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Analysis of Fish Cultivation Business in Rapid Pools in Nagari Lubuk Basung, Agam District, West Sumatra Province

Analisis Usaha Budidaya Ikan pada Kolam Air Deras di Nagari Lubuk Basung Kabupaten Agam Provinsi Sumatera Barat

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Abstract

The research was carried out in 2023 at Jorong I Siguhung Nagari Lubuk Basung, Agam Regency, West Sumatra with the aim of knowing non-financial feasibility and analyzing the financial feasibility of fish farming in a fast-water pond system. The method used in this study was a survey method and the determination of respondents was carried out using purposive sampling. Commercial aspects include the procurement of seeds and feed, prices and marketing as well as the influence of the selling price of fish on fish farming in KAD. The social aspect can see the impact of social and environmental impacts on the surrounding community. The institutional aspect can be seen from the cultivator's relationship with the institutions and institutions in Nagari Lubuk Basung. The institutional aspect can be seen from the cultivator's relationship with the institutions and institutions in Nagari Lubuk Basung. The feasibility value of the goldfish and tilapia cultivation business in KAD is like the investment value of IDR 461,620,000 (goldfish farming) and IDR 289,940,000 (tilapia fish farming).The largest production was for carp ±38 tons/year from 4 ponds, for tilapia ±54 tons/year from 3 ponds. The largest amount of income is IDR 1,152,000,000 (carp) and IDR 1,188,000,000 (tilapia). NPV 10% IDR 2,996,074,627 (10 Years), BCR 1.54, IRR > 26% business can be developed from this value.

Keywords: Business feasibility, Rapid pool, Tilapia cultivation

Abstrak

Penelitian dilaksanakan tahun 2023 di Jorong I Siguhung Nagari Lubuk Basung Kabupaten Agam Sumatera Barat dengan tujuan untuk mengetahui kelayakan non finansial dan menganalisis kelayakan finansial dari usaha budidaya ikan pada sistem kolam air deras. Metode yang digunakan dalam penelitian ini adalah metode survey dan penentuan responden dilakukan menggunakan *purposive sampling*. Aspek komersial meliputi pengadaan benih dan pakan, harga dan pemasaran serta pengaruh harga jual ikan terhadap usaha budidaya ikan pada KAD. Aspek sosial dapat melihat dampak dari sosial dan lingkungan terhadap masyarakat sekitar. Aspek institusi dapat melihat hubungan pembudidaya dengan institusi dan lembaga yang ada di Nagari Lubuk Basung. Nilai kelayakan usaha budidaya ikan mas dan nila di KAD seperti nilai investasi ialah Rp 461.620.000 (budidaya ikan mas) dan Rp 289.940.000 (budidaya ikan nila). Produksi terbesar pada ikan mas ±38 ton/tahun dari 4 kolam, pada ikan nila ±54 ton/tahun dari 3 kolam. Jumlah pendapatan terbesar senilai Rp 1.152.000.000 (ikan mas) dan Rp1.188.000.000 (ikan nila). NPV 10% Rp 2.996.074.627 (10 Tahun), BCR 1.54, IRR > 26% usaha dapat dikembangkan dari nilai tersebut.

Kata kunci: Kelayakan usaha, Budidaya ikan nila, Kolam air deras

1. Introduction

Aquaculture or aquaculture is the activity of producing aquatic biota (organisms) for profit. Production from aquaculture is obtained through the maintenance of aquatic biota in controlled containers and environments. The maintenance activities include seeding and enlargement. In addition to aquaculture, in the fisheries sector, production of aquatic biota can be carried out through capture or capture fisheries. In capture fisheries, production is obtained by harvesting (hunting) aquatic biota from nature without ever raising them. Aquaculture, together with capture fisheries and fish processing, is the backbone of the fisheries sector in providing food and a source of protein for humans (Effendi & Mulyadi, 2004).

