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Business Analysis of Tilapia (*Oreochromis niloticus*) at Pond of Running Water in Koto Tangah District, Padang City, West Sumatera Province

Analisis Usaha Pembesaran Ikan Nila (Oreochromis niloticus) Sistem Kolam Air Deras di Kecamatan Koto Tangah Kota Padang Provinsi Sumatera Barat

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Abstract

This research was conducted in two Villages, Balai Gadang Village and Lubuk Minturun Village, Koto Tangah District, Padang City, West Sumatera Province with the aim of calculating the amount of investment, revenue, profit and feasibility level of tilapia fish farming of water pouring down based on financial (financial) aspects using analysis of investment, revenue, profit, Revenue Cost of Ratio (RCR), financial rate of return (FRR), and payback period of capital (PPC). The method used in this study is a survey method. Data collection was carried out by observation, interviews and direct documentation with 7 tilapia cultivators. The results showed that the average investment issued by tilapia cultivators on a small scale was IDR88.432.667, medium scale was IDR147.275.000 and large scale was IDR306.318.000. The average income earned by each cultivator starting from a small scale is IDR214.751.000 with a profit of IDR42.871.133/year, a medium scale of IDR411.033.000 with a profit of IDR93.514.000/year, and a large scale of IDR798.468.000 with a profit of IDR143.500.400/year. The return cost of ratio value obtained for the small scale is 1,25; the medium scale is 1,29; and the large scale is 1,22. The Financial Rate of Return value for each scale is 47,97% small scale, medium scale 62,21%, and large scale 47,76%, and the payback period of capital value for small scale is 2,10 years, medium scale is 1,67 years and large scale 2,15 years.

Keywords: Business Feasibility, Tilapia, Running Water, Investment

Abstrak

Penelitian ini dilakukan di dua Kelurahan yaitu Kelurahan Balai Gadang dan Kelurahan Lubuk Minturun Kecamatan Koto Tangah Kota Padang Provinsi Sumatera Barat dengan tujuan untuk menghitung besar investasi, penerimaan, keuntungan dan tingkat kelayakan usaha pembesaran ikan nila sistem kolam air deras berdasarkan aspek finansial (keuangan) menggunakan analisis investasi, penerimaan, keuntungan, *Revenue Cost of Ratio* (RCR), *Financial Rate of Return* (FRR), dan *Payback Period of Capital* (PPC). Metode yang digunakan dalam penelitian ini adalah metode survei. Pengumpulan data dilakukan secara observasi, wawancara dan dokumentasi secara langsung dengan pembudidaya ikan nila berjumlah 7 orang. Hasil penelitian menunjukkan bahwa rata-rata investasi yang dikeluarkan oleh pembudidaya ikan nila dari skala kecil yaitu Rp88.432.667, skala sedang Rp147.275.000 dan skala besar Rp306.318.000. Rata-rata penerimaan yang diperoleh setiap pembudidaya mulai dari skala kecil yaitu Rp214.751.000 dengan keuntungan Rp42.871.133/tahun; skala sedang

Rp411.033.000 dengan keuntungan Rp93.514.000/tahun; dan skala besar Rp798.468.000 dengan keuntungan Rp143.500.400/tahun. Nilai rata-rata RCR yang diperoleh untuk skala kecil yaitu 1,25; skala sedang 1,29; dan skala besar yaitu 1,22. Nilai FRR masing-masing skala yaitu skala kecil 47,97%; skala sedang 62,21%; dan skala besar 47,76%; serta nilai PPC untuk skala kecil 2,10 tahun; skala sedang 1,67 tahun; dan skala besar 2,15 tahun. Berdasarkan hasil penelitian, maka usaha budidaya pembesaran ikan nila sistem kolam air deras di Kelurahan Balai Gadang dan Kelurahan Lubuk Minturun layak untuk dilanjutkan.

