7 months, 6 days. Based on the financial feasibility analysis, the ponyfish cracker business was declared feasible and profitable with a profit forecast in 2022 of IDR 37,019,291, in 2023 of IDR 39,186,758, and in 2024 of IDR 41,455,228.

**Key Words:** B/C ratio, IRR, Kendal Regency, NPV, ponyfish cracker.

**Introduction.** Kendal Regency is located on the north coast of Central Java Province. People in Kendal Regency take advantage of capture fisheries as a source of income. Capture fisheries production in Kendal Regency can affect the level of community income, especially coastal communities who generally work as fisherman. The catch can be in the form of fish with important economic value and fish with non-economic value. One of the fish with the non-economic value in Kendal Regency is ponyfish (*Photopectoralis bindus*). According to the Department of Marine Affairs and Fisheries of Kendal Regency (2018), 256,548 tons or 9.14% of ponyfish were caught in Kendal Regency in 2018.

The global financial crisis and the current pandemic recession both had a significant negative distributional impact in terms of job prospects. Low-income earners had a much higher chance of job loss than those at the top wage quantile. This differential impact of the job separation rates was much starker during the current pandemic recession (Shibata 2021). The 2020 downturn was the sharpest recession experienced by the global economy since the Great Depression of the 1930s. The contraction in global GDP, forecast to equal -3 percent year over year, significantly exceeded the contraction in the Global Financial Crisis 2008 (IMF 2020).

The declining economy urged people to innovate to survive. Ponyfish in Kendal Regency has an abundance of numbers but has a low price. To date, ponyfish is only used as an animal feed with lower added value. One of the products from ponyfish with added value is fish crackers. According to Zzaman et al (2017), fish crackers is one of the popular snack foods in Southeast Asian countries and they are made of fish flesh together with starch flour, water and seasoning whit then shaped into round, oblique, stick or longitudinal forms.

Referring to the description earlier that ponyfish has a business potential, it is necessary to evaluate the financial feasibility of Ponyfish cracker business. This is in line with the purpose of the processing of non-economic fish to get the maximum benefit by reducing the production costs incurred. The level of the financial feasibility of a fish cracker business can determine whether the business is feasible to continue. Data analysis used in this study include benefit-cost ratio (B/C ratio), payback period (PP), break-even point (BEP), forecasting method based on the regional inflation rate, net present value (NPV), and internal rate of return (IRR).

**Material and Method.** This research was carried out from August 2021 to September 2021 in Gempolsek village, Rowosari District, Kendal Regency. In this study, the subject is the actors behind the business of capture fishery production namely Dasri from "UKM Mandiri". This descriptive quantitative study seeks to find out information about the processing of fish into fish crackers as well as to analyze the financial feasibility of the ponyfish cracker business.

The sampling technique that used in this study was purposive sampling, which is a technique with a specific criteria whose information was selected based on certain goals (El Shiffa et al 2022). Respondents in this study were taken from fish cracker business actors in Gempolsek village named "UKM Mandiri". Data collection includes:

- the aim of observation is to find the information directly from the production unit of the fish cracker business regarding the fish cracker made from non-economic fish;
- interviews were conducted with Mrs. Dasri, a 43-year-old fish cracker business actor from "UKM Mandiri" to obtain information on the fish cracker business such as how to make and market it.

**Financial analysis.** Data analysis for the financial feasibility of fish crackers made from ponyfish consists of benefit-cost ratio (Watts et al 2022), payback period (Zhang et al 2021), break-even point (Alnasser et al 2014), net present value (Zizlavsky 2014), and internal rate of return (Sharma et al 2014). The formulae used are described as follows:

a. Benefit-cost ratio (B/C ratio):

$$\text{B/C ratio} = \frac{\text{Benefits (IDR)}}{\text{Total costs (IDR)}}$$

b. Payback period (PP):

$$\text{Payback period} = \frac{I}{CF} = \frac{1 - (1 + \text{IRR})^{-L}}{\text{IRR}}$$

where: I = investment outlay (IDR);

CF = annual cash flow (IDR);

L = represents the economic life of the equipments;

IRR = internal rate of return (%).

c. Break even point (BEP):

$$\text{BEP} = \frac{\text{Fixed cost (IDR)}}{\text{Contribution margin (IDR)}}$$

d. Net present value (NPV):

$$NPV = \sum_{t=0}^n \frac{NCF_t}{(1+r)^t}$$

where: NPV = net present value (IDR);

NCF<sub>t</sub> = net cash flow generated by innovation project in year t (IDR);

r = discount rate (%);

e. Internal rate of return:

$$IRR = LDR + D \left( \frac{NPV_{LDR}}{|NPV_{HDR}| + NPV_{LDR}} \right)$$

where: LDR = lower discount rate;

HDR = higher discount rate;

$NPV_{HDR}$  = NPV calculated using higher discount rate;

$NPV_{LDR}$  = NPV calculated using lower discount rate;

D = difference between lower and higher discount rates.