Aquaculture carried out in various ways, including the cultivation system of earthen ponds, concrete ponds, floating net baskets and swift water pools. The system that is often developed by cultivators is one of them in the fast-water pond system, the fast-water pond is a pond for fish cultivation where the water flows continuously in a certain amount. In principle, cultivating fish with heavy water ponds utilizes a relatively heavy flow of water to increase the carrying capacity of the pond to support the growth of the fish being reared. In addition to having advantages, of course this technology also has several drawbacks that limit its implementation.The drawbacks of fish farming in rapid ponds are that, as the name implies, fast-water ponds must flow like a river, the feed used by artificial feed cannot use natural feed, the high cost of investment to build a rapid pond is due to additional costs, so it is not all cultivating farmers can use the KAD method.

Areas that have the potential for the cultivation of rushing water ponds that have good prospects are one of them in Agam Regency, West Sumatra. Agam Regency is an area with great potential for fish farming, the people there cultivate various kinds of freshwater fish with a cultivation system of rapid ponds, earthen ponds and floating net cages. The potential for cultivation there is supported by quality water resources originating from Lake Maninjau which is very good as a source of water for cultivation and is supported by a cool climate, making this area considered to have the potential to be used as a center for the development of freshwater fish farming.

There are 350 plots of rushing water ponds in Nagari Lubuk Basung with an average production of 1,000 tons per year, the number of KAD system fish cultivators is 90 people (DPKP Agam, 2021). The shape and size of the fast-water pools in Nagari Lubuk Basung are generally oval or tube-shaped with a size of 5m × 12m × 1 m. Enlargement of fish in rapid ponds is believed to produce fish with a denser meat texture. This is presumably because the water flow is quite heavy and occurs continuously causing the fish to always be actively moving (Dharmawantho & Supriyanto, 2021). One of the main commodities that are cultivated by the community in fast water ponds in Nagari Lubuk Basung are carp and tilapia.

Carp (*Cyprinus carpio*) is currently the highest production freshwater fish and has been cultivated commercially in all provinces in Indonesia (Pudjirahaju et al., 2008). Carp is also a freshwater fish that has economic value, so this fish is widely cultivated. Tilapia is the same as carp, tilapia (*Oreochromis niloticus*) is also a mainstay of fishery commodities to support national food security and increase exports of fishery commodities, this is due to its nature which can be mass-produced and easy (Rahmatillah et al., 2018).

In addition to having an economic objective, the rapid 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 rapid pond fishing business requires a large amount of capital. As a commercial fishing business, rapid pond cultivators expect that the capital invested as a business investment can provide benefits in the form of profit and it is hoped that the business is feasible to continue. In order to achieve this goal, rapid pond cultivators must develop a strategy in managing the rapid pond business that is feasible to manage.

2. Material and Method

2.1. Time and Place

The research was carried out in 2023 at Jorong I Siguhung Nagari Lubuk Basung, Agam Regency, West Sumatra. The location selection was carried out purposively with the consideration that the majority of the people in Jorong I Siguhung Nagari Lubuk Basung have carp and tilapia farming businesses using a rapid pond system.

2.2. Methods

The method used in this research is a survey method. According to Effendi et al. (2015) the survey method is in reviewing, observing, collecting data, and direct information to the field and collecting data that is related to this research, as well as using a questionnaire as a guide to obtain data which is carried out by conducting interviews with respondents and local government officials 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 state of the research site and also some photographic documentation when interviewing respondents.

2.3. Procedures

2.3.1. Determination of Respondents

Respondents in this study amounted to 3 people consisting of 1 cultivator and 2 workers in a fast-water pond cultivation business in Nagari Lubuk Basung, Lubuk Basung District, Agam Regency, West Sumatra Province. This determination was made using a purposive sampling technique (intentionally). According to Hardani (2020) purposive sampling is a technique for determining research samples with specific considerations that aim to make the data obtained later be more representative. Determination of respondents was carried out with the following considerations: having more than 5 units of rapid ponds, the pond units have the requirements of a rushing pond, the cultivation business has been established for more than 10 years, has carp and tilapia commodities in KAD, the cultivation business is consistent until now.