Kata kunci: Kelayakan Usaha, Ikan Nila, Kolam Air Deras, Investasi

1. Introduction

Freshwater aquaculture activities in Padang City are one of the sub-sectors that are quite important in producing fishery products. The largest amount of freshwater fish production in Padang City in 2019-2021 is Tilapia, which is 1,559.44 tons (BPS Kota Padang, 2021). Tilapia production always increases every year, but in 2020 there will be a decrease in the amount of tilapia production. This shows that there are several factors that influence tilapia production. Goldfish production in the city of Padang originates from cultivation activities carried out in floating net cages, pools of still water and swift water ponds, and rice fields.

One of the potentials for freshwater aquaculture in the city of Padang is a heavy water pool. The number of fish cultivators in the fast-water pond system in Padang City has increased from 2019-2021. The rushing water ponds in the city of Padang which are scattered in several areas generally raise goldfish, tilapia and mujair. According to Kordi (2019), in fast-water pools it is only suitable for keeping certain fish, especially those that are able to swim in fast-flowing water. Rapid water ponds must have many springs and irrigation channels so that they are useful in increasing the production of freshwater aquaculture. The process of rearing tilapia in a fast water pond is different from that of tilapia in a still water pond. The level of density is different compared to a calm pool. Fast-water pools generally have a higher level of density compared to still-water pools (Jayalaksana et al., 2016).

Tilapia production in fast-water pond cultivation in the city of Padang has not been stable from year to year. In 2019 production reached 456 tons and in 2020 only 326.99 tons due to the Covid-19 pandemic, while in 2021 there was an increase again reaching 776.45 tons. This shows the unstable production of Tilapia in fast water pond cultivation in Padang City. The unstable production of tilapia can be caused by a number of things, such as the price of feed and goldfish seeds that are always rising so that tilapia fish farmers limit their production, and the cultivation management is not optimal.

Fishing business is an economic activity in which humans work on fishery biological resources to get the maximum benefit for their welfare. In addition to having an economic objective, the fast-water pond fishing business is expecting maximum profits, it is also hoped that the business will last a long time and be able to develop. The fast-water pond fishing business requires a large amount of capital. As a commercial fishery business, the owner or manager of a fast water pond hopes that the capital invested as a business investment can provide benefits in the form of profits and it is hoped that the business is feasible. According to Irwandi et al. (2015), a feasibility analysis of tilapia pond farming is carried out to describe the amount of investment and costs that must be incurred in building a tilapia pond business and the amount of benefits that can be obtained from the tilapia pond business. Analysis of the tilapia pond business is carried out on the existing tilapia pond business, to get an overview of the costs incurred and compared with the amount of benefits that have been obtained as well as an overview of the benefits costs in the future. Therefore, it is necessary to conduct research on the performance analysis of tilapia enlargement business in a fast-water pond system that provides advantages or disadvantages.

The purpose of this study was to calculate the amount of investment for the tilapia (*Oreochromis niloticus*) aquaculture pond system; to calculate the receipts and profits derived from the tilapia aquaculture pond system; to analyze the feasibility of cultivating tilapia with the flowing water pond system in Koto Tangah District.

2. Material and Method

2.1. Time and Place

This research was conducted from March 1 to March 15 2022. The research locations were in two sub-districts in the Koto Tangah District. The selection of research locations was based on the highest number of cultivators, namely in the Balai Gadang Village and Lubuk Minturun Village.

2.2. Methods

The method used in this study is a survey method, namely in reviewing, observing, collecting data, and direct information on the field and collecting data related to this research, as well as using a questionnaire as a guide to obtain data by conducting interviews with respondents and government officials local area by using a questionnaire as a means of collecting primary data and secondary data, then documentation to complete the results of the research data, such as a map of the research location, the condition of the research site and also several photographic documentation when interviewing respondents (Effendi et al., 2015).

