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Business feasibility assessment of floating cage system of trevallies in Inner Ambon Bay

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Abstract. Study on the feasibility of a floating cage cultivation business of Trevally in Inner Ambon Bay (IAB) waters was done to analyse the production factors of floating cage system and to analyse the feasibility business of floating cage system in IAB. This research was conducted in IAB considering most of floating cage distribution are located in the area. Data collection was carried out on floating cage cultivation business units in IAB waters, which consisted of 10 cultivation units according to the management group. Result of this research showed that the factors of production in the Trevallies aquaculture business unit in IAB are supply of feed that cover mostly operational cost and unavailability of feed suppliers, supply of fish seeds from Marine Cultivation and Seed Center Waiheru Ambon and the availability of labour ranging from 2-5 people per business unit. The cultivation of Trevallies in IAB using the floating cage method is very feasible and profitable to run.

1. Introduction

Inner Ambon Bay (IAB) waters have ecological, economic and socio-cultural functions for the community. Starting from its functional existence, the IAB waters have been utilized by the community with various interests. Among other things, as an area for capture fisheries and cultivation, sea transportation routes, conservation areas and places for recreation and sports [1, 2]. In the field of aquaculture, IAB is used as a location for groupers and rabbit fish culture using a floating cage system and the potential of aquaculture in IAB is very promising [3].

Based on the conditions described above, the development of the aquaculture is a strategic step to increase fishery productivity in Ambon City by utilizing IAB marine environmental services as a cultivation medium (mariculture). Development efforts can be made based on scientific studies that can provide information as a basis for management, one of which is information about the feasibility of cultivation in IAB. Information regarding the feasibility level of cultivation, especially floating cages in IAB, which has been carried out for a long time, can be an indicator of the capacity of the land to support the development of cultivation businesses. Referring to the existing conditions, scientific studies on the feasibility of floating cage cultivation have the following urgencies.

First, the productivity of marine culture, especially the type of fish resources for floating cage cultivation commodities in Ambon City, shows an increasing trend in the period 2012 - 2016 (Figure 1). The production of grouper, snapper, rabbitfish, pompano and other fish cultivation has increased annually from a total production of 4.92 tons in 2012 to 61.13 tons in 2016 [4]. This condition gives an indication of the prospect of developing floating cage cultivation in IAB waters.



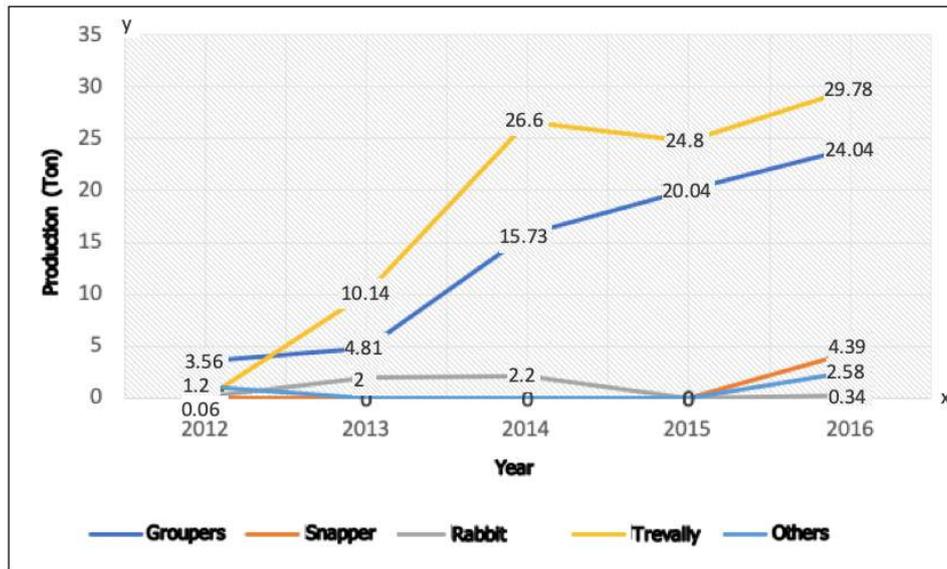


Figure 1. Aquaculture production of several fisheries commodities in Ambon during 2012-2016 period (Source: [4])

Second, the analysis of the feasibility of floating cage cultivation in IAB has not been carried out specifically for trevally fish which has significantly increased its production compared to other fish. The condition of the unavailability of information about the feasibility of the floating cage cultivation business in IAB, together with the opening of area for the development of aquaculture provides justification that a scientific study of the feasibility of cultivation in these waters needs to be carried out. This is as done by [5] regarding the feasibility of shrimp and milkfish cultivation in Pasekan Subdistrict, Indramayu Regency, and [6] regarding the feasibility of cultivating tilapia in Paslaten Village, Remboken District, Minahasa Regency, which provides information that the cultivation business in the two locations is feasible to run.