2.4. Data Analysis

Data analysis in this research is descriptive analysis and quantitative. Descriptive analysis is an analysis that describes systematically, accurately the facts and characteristics regarding the population or activities carried out in specific fields that make the research subject based on data from variables obtained from the group of subjects studied as well as facts that occur in the field (Nazir, 2013). Descriptive analysis is used to find out the non-financial aspects of fish farming in KAD, which consist of technical aspects, institutional aspects, social aspects and commercial aspects.

2.4.1. Technical Aspect

The technical aspect is the main aspect that needs attention, because in this aspect the calculation of project inputs and outputs in the form of goods and services is carried out based on the actual production flow, so that other aspects of project analysis will only work if technical analysis can be carried out. The technical aspect is an aspect related to the project development process technically and its operation after the project has been completed. Based on this analysis, it can also be seen that the initial design of the investment cost estimate includes the cost of exploitation (Husnan & Muhammad, 2014). Technically what will be seen in the fish farming business in KAD is the location and source of water, construction of rapid ponds, types of commodities being cultivated, stocking density, feed, harvest and production.

2.4.2. Commercial Aspect

The commercial aspect of a project relates to the purchase of inputs and the sale of output. Based on the input view, the design that is suitable for fish farmers is to ensure the availability of inputs such as seeds; feed and medicines are available or arrive on time. Meanwhile, from an output point of view, market analysis for project results is very important to ensure an effective demand at a profitable price (Hendrik, 2015). Commercially, the things that will be seen from the fish farming business in KAD are whether the supply of seeds and feed is safe, where are the fish sold, what is the market price of the fish, does the selling price of the fish affect the project financially.

2.4.3. Social Aspect

According to Hendrik (2015), project analysts are also expected to examine carefully the broader social implications of the proposed investment. The social aspect that can be seen from the fish farming business in KAD is the social and environmental impact on the surrounding community.

2.4.4. Institutional Aspect

According to Hendrik (2015), project preparation and analysis relates to institutional, organizational and management aspects that affect project implementation, usually related to the proper determination of project institutions and institutions. The institutional aspect that can be seen from the fish farming business in KAD is the relationship between cultivators and institutions in the Nagari Lubuk Basung area.

2.4.5. NPV (Net Present Value)

According to Sofyan (2002), the NPV of a project is the present value of the difference between benefits and costs at a certain discount rate. By using the formula, as follows:

$$NPV = \sum_{t=1}^{n} \frac{Bt\text{-}Ct}{(1+i)^t}$$

Description:

Bt = Revenue in year t

Ct = Cost in year t

i = Discount rates (applicable interest rate)

t = year to (t=0,1,2,…n)

n = Number of years

Criteria: If NPV > 0, then the project is profitable (investment is feasible,) and if NPV ≤ 0, then the investment is not feasible.

2.4.6. Net B/C (Net Benefit Cost Ratio)

Net benefit cost ratio is the comparison between the PV that has a positive value and the PV that has a negative value. Net B/C is used to find out the net benefits that the company gets by adding everyone IDR of net expenditure (Sulistyo, 2015). With the formula:

$$BCR = \frac{\sum_{t=1}^{n} \frac{Benefit}{(1+i)^t}}{\sum_{t=1}^{n} \frac{Cost}{(1+i)^t}}$$

Description:

Bt = Benefits caused by investment in year t

Ct = Cost annual due to investment in year t

(1+i)t = Discount factor

N = Age of business (project)

Criteria: If BCR >1, the business is said to be feasible and BCR < 1 the business is said to be not feasible BCR = 1 The business only reaches the breakeven point.