2.3. Data Collection

The data collected in this study are primary data and secondary data. The primary data used in this study is data from interviews conducted with respondents. Secondary data obtained in this study are selling prices, input prices, components of investment costs, operational costs, fixed costs, revenues, income and profits as well as additional data that supports the correctness of the primary data.

2.4. Data Analysis

2.4.1. Total Investment

Investment is the investment of a number of funds or other resources at this time with the aim of obtaining a number of benefits in the future. Investment is the addition of fixed capital and working capital. According to Hendrik (2013) the formula used to calculate the total investment is:

$$TI = MT + MK$$

Information :

TI : Total investment (IDR)
MT : Fixed capital (IDR)
MK : Working capital (IDR)

2.4.2. Total Cost

Total costs are all costs incurred due to the on-going production process consisting of fixed costs and variable costs (Choliq *in* Damayanti, 2017). The formula for calculating the total cost is:

$$TC = FC + VC$$

Information :

TC : Total cost (IDR)
FC : Fixed cost (IDR)
VC : Variabel cost (IDR)

2.4.3. Profit

Profit is the difference between total incomes and total costs incurred (Helda in Aji, 2018). The profit of enlargement business can be formulated as follows:

$$\boldsymbol{\pi} = TR - TC$$

Information:

π = Profit
TR = Total revenue
TC = Total cost

2.4.4. Gross Income

Income is all income derived from the number of fish produced multiplied by the selling price of the fish produced (Fahrudin, 2018). Can be written with the following formula:

$$TR = QP$$

Information:

TR : Total revenue (IDR)
Q : Total sales (kg)
P : Product price (IDR/kg)

2.4.5. Revenue Cost Ratio (R/C Ratio)

According to Fitri *in* Jamal (2018) the R/C ratio is the comparison between total income and total costs. R/C ratio analysis is carried out to see how much income is obtained from every rupiah of costs incurred in the fishing business unit. Can be formulated by:

$$\text{R/C Ratio} = \frac{TR}{TC}$$

Information:

R/C Ratio : Revenue cost ratio
TR : Total revenue (IDR)

TC : Total cost (IDR)

The decision criteria taken are if the R/C value >1 then the business is considered profitable, if the R/C value <1 then the business is considered a loss, if the R/C value =1 then the business is considered to break even.

2.4.6. Financial Rate of Return (FRR)

Financial Rate of Return (FRR) is a comparison between net income and investment multiplied by 100% (Riyanto *in* Hendrik, 2013). Can be formulated with:

$$FRR = \frac{\pi}{TI} \times 100\%$$

Information:

FRR : *Financial Rate of Return*

π : Profit (Rp)

TI : Total Investment (IDR)

The financial rate of return is used for investment eligibility criteria compared to bank deposit rates. If FRR > interest rate, it is better to invest in the business. If the FRR < bank interest rate, it is better if business capital is deposited in a bank because it will be more profitable.

2.4.7. Payback Period of Capital (PPC)

Payback period of capital is used to see how long it takes to return capital (Hendrik, 2013). The payback period of capital (PPC) is the ratio between the total investment and profit multiplied by 1 year. Written by the formula:

$$PPC = \frac{TI}{\pi}$$

Information:

PPC : Payback Period of Capital (PPC)

TI : Total Investment (IDR)

π : Profit (IDR)

The payback period criteria are as follows: if the payback period value obtained is < 3 years then the return on business capital is categorized as fast and feasible, if the payback period value obtained is 3-5 years then the return on capital is categorized as moderate and feasible, if the payback period value is > 5 years then the return on capital is categorized as slow and inappropriate (Sari, 2021).