**Result and Discussion.** The raw ingredients for fish crackers made from non-economic ponyfish fish species were obtained from the catch of fishermen in Gempolsewu village. The production of ponyfish fish cracker starts with cleaning, boiling and sieving the ingredients. Next, mixing a dough with tapioca flour and shaping a dough. Steaming a dough at 100°C for 120 minutes and cooling the dough. After that, cutting and drying a dough during 2-3 days. After it dried, the crackers are packed and ready to storing.

The making of ponyfish crackers has similarities with the making of fish crackers in general. The difference is only on the raw ingredients used. One of the processes that determine the success of processed fish crackers is the drying process. This process aims to reduce the water content in fish crackers. According to Baishak et al (2020), fish crackers are usually produced by mixing minced fish flesh with water and starch and then shaping the dough by boiling or steaming for gelatinization and then the dough is cooled, followed by slicing and drying to the moisture content of around 10%.

The observations reveal that the composition of fish crackers produced at "UKM Mandiri" consists of 22.99% ponyfish, 68.97% tapioca flour, 1.44% salt, 0.86% sugar, 1.72 % flavoring (MSG), and 4.02% garlic. Chudasama et al (2019) described that fish crackers are produced from flesh fish, rice starch, sago starch and tapioca starch at the fish to starch ratio of 50:50 including 1% sodium bicarbonate, 2% salt, 2% seasoning and 200 mL water added to the mixture.

**Ponyfish needed in "UKM Mandiri".** The amount that the firm pays to buy inputs is called total cost. Total cost can be divided into two types, fixed costs are costs that do not change due to changes in production volume. Some of firm's costs, called variable costs, change as the firm alters the quantity of output produced (Mankiw 2020). The production of crackers in "UKM Mandiri" in one month with 20 working days is adjusted to the number of raw ingredients obtained from fishermen. The investment costs incurred in the business are IDR 50,000,000.

The amount of raw ingredients of ponyfish used in the production of fish crackers in one year is 420 kg for IDR 3,000/kg. The total cost of raw ingredients needed for the production of ponyfish crackers is IDR 1,260,000/year. However, the raw ingredients for ponyfish in one year is uncertain as it adjusts to how much fishermen can catch.

Figure 2 reports the raw ingredients for ponyfish were highly available in May, at 80 kg, and the least in March and April, at 20 kg. The availability of ponyfish affects the number of fish crackers produced. The production of ponyfish crackers is very dependent on fisherman catch. Therefore, although ponyfish are abundant on the north coast of Java, the availability of stock must be considered. This is also confirmed by Acharya & Naik (2015) that the ponyfish forms a major fishery resource by itself in the marine fisheries sector and the ponyfish is widely distributed in the Indo-Pacific region.

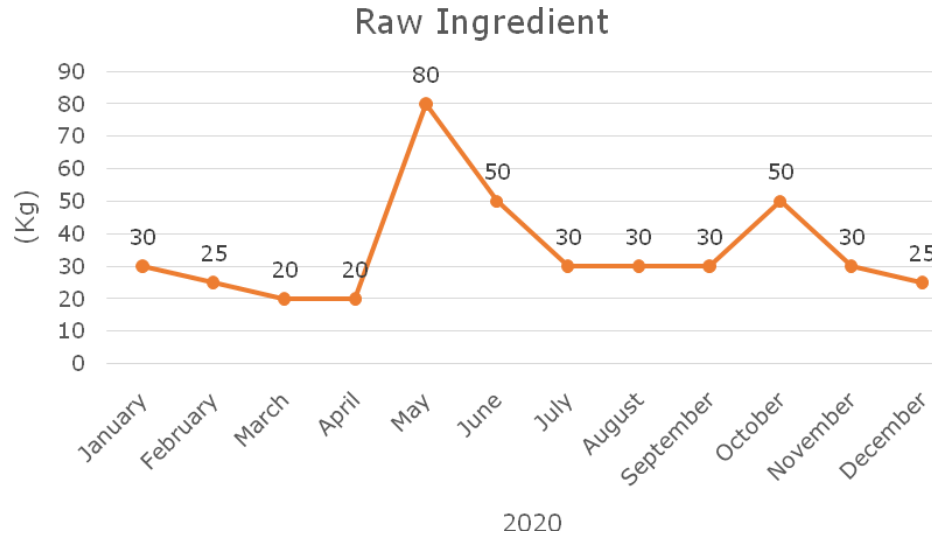


Figure 2. The amount of ponyfish required by month in one year.