2.4.7. IRR (Internal Rate of Return)

According to Sudiatmika (2015), the Internal Rate of Return (IRR) is the interest rate (discount rate) that makes the project's NPV equal to zero. The IRR value is obtained using the following formula:

$$IRR = i_1 + \frac{NPV_1}{NPV_1 - NPV_2} X (i_2 - i_1)$$

Description:

i1 = First discount rate where positive NPV is obtained

i2 = Discount rates the second where a positive NPV is obtained

NPV1 = NPV, which is still positive

NPV2 = Negative NPV

3. Result and Discussion

3.1. Stages of Project Implementation in the First Year

In the first year, the fish cultivators at KAD built goldfish and tilapia ponds with 3 ponds built consisting of 2 carp ponds and 1 tilapia pond. Each tubular pond with a pool size of 12m × 5m × 1m, the area of the irrigation channel is 120 m3. The land used for fish farming in KAD is privately owned land with an area of 600 m^3. The costs incurred by the cultivator at the beginning for the construction of 2 units of carp ponds amounted to IDR 186,140,000 and the manufacture of 1 unit of tilapia pond amounted to IDR 111,920,000 with the most significant costs incurred from making ponds, making irrigation canals, paying land taxes, purchasing iron sieves, monik, scales, wheelbarrows, hoes, confinement nets, tangguk, buckets, baskets and brushes.

3.2. Stages of Project Implementation in Years Two and Three

In the second year, the cultivator began to carry out fish farming activities at KAD. The costs incurred are fixed costs and operational costs for one year of cultivation with a carp harvest cycle for 6 months, so there are 2 harvests a year while the tilapia harvest cycle is 4 months, so there are 3 harvests a year. In the second year the fish farming business at KAD began to operate 3 ponds with initial seeds stocked of 10,000 seeds/pond, seeds stocked with a size of 10-12 cm were fed Pf 500 artificial feed for ±3 weeks as many as 8 sacks for carp and 4 sacks for tilapia measuring 10 kg, then the fish are given Comfeed feed until harvest, where for carp, 212 sacks of 50 kg of feed are needed and 92 sacks of 30 kg of tilapia are needed.

In the KAD fish farming business, there are 2 categories of workers, namely 2 daily workers who work to provide feed, help supervise ponds, and take care of ponds after harvest, harvest workers are needed 4 workers when harvesting carp and 2 workers when harvesting tilapia , harvest workers themselves function to help harvest fish at harvest time. Treatment of the pond walls is also carried out at the time of harvest where the water channels are closed so that the water in the pond is drained and cleaned of dirt or moss, then the pond is left standing with the water flowing continuously for 1-2 days before the seeds are put into the pond, this aims to The fish seeds that are spread are not susceptible to disease. The fixed costs incurred by the fish farming business in KAD in the second year are land tax payments and depreciation costs from ponds and goods purchased in the first year. In the third year, the operational costs of the fish farming business in KAD are still the same as in the second year. Meanwhile, fixed costs in the third year consist of land tax payments, depreciation costs and pool support tools such as confinement nets, baskets, buckets, and brushes.

3.3. Stages of Project Implementation in Year Four

In the fourth year of the fish farming business at KAD, there was an increase in pond buildings by four pond units, with two pond units each for the cultivation of carp and tilapia. And the addition of fish seeds to the ready pond, because of the addition of seeds the amount of feed also increases. In the fourth year, there was an addition of 4 pond units with a cost of IDR 264,880,000, where two ponds for carp cultivation cost IDR 132,440,000 and 2 ponds for tilapia cultivation cost IDR 132,440,000. With the increase in market demand and demand for fish supplies for several restaurants that are regular customers and new customers, this has made farmers increase the number of ponds and seeds that are stocked.

The operational costs of the 3 ponds also increased with the initial seeds being stocked from 10,000 seeds/pond to 12,000 seeds/pond for carp with 2 pond units and tilapia to 15,000 seeds/pond with 1 pond unit, the seeds were stocked with a size of 10-12 cm which were given Pf 500 artificial feed for ±3 weeks as much as 10 sacks for carp and 6 sacks for tilapia measuring 10 kg, then the fish were given Comfeed feed until harvest where for carp the feed needed 254 sacks measuring 50 kg and the required feed tilapia is 138 sacks measuring 30 kg. The fixed costs incurred by the fish farming business in KAD in the fourth year are paying land taxes, repairing irrigation canals, repairing 3 ponds.