3. Result and Discussion

3.1. Geographical Conditions and Location of the Region

Koto Tangah District as one of the 13 sub-districts in Padang City has an important role in the development of Padang City. Koto Tangah District is the gateway to enter the city of Padang. With a land area of ±232.25 km^2. The condition of the area in this sub-district, where 87.67% of the total area of the sub-district are roads, rivers and state forests, community forests and pastures, and the rest has been utilized by the community such as rice fields, buildings and so on. Koto Tangah sub-district is a lowland with a height of 2-25 meters below sea level where 75% is relatively flat area. Koto Tangah District is located at coordinates 0-58 South Latitude and 100'21'11" Longitude with an area boundary consisting of : North is bordered by Batang Anai District (District Padang Pariaman), the south is bordered by North Padang District and Nanggalo District, the west is bordered by the Indonesian Ocean, and the east is bordered by Kuranji District and Solok Regency

3.2. Tilapia Fish Cultivations Business

The shape and construction of a fast-water pool is different compared to a still-water pool. The main difference is that in torrent pools the water flows at a high speed, so special pond construction is required to withstand the strong currents of water on the walls and bottom of the pond. Therefore, swift water pools cannot be made from the ground but must have concrete walls that are strong enough. Production is the total number of cultivated fish obtained by farmers in one fish cultivation harvest (tonnes/harvest). The yield of fish cultivation per harvest is approximately 1.8-12 ton/year. In one year fish cultivators carry out fish farming business three times.

3.3. Tilapia Fish Cultivations Business

One of the factors that determine the success of a fish farming business is the availability of quality seeds and stocking density according to the size of the pond. According to Amri & Khairuman (2013), one of the factors that influence the production of tilapia aquaculture is the quality of fish seeds. The characteristics of healthy seedlings are bright colors, agile movements, nimble and responsive to food. Tilapia seeds obtained by grow-out cultivators are from Balai Gadang Village. The purchase price for the seeds of tilapia is IDR 250 per fish with a size of 2-3 cm. The cultivators spread the seeds in the morning (08.00-09.00) or afternoon (15.30-

16.30) because it is estimated that at that time the water temperature was not too hot or relatively stable. The average cultivator spreads 100-150 seeds/m^2.

The need for fish feed from each cultivator starting from per day, per week and per month for one period varies depending on the number of seeds that are spread.

Table 1. Average amount of feed given by type in Koto Tangah District in one fish growing process

Scale	Average pond area (m^2)	Feed		
		781-1 (kg)	781-2 (kg)	PF 1000 (kg)
Small	114	773	987	1.033
Medium	210	2.750	3.100	4.300
Big	432	5.100	5.750	4.500

Based on Table 1, there are several types of feed used in growing Tilapia in heavy water ponds, namely 781-1 feed, 781-2 feed, and Pf 1000 feed. The type and quality of feed affect the growth rate of fish. The growth rate of fish will be fast with low mortality if the feed given is of sufficient quality and quantity (Yanuar, 2017).

The average yield of rearing tilapia cultivation for each harvest is 1.8-12 tonnes, but these results are not always obtained by cultivators. In one year cultivators carry out enlargement efforts 2-3 times in one year. For the cultivation of tilapia enlargement in Koto Tangah District, the time required from seed stocking to harvesting is 4 months. Farmers will harvest when the size of the fish has reached the size desired by consumers and the market, namely the size of 4 fish/kg. Fish cultivators who operate Tilapia enlargement in fast-water ponds in Koto Tangah District usually work together with collectors in marketing Tilapia. The price of tilapia taken by collectors from cultivators is IDR 23,000/kg. The fish distributed to the collectors aims to maintain product quality. Collector traders will then market the crops to retailers in the region.

3.4. Investment in Tilapia Cultivation with a Flowing Water Pond System

Investment is the sum of fixed capital and working capital, for more details can be seen in Table 2.

Table 2. Total Investment in Tilapia Growing Business in Koto Tangah District, Padang City

Scale	Fixed capital (IDR)	Working capital (IDR)	Total investment (IDR)
Small	32.724.333	55.691.667	88.432.667
Medium	43.437.500	103.837.500	147.275.000
Big	91.668.000	214.650.000	306.318.000

From Table 2 it can be seen that the average total investment per year owned by small scale is IDR 88,432,667, medium scale is IDR 147,275,000 and large scale is IDR 306,318,000. According to Soekartawi (2003), total investment is the sum of fixed capital and working capital or variable capital. This total investment will be issued at the start of the business so that it can run in the future until you get a profit, the greater the investment invested, the profit will also increase.