**Production and selling price of ponyfish crackers.** The production of ponyfish crackers depends on the availability of raw ingredients and the production capacity. The more raw ingredients available, the more production will be. However, if the number of raw materials available is limited, the amount of ponyfish crackers made will be limited as well.

Figure 3 reports the production of ponyfish crackers fluctuated due to the availability of raw ingredients from fishermen. The largest number of productions was in May with 1,392 packs, while the least production was in March and April with 348 packs. The amount of ponyfish cracker production is directly proportional to the availability of raw ingredients.

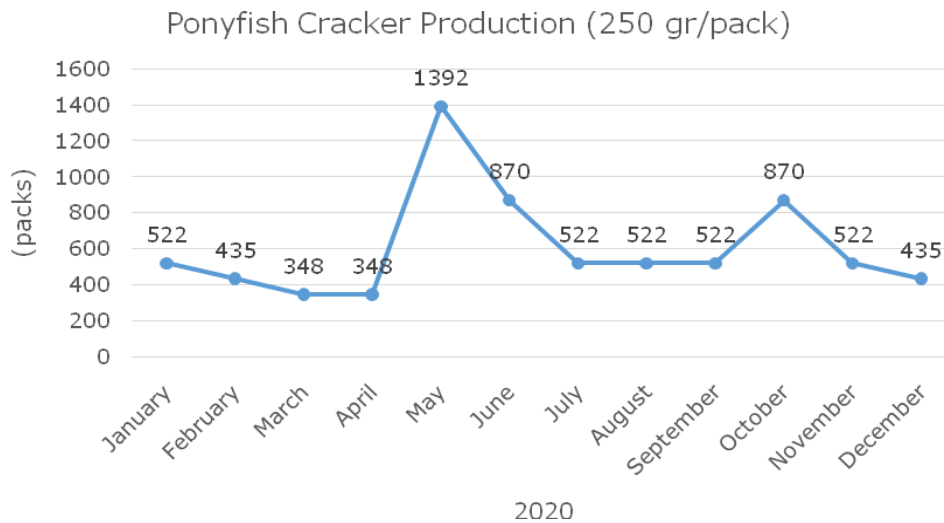


Figure 3. The production of ponyfish crackers by month in one year.

The selling price of ponyfish crackers will determine the income and continuity of the business. Ponyfish crackers are packaged in a size of 250 g/pack. The price set per pack is IDR 8,500. According to business actors at "UKM Mandiri", this price is the ideal price for selling ponyfish crackers. According to Chwastyk & Kolosowki (2014) the information

about the cost of future implementation of the new product is important. For this reason, it is urgent to indicate the appropriate cost estimating techniques and the hardest part is to assess the future costs at the planning stage.

The total production of ponyfish crackers in “UKM Mandiri” is 7,308 packs/year. The selling price has been set at IDR 8,500/pack. Thus, the production value obtained from the production of ponyfish crackers is IDR 62,118,000/year.

**Financial feasibility analysis.** A business can be said to be feasible or profitable by judging from several aspects such as capital, costs, income, and profits. The results of financial feasibility analysis are shown in Table 3. Feasibility analysis of ponyfish cracker business used the following assumptions:

- the projected time of fish cracker processing business is 5 years;
- using a discount factor of 6%; and
- there is a 2% annual growth in revenue and cost.