3.4. Stages of Project Implementation in Years Five to Ten

In the fifth to tenth year the fish farming business at KAD has operated the 7 pond units owned by the cultivator so that operational costs from the fifth to the tenth year do not change every year. Meanwhile, fixed costs in the fifth to tenth year will continue to change according to the economic age of the fixed cost components. In the fifth year with 7 units of ponds, with the initial seeds stocked for carp as many as 12,000 seeds/pond with 4 units of ponds and tilapia with 15,000 seeds/pool with 3 units of ponds, the seeds that were stocked were 10-12 cm in size and given Pf 500 artificial feed for ±3 weeks as much as 20 sacks for carp and 18 sacks for tilapia measuring 10 kg, then the fish are given Comfeed feed until harvest, where for the feed carp needed as much as 508 sacks measuring 50 kg and tilapia feed needed as much as 414 sacks measuring 30 kg. With the addition of ponds, the number of workers in the aquaculture business also increases, there are 5 daily workers consisting of 3 workers in carp cultivation and 2 workers in tilapia cultivation and harvest workers, 8 workers are needed when harvesting carp and 6 workers at the time of harvesting tilapia.

The fixed costs incurred by the fish farming business in KAD in the fifth year are payment of land tax, renewal of supporting equipment (nets, baskets, buckets and brushes), and depreciation costs of goods purchased in the first year plus the fourth year. In the sixth year, the operational costs incurred for cultivating carp amounted to IDR 696,400,000 and IDR 544,680,000 for tilapia. The fixed costs incurred by the fish farming business in KAD in the sixth year are payment of land tax, renewal of supporting equipment from purchase in the fourth year, renewal of scales and iron filters from purchase in the first year and the depreciation expense of the items purchased in the first year plus the fourth year.

In the seventh year, operational costs incurred for cultivating carp amounted to IDR 696,400,000 and IDR 544,680,000 for tilapia. The fixed costs incurred by the fish farming business in KAD in the seventh year are payment of land tax, renewal of supporting equipment (nets, baskets, buckets and brushes) from purchases in the first year, repair of irrigation canals, repair of 7 ponds, repair of 7 pairs monik on 7 pools, and the depreciation expense of items purchased in the first year plus the fourth year. In the eighth year, operational costs incurred for cultivating carp amounted to IDR 696,400,000 and IDR 544,680,000 for tilapia. The fixed costs incurred by the fish farming business in KAD in the eighth year are payment of land tax, renewal of supporting equipment.

In the ninth year, operational costs for cultivating carp amounted to IDR 696,400,000, and tilapia amounted to IDR 544,680,000. The fixed costs incurred by the fish farming business in KAD in the ninth year are payment of land tax, renewal of supporting equipment and tangguk from purchases in the first year, renewal of 4 pairs of iron filters from 4 ponds, and the depreciation expense of items purchased in the first year plus the fourth year. In the tenth year, operational costs incurred for cultivating carp amounted to IDR 696,400,000 and IDR 544,680,000 for tilapia. The fixed costs incurred by the fish farming business in KAD in the tenth year are land tax payments, renewal of supporting equipment (nets, baskets, buckets, etc.)

3.5. Technical Aspect

Data that can be used on technical aspects include the location of ponds and water sources, construction of fast water ponds, types of commodities being cultivated, stocking density, feed, harvest and production from fish farming in KAD. The commercial aspect is about the marketing plan for the output produced at the time of cultivation as well as the plan for providing inputs needed for the continuity and implementation of carp and tilapia cultivation, such as the secure supply of seeds and feed, where to market the fish, what is the market price of the fish, does the selling price of the fish affect the project financially.

3.6. Social Aspect

The social aspect that can be seen from the fish farming business in KAD is the social and environmental impact on the surrounding community. The social aspect in the fish farming business in KAD for the community

is the opening of jobs for the surrounding community and reducing unemployment and being able to take advantage of the flow of the Antokan river water appropriately and usefully. In Nagari Lubuk Basung, with the cultivation of rapid ponds, the community is productive in the fish farming business and can make it one of those who distribute fish in the West Sumatra region or its surroundings. The social aspect is the result of human activity with the natural surroundings. The main goal of every business is to make big profits, but these entrepreneurs cannot stand alone, entrepreneurs also live together with other components which are called social institutions (Eniarti, 2022).