Third, many changes have occurred in Ambon City. That changes such as the presence of seed providers or suppliers, the increasing demand for cultivated trevally fish due to the increasing number of food stalls present in Ambon, and the condition of IAB itself which continues to receive input and pressure from activities on land and sea. In future, this will certainly have an impact on the carrying capacity for the development of marine cultivation activities in IAB, especially the cultivation of floating cages.

Through the aforementioned considerations, it is necessary to carry out a study on the feasibility of a floating cage cultivation business in IAB waters. The information obtained from the feasibility analysis will be an input to formulate alternative strategies for the management of floating cage aquaculture in the waters of Ambon Bay, which will also serve as recommendations for improving its management at the policy-making level.

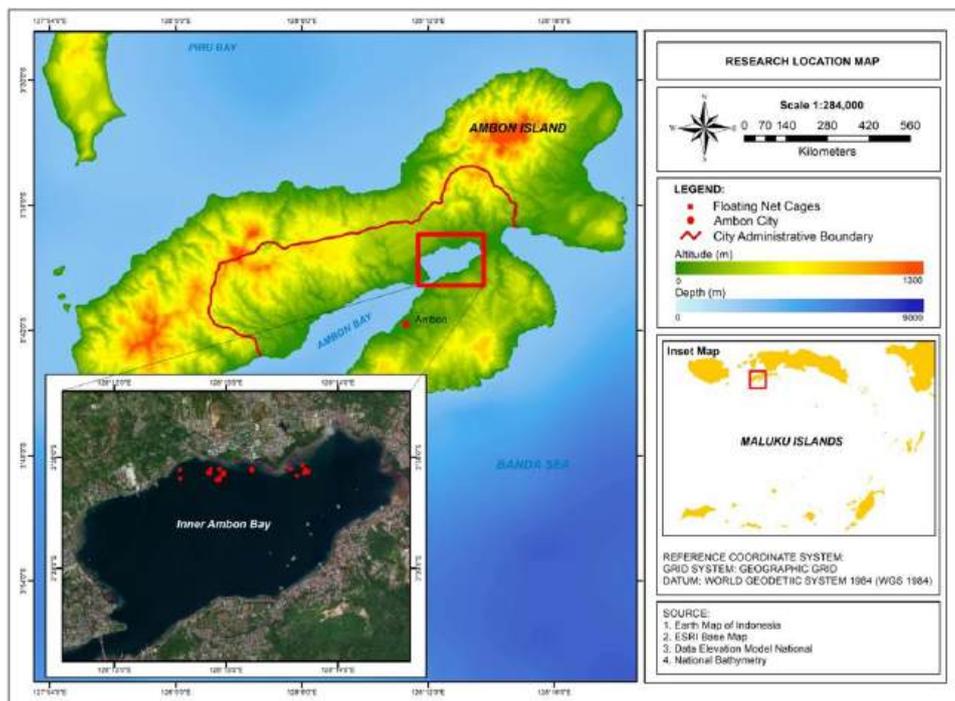
The objectives of this study which are follows: 1) analysing the production factors of floating cage system in IAB, and; 2) analyse the feasibility business of floating cage system in IAB. The benefits of this study such: 1) providing information on the feasibility of floating cage system to the business actors, and; 2) the information provided can be a reference for further research.

2. Materials and Method

This research was conducted in IAB considering most of floating cage distribution are located in the area (Figure 2). Data collection was carried out on floating cage cultivation business units in IAB waters, which consisted of 10 cultivation units according to the management group (Table 1).

Table 1. Distribution of floating cage aquaculture business groups in IAB

No.	Floating cage aquaculture business groups	Village
1	Besarkan Kami	Waiheru
2	Waiheru Sehati	Waiheru
3	Teri	Waiheru
4	Kerapu Waiheru	Waiheru
5	Harapan	Waiheru
6	Kerapu Baru	Waiheru
7	Mekar	Waiheru
8	Garopa	Waiheru
9	Sentosa	Waiheru
10	Anemon	Waiheru

**Figure 2.** Research Location Map

2.1. Data collecting method

The research was conducted using data collection techniques tailored to the data needs to answer the objectives. The data collection techniques used according to the research objectives is presented in Table 2 below.

Table 2. Data collecting method