Table 3

Financial feasibility analysis of ponyfish cracker business

<i>Description</i>	<i>Average per unit</i>
Investment capital (IDR)	50,000,000
Fixed cost (IDR year <sup>-1</sup> )	14,496,000
Variable costs (IDR year <sup>-1</sup> )	16,540,014
Total cost (IDR year <sup>-1</sup> )	31,036,014
Income (IDR year <sup>-1</sup> )	62,118,000
Profit (IDR year <sup>-1</sup> )	31,081,986
B/C ratio	2.24
BEP of production (pack year <sup>-1</sup> )	3,651
BEP of price (IDR pack <sup>-1</sup> )	4,247
IRR (%)	57
NPV (IDR in 6 years)	85,946,066
Payback period (years)	2.60

The capital required for ponyfish cracker business is IDR 50,000,000/business unit. Fixed costs are IDR 14,496,000/business unit/year and the variable costs are IDR 16,540,014/business unit/year so that the total cost that must be incurred is IDR 31,036,014/business unit/year. The costs include the purchase of fish, seasonings, employee salaries, water, electricity, gas, and so on. The income obtained from the sale of ponyfish crackers is IDR 62,118,000/business unit/year with a profit of IDR 31,081,986/business unit/year. Ahmadi et al (2019) describes that the average annual profit received by the fish chips producers is IDR 12,930,000 and the average monthly business profit obtained was IDR 2,939,583.

The NPV of the ponyfish cracker business is IDR 85,946,066/unit in 6 years, which means that the projection in 6 years of business can generate IDR 85,946,066/unit. The projection shows that the ponyfish cracker business is feasible or profitable because the value of the NPV in the business is positive. Kallio-Nyberg et al (2013) proffer that NPV is the difference between the present value of cash inflows and the present value of cash outflows at a certain point in time. This was done by assigning monetary values to the benefits and cost, discounting future benefits and costs using an appropriate discount rate, and subtracting the sum of discounted costs from the sum of discounted benefits.

Ponyfish cracker business is said to be feasible if the IRR is greater than the applicable discount factor. The IRR from the analysis of the financial feasibility of the ponyfish cracker business was 57%. This indicates that the ponyfish cracker business is feasible or profitable because the IRR value is greater than the applicable discount factor. According to El-Tahir & El-Otaibi (2014), IRR calculations are commonly used to evaluate the desirability of investments or projects. The higher a project's IRR, the more desirable it is to undertake the project with assuming all project require the same amount of up-

front investment, the project with the highest IRR would be considered the best and undertaken first.

The B/C ratio in ponyfish cracker business is 2.24. This indicates that the business is feasible or profitable as indicated by the value of the B/C ratio which is  $> 1$ . Conversely, if the value of the B/C ratio is  $< 1$ , the business is not feasible or suffers a loss. Ebers & Thomsen (2021) states that if the B/C ratio is above 1, the program benefits society and should obtain funding. If the B/C ratio is below 1, the program costs society and should obtain no funding.

BEP analysis is used to determine the break-even point of the business. Production analysis aims to determine the BEP of ponyfish cracker production so that business actors can determine the number of products that must be produced to avoid losses. The BEP analysis aims to determine the selling price of ponyfish crackers so that business actors can settle the selling price of the product to avoid losses. Based on Table 3, it is known that the production for BEP is 3,651 packs/year and the price for BEP is IDR 4,247. Meanwhile, the production of ponyfish crackers at "UKM Mandiri" is 7,308 packs/year and the price is IDR 8,500/pack. This shows that the ponyfish cracker business has exceeded the BEP production and the BEP price. Hence, it is feasible and profitable. Referring to Oppusunggu (2020), uses of the breakeven analysis consist in: a) assisting to determine the capacity of the people who are employed once the breakeven point is reached; this will help to show the maximum profit in the certain products/services that can be produced; b) replacing fixed costs with variable costs can determine the change of the profit; c) assisting to determine the changes in profit if the price of a product is changed; and d) assisting to determine the amount of loss that can be sustained if there is a decline in sales.

The payback periods in the ponyfish cracker business indicate the time required to return the investment that has been spent. The payback period value obtained is 2.60, which is 2 year 7 months 6 days. The time required for a return on investment from the business is short because it is under three years. This is confirmed by Cai et al (2022) that a payback period determines how long the building would need to operate when the potential reduction in operational emissions through improvement of building energy efficiency relative to a baseline building can offset potential increase in the upfront embodied emissions relative to the baseline.

**Conclusions.** Fish cracker business with non-economic fish species of ponyfish as the raw ingredient is feasible and profitable with the criteria of B/C ratio of 2.24, production BEP of 3,651 packs/year, price BEP of IDR 4,247, IRR of 57%, NPV of IDR 85,946,066/business unit/6 years, and PP of 2.60. It is known that the fish cracker business is feasible and profitable, so it is expected to be an alternative for developing fish processing businesses to improve the economy of coastal communities. Further research to be carried out is related to product marketing strategies and increasing productivity of fish cracker processing.