3.7. Institutional Aspect

The institutional aspect that can be seen from the fish farming business in KAD is the relationship between cultivators and institutions in the Nagari Lubuk Basung area. The aspect of fisheries institutions in the aquaculture pond business is that farmers who have long studied fish farming in the KAD system assist the Lubuk Basung Fisheries Service in directing the community to carry out fish farming in the KAD system. This briefing aims to make cultivators know about what aspects must be considered by training cultivators. This training aims to make cultivators have sufficient knowledge and add insight for the community to carry out fish farming in the KAD system, in addition to carrying out the task direction of fisheries institutions must also monitor cultivators. Based on the institutional aspect, Fish farming in KAD can be said to be feasible because there are institutions that can help the community in mentoring the community so they can open their own jobs. This is supported by the expert opinion of Anantanyu (2009) stating that the level of extension support has an influence on increasing farmer participation in farmer groups and boost the institutional capacity of farmer groups. Such support certainly requires adequate extension competence and a participatory extension approach.

3.8. Fish Cultivation Business Investment in KAD

The initial capital required for the carp farming business in the first year is IDR 186,140,000. In the second year, the capital issued is IDR 143,040,000 in one production of carp cultivation, and the addition of 2 pond units in the fourth year is IDR 132,440,000, The most significant cost in making pools and buying goods is the making of fast water pools which consist of (digging pools, installing stones, casting the bottom of the pool, plastering pools and workers' wages) making irrigation canals, buying iron and monik filters. At the same time, the most negligible costs are supporting equipment such as confinement nets, scales, hoes, rakes, wheelbarrows, buckets, baskets, land tax, brushes. The biggest costs in operating carp farming in the first harvest are the purchase of Comfeed feed, the wages of daily workers, the purchase of fish seeds, the Pf 500 feed, the payment of electricity, the maintenance of pond walls, and the wages of harvest workers.

3.9. Cash Flow Fish Cultivation Business in Rapid Ponds

Cash flow or cash flow is a report that explains the cash flowreceived and paid by the business during a specific period. According to Harjito & Martono (2012), cash inflow and cash outflow are cash inflows which are cash requirements for payments. In the Inflow of carp and tilapia farming business in KAD in the first year there is no cash income, in the 2nd and 3rd year the cash income is IDR 480,000,000 (carp cultivation) and IDR 132,000,000 (tilapia cultivation), the 4th year cash income valued at IDR 576,000,000 (carp cultivation) and IDR 396,000,000 (tilapia cultivation), year 5-10 cash income of IDR 1,152,000,000 (carp cultivation) and IDR 1,188,000,000 (tilapia cultivation). The output of the carp and tilapia farming business in KAD in years 1-10 experienced a change in the amount of cash outlay, the most significant expenditure was in years 7 and 10 worth IDR 767,333,333 (carp cultivation) and IDR 603,995,000 (tilapia fish cultivation), this is caused by the fixed costs at the outflow which differ each year following the economic life of the fixed cost components. net benefit is benefit minus cost. The highest net benefit value for carp cultivation in the KAD in years 5 and 8 is ID 412,066,667and the highest net benefit value for tilapia cultivation in KAD in the 5th year is IDR 607,925,000. cummulative cashflow is the amount of cash flow in the previous year which shows how much debt or cash is available in the following year. The cummulative cashflow value of carp farming with the KAD system in years 1 and 2 still has debt, in the 3rd - 10th year the cash flow continues to increase and the cummulative cashflow value of tilapia farming business with the KAD system in years 1-4 is still have debt, in the 5th - 10th year the cash you have continues to increase.