3.5. Total Cost, Gross Income, and Profit

The average total production cost is the sum of the fixed costs and variable costs per harvest. The fixed costs per harvest in the Tilapia farming business consist of maintenance costs and depreciation. Variable costs are costs incurred during production activities that can change depending on the materials used. For one harvest, the total cost of production on a small business scale is IDR 171.879.867; medium scale of 317.519.000; and large scale of IDR 654.867.600.

Revenue is the result of selling Tilapia in one production process. This is in line with the opinion of Sari et al (2022), which states that revenue is income that has not been deducted by production costs and is the production value that is sold. The price of tilapia is IDR 23.000/kg. Where the total revenue on a small business scale is IDR 214.751.000; medium business scale of IDR 411.033.000; and large business scale of IDR 798.468.000. Profit is the result of the revenue received minus the total costs incurred in the Tilapia growing business. The benefits of growing Tilapia using a heavy-water pond system can be seen in Table 3.

Table 3. Average net income (profit) of growing tilapia in heavy water ponds, Koto Tangah District, Padang City

Scale	Average pond area (m^2)	Gross income (IDR)	Total cost (IDR)	Profit (IDR)
Small	114	214.751.000	171.879.867	42.871.133
Medium	210	411.033.000	317.519.000	93.514.000
Big	432	798.468.000	654.967.600	143.500.400

From Table 3 it can be seen that the average annual net income of a small scale is IDR 42.871.133, a medium scale is IDR 93.514.000, and a large scale is IDR 143.500.400.

3.6. Feasibility

Business analysis aims to find out whether tilapia aquaculture is profitable and feasible to develop in terms of various aspects such as RCR, FRR and PPC as shown in Table 4.

Table 4. Feasibility analysis of tilapia growing business in Koto Tangah District

Scale	RCR	FRR	PPC
Small	1,25	47,97	2,10
Medium	1,29	62,21	1,67
Big	1,22	47,76	2,15

From Table 4 it can be seen that the average RCR value for small scale is 1,25; meaning that for every IDR 125,-. The RCR value for medium scale is 1,29, meaning that for every IDR 1 spent by Tilapia cultivators, the cultivator will receive revenue of IDR 129,-. Meanwhile, the RCR value for large scale is 1,22; meaning that for every IDR 1 spent by Tilapia cultivators, the cultivator will receive revenue of IDR 122,-.

The average FRR value obtained from the division between net income and total investment multiplied by 100% obtains an FRR value for small scale, namely 47.97%, medium scale 62.21% and large scale 47.76%. FRR is used for investment feasibility criteria compared to Bank BRI's interest rate of 6.4%. FRR > Bank loan interest rates apply, so the business provides benefits for invested investments and it is advisable to invest, FFR < Bank loan interest rates apply, the business investment should be deposited in the Bank because it is more profitable (Hendrik, 2013). From the results of the FRR obtained by each business scale, the tilapia enlargement business is very good to continue, because the level of profit from this business is greater than the interest rate at Bank BRI, which is 6.4%, so it will be better capital is invested in tilapia enlargement business using a swift water pond system.

The PPC calculation is used to show the length of the period or time in returning a project's investment (Sari et al, 2022). The lowest PPC value is found on a medium business scale, namely 1.67 years. While the highest PPC value is found on a large business scale, namely 2.15 years. The value of small-scale PPC is 2.10 years. So from these results the order of return on investment from the fastest to the longest, starting from medium, small and large scale.