**Conflict of interest.** The authors declare that there is no conflict of interest.

## References

- Acharya K. V., Naik S. D., 2015 Reproductive biology of pony fish, *Leiognathus splendens* (Cuvier, 1829) off Ratnagiri coast, Maharashtra. *Global Journal of Multidisciplinary Studies* 4(12):389-400.
- Ahmadi, Muhammad, Sari D. K., 2019 Featherback fishery in Barito Kuala District, Indonesia: potency, business opportunity and challenge. *International Journal of Innovative Studies in Aquatic Biology and Fisheries* 5(4):21-31.
- Alnasser N., Shaban O. S., Al-Zubi Z., 2014 The effect of using break-even-point in planning, controlling, and decision making in the industrial Jordanian companies. *International Journal of Academic Research in Business and Social Science* 4(5): 626-636.

- Baishak N. N., Islam M. R., Moazzem M. S., Ahmad I., Zzaman W. 2020 Quality evaluation of nutritious fish crackers developed from three carp fish species. *Asian Food Science Journal* 17(1):15-23.
- Cai H., Wang X., Kim J. H., Gowda A., Wang M., Mlade J., Farbman S., Leung L., 2022 Whole-building life-cycle analysis with a new GREET® tool: embodied greenhouse gas emissions and payback period of a LEED-certified library. *Building and Environment* 209:108664.
- Chudasama B. G., Zofair S. M., Bhola D. V., Dave T. H., 2019 Development and characterization of fish crackers prepared from the bull's eye (*Priacanthus hamrur*, Forsskal, 1775) fish meat and different starches. *Journal of Entomology and Zoology Studies* 7(3):401-406.
- Chwastyk P., Kolosowski M., 2014 Estimating the cost of the new product in development process. *Procedia Engineering* 69:351-360.
- Dinas Kelautan dan Perikanan Kabupaten Kendal, 2018 Perikanan Dalam Angka. Dinas Kelautan Perikanan, 330 pp. [in Indonesian]
- Ebers A., Thomsen S. L., 2021 Benefit-cost analysis of social media facilitated bystander programs. *Journal of Benefit-Cost Analysis* 12(2):367-393.
- El Shiffa N. A., Rahmiati F., Santoso A. S., Yustina A. I., 2022 Strategic entrepreneurship for achieving customers repurchase intention amidst pandemic Covid-19 on digital multi-sided platform: a case of Traveloka. *Procedia Computer Science* 197:247-255.
- El-Tahir Y., El-Otaibi D., 2014 Internal rate of return: a suggested alternative formula and its macro-economics implications. *Journal of American Science* 10(11):216-221.
- International Monetary Fund (IMF), 2020 World economic outlook, October 2020: a long and difficult ascent. IMF. Washington, D. C. Available at: <https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020>. Accessed: April, 2022.
- Kallio-Nyberg I., Salminen M., Pakarinen T., Koljonen M. L., 2013 Cost-benefit analysis of Atlantic salmon smolt releases in relation to life-history variation. *Fisheries Research* 145:6-14.
- Mankiw N. G., 2020 Principles of economics. Ninth edition. Cengage Learning, Boston, 864 pp.
- Oppusunggu L. S., 2020 Importance of break-even analysis for the micro, small, and medium enterprises. *International Journal of Research - GRANTHAALAYAH* 8(6): 212-218.
- Sharma M., Thakur R., Mehta P., 2014 Economic feasibility analysis of major flower crops in Himachal Pradesh State of India. *International Journal of Advanced Research in Management and Social Sciences* 3(9):24-40.
- Shibata I., 2021 The distributional impact of recessions: the global financial crisis and the Covid-19 pandemic recession. *Journal of Economics and Business* 15:105971.
- Watts E., Mak J., Patenaude B., 2022 Benefit-cost ratios of continuing routine immunization during the Covid-19 pandemic in Africa. *Journal of Benefit-Cost Analysis* 13(1):91-106.
- Zhang C., Hu M., Laclau B., Garnesson T., Yang X., Tukker A., 2021 Energy-carbon-investment payback analysis of prefabricated envelope-cladding system for building energy renovation: cases in Spain, the Netherlands, and Sweden. *Renewable and Sustainable Energy Reviews* 145:111077.
- Zizlavsky O., 2014 Net present value approach: method for economic assessment of innovation projects. *Procedia - Social and Behavioral Sciences* 156:506-512.
- Zzaman W., Yusoff M. M., Yang T. A., 2017 Preparation and properties of fish cracker from different freshwater fish species. *International Food Research Journal* 24(5): 1858-1862.

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