3.10. Inflow

Receipt or income in the cultivation of carp and tilapia represents costs received by cultivators from the production of carp and tilapia. Sales revenue is obtained from the total sales of production. Fish farming business income in KAD in years 2-3 is IDR 8,448,000,000 (carp cultivation) and IDR 7,788,000,000 (tilapia fish cultivation). The harvest cycle for carp is two times/year and for tilapia is three times/year. Every year, with a percentage of fish life of 80%, the total production of carp in years 2 and 3 is 16,000 kg and tilapia is 6,000 kg, year four is carp production of 19,200 kg and tilapia is 18,000 kg, years 5-10 yield carp production of 38,400 kg and tilapia 54,000 kg. Production in years 2-4 was obtained from two carp ponds and one tilapia pond, 5-10 years from four carp ponds and three tilapia ponds. The harvest cycle for carp is two times/year, and for tilapia, it

is 3 times/year. Fish production continues to increase. On research Jayalaksana et al. (2016) stated that five units of carp ponds produced 39,804 kg, and in Ratnawati's (2010), the production of red tilapia in one harvest was 3,880.33 kg and in one year, 11,640.99 kg with a pond area of 257 m^2.

3.11. Outflow

All costs used in fish farming in heavy water ponds are divided into three, namely investment, fixed, and operational costs. The total investment cost incurred by KAD cultivators is IDR 461,620,000 (carp cultivation) and IDR 289,940,000 (tilapia fish cultivation). Fixed costs that must be incurred by farmers from years 2-10 are IDR 426,310,000 (carp cultivation) and IDR 343,065,000, while operational costs incurred by farmers from years 2-10 are IDR 4,944,920,000 (carp cultivation) and IDR 3,687,140,000 (tilapia fish cultivation). Fixed costs in the fish farming business in fast water ponds are the costs incurred to run the business. Fixed cost components consist of land tax, pond support equipment, irrigation canal repairs, pond repairs, monik repairs, tangguk, scales, iron filters, pool infrastructure, and depreciation of goods. More details can be seen in Appendices 7 and 8. Operational costs in fish farming business in fast water ponds are costs that are used/exppensated while the fish farming business is running. The operational cost component consists of carp and tilapia seeds, feed, electricity, worker wages, pond wall maintenance.

3.12. Net Present Value (NPV)

NPV is the net profit of a business derived from gross income minus total costs. For more details, see the NPV of carp and tilapia cultivation. Feasibility of fish farming in KAD from carp cultivation with Net calculation criteria net present value is obtained from the present value, which is the value of the entry fee minus the value of the exit fee, then multiplied by the interest rate used, which is 10%. The NPV value is the sum of the present value values from the first year to the tenth year, so the NPV value is IDR 1,329,463,697. From the results of the NPV>0 analysis which states that the carp cultivation business in KAD is profitable. According to Basharahil (2015) in his research that the analysis of the NPV value in carp farming in fast-water ponds in the Balai Gadang Village was positive (NPV> 0), indicating an advantage in the business of cultivating fish in rapid ponds, for ten years with the calculation of present value and interest rates interest of 10%. The NPV value of IDR 836,783,477 means that the investment plan is feasible to continue.

The feasibility of fish farming business in KAD from tilapia fish cultivation with calculation criteria net present value is obtained from the present value, which is the value of the entry fee minus the exit fee, then multiplied by the interest rate used, which is 10%. The NPV value is the sum of the present value values from the first year to the tenth year, so the NPV value is IDR 1,666,610,931. From the analysis NPV>0, which states that the tilapia aquaculture business on KAD is profitable. This is following previous research by Ash-shufi & Anik (2019), the results of calculating the NPV in the tilapia aquaculture business of the Tunas Mekar Jaya group yielded an NPV of Rp. 33,310,800, this value is more than zero, so the cultivation business of the Tunas Mekar Jaya group can be said to be feasible and profitable. Business feasibility with net calculation criteria: NPV is obtained from the present value, which is the value of the entry fee minus the value of the exit fee, then multiplied by the interest rate used, which is 10%. The NPV value is the sum of the Present Value values from the first year to the tenth year, so the NPV value is IDR 2,996,074,627. From the results of the NPV analysis> 0 which states that the fish farming business in KAD is profitable. According to Hendrik (2015), in evaluating a particular project, the NPV value is equal to or greater than zero, meaning that the project can be implemented because it is profitable.