4. Conclusions

From the research, results show that: 1) the average total investment made by small-scale tilapia cultivators is IDR 88.432.667; medium scale IDR 147.275.000; and large scale IDR 306.318.000, 2) the average income received by each cultivator starting from a small scale is IDR 214.751.000 with a profit of IDR 42.871.133/year; medium scale IDR 411,033,000 with a profit of IDR 93.514.000/year; and large scale IDR 798.468.000 with a profit of IDR 143.500.400/year. 3) the average RCR value obtained for the small scale is 1.25; medium scale 1.29; and the large scale is 1.22. The FRR value of each scale is small scale 47.97%; medium scale 62.21%; and large scale 47.76%; as well as the PPC value for small scale 2.10 years; medium scale 1.67 years; and large scale 2.15 years. Based on the results of the research, the tilapia enlargement cultivation business with a swift water pond system in the Balai Gadang Village and Lubuk Minturun Village is feasible to continue.

5. References

Alwi, Z. (2021). Analisis Usaha Budidaya Pembesaran Ikan Lele (*Clarias* sp) dalam Keramba di Kelurahan Tebing Tinggi Okura Kecamatan Rumbai Pesisir Kota Pekanbaru Provinsi Riau. *Jurnal Sosial Ekonomi Pesisir*, 2(1): 28-39.

Amri, A., Khairuman, K. (2013). *Budidaya Ikan Nila*. Agromedia. Jakarta Selatan.

Basharahil, F., Hendrik, H., Ramli, M. (2015). Analisis Usaha Ikan Mas pada Kolam Air Deras di Kelurahan Balai Gadang Kecamatan Koto Tangah Kota Padang Provinsi Sumatera Barat. *Jurnal Perikanan dan Kelautan* 2(1): 2-4.

BPS Kota Padang. (2021). *Kota Padang dalam Angka*. Badan Pusat Statistik

Damayanti, H.O. (2017). Struktur Usaha Penangkapan Ikan oleh Nelayan Tradisional di Desa Pecangaan Kecamatan Batangan Kabupaten Pati. *Jurnal Litbang: Media Informasi Penelitian, Pengembangan dan IPTEK*, 13(2): 80-92.

Effendi., Sofian., Tukiran. (2015). *Metode Penelitian Survey.* Jakarta: LP3ES.

Fahrudin, A. (2018). Analisis Pendapatan dan Faktor-Faktor yang Mempengaruhi Produksi Usaha Budidaya Tambak Ikan. Efficient. *Indonesian Journal of Development Economics*, 1(1): 77-85.

Kordi, K. (2019). *Pemeliharaan Ikan di Kolam Air Deras*. CV Aneka Ilmu.

Hendrik. (2013). *Studi Kelayakan Proyek Perikanan*. Penerbit: Faperika Unri. Pekanbaru. .

Irwandi., Badrudin., Suryanty. (2015). Analisis Pendapatan dan Efisiensi Usaha Pembesaran Ikan Nila *(Oreochromis Niloticus)* di Desa Mekar Mulya Kecamatan Penarik Kabupaten Mukomuko. *Jurnal AGRISEP,*15(2): 237-253.

Jayalaksana, M.R., Handaka., Subhan. (2016). Keragaan Produksi dan Evaluasi Usaha Pembesaran Ikan Mas (*Cyprinus carpio*) pada Sistem Kolam Air Deras (Studi Kasus di Kecamatan Cijambe Kabupaten Subang). *Jurnal Perikanan dan Kelautan,* 7(1): 84-92

Sari., Primyostanto., Fattah. (2022). *Perencanaan dan Evaluasi Proyek Perikanan*. UB Media.

Soekartawi. (2016). *Analisis Usahatani*. Jakarta : UI – Press

Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung Alfabeta

Yanuar, V. (2017). Pengaruh Pemberian Jenis Pakan yang Berbeda Terhadap Laju Pertumbuhan Benih Ikan Nila (*Oreochromis niloticus*) dan Kualitas Air di Akuarium Pemeliharaan. *Jurnal Ziraa'ah*, 42(2): 91-99.