3.13. Net Benefit Cost Ratio (Net B/C)

Net B/C used to determine the net benefits obtained by the company. The criteria for calculating Net B/C in KAD fish farming from carp cultivation with a discount rate of 10%, Net B/C =4,577,597,381/3,248,133,685= 1.41. A Net B/C value of more than one means that the carp farming business in KAD is being run efficiently. The Net B/C value of 1.14 means that every Rp. 1.00 spent during the fish farming process at KAD provides revenue of 1.41 times the costs incurred. Following previous research by Basharahil (2015) in his research that the Net B/C Ratio is worth 1.18, having > 1, meaning that the cash in flows is greater than the cash-out flows or the total revenue is greater than the total cost or in words otherwise every one rupiah of spending on cash costs will give 1.18 receipts. Based on this, fish farming in KAD is feasible and profitable with a Net B/C value of > 1.

For the criteria for calculating Net B/C in KAD fish farming from tilapia fish farming with a discount rate of 10%, Net B/C =4,012,683,362/2,346,072,432 = 1.71. A Net B/C value of more than one means that the tilapia aquaculture business in KAD is being run efficiently. The Net B/C value of 1.71 means that every IDR 1.00 spent during the fish farming process at KAD provides revenue of 1.71 times the costs incurred. For carp and tilapia farming in the Nagari Lubuk Basung heavy water pond with a discount rate of 10%, a benefit value of Rp.8,590,280,744and a cost of IDR 5,594,206,116, then Net B/C =8,590,280,744/5,594,206,116 = 1.54. A Net B/C value of more than one means that the fish farming business in KAD is being run efficiently. The Net B/C value of 1.54 means that every IDR 1.00 spent during the fish farming process at KAD provides revenue of 1.54

times the costs incurred. It can be seen that the Net B/C of carp cultivation and the Net B/C of tilapia cultivation are greater than that of carp cultivation, namely 1.71> 1.41.

3.14. Internal Rate of Return (IRR)

IRR is the interest rate (Discount rate) of a business; the IRR of carp and tilapia farming in KAD in Nagari Lubuk Basung is said to be feasible and profitable, whereas the IRR of fish farming in KAD is 26%, the IRR of carp cultivation in KAD is 27%, and the cultivation of tilapia in KAD is 26%. According to Hendrik (2015), an IRR value that is greater than or equal to the discount rate indicates that the project is feasible to continue. This means that the cultivation of carp and tilapia that is cultivated is feasible and profitable to run, because the IRR value obtained is greater than the prevailing interest rate (IRR> 10%). According to Kalidah et al. (2010), in an investment analysis study of an intensive carp rearing business in Southeast Aceh District, an IRR value of 62% was obtained. Thus the business in heavy water ponds shows that this investment is feasible because the IRR value is > 18%. According to Ash-shuf & Anik (2019), in their research, the results of data analysis on tilapia cultivation in the Tunas Mekar Jaya group obtained an IRR of 33.31%; this shows that the tilapia aquaculture business in the Tunas Mekar Jaya group is said to be feasible and profitable because the IRR value >12%.

4. Conclusions

The feasibility value of the carp and tilapia cultivation business in (KAD) is like the investment value of the fish farming business in KAD, which is IDR 461,620,000 (carp fish cultivation) and IDR 289,940,000 (tilapia fish cultivation) with the most significant production of carp ± 38 tons/year from 4 ponds and tilapia ± 54 tons/year from 3 ponds, while the most significant amount of income was IDR 1,152,000,000 from carp and IDR 1,188,000,000 from tilapia. The NPV of 10% is IDR 2,996,074,627 in ten years of business, the BCR is 1.54, IRR > 26%. All of these values meet the business feasibility criteria to be developed.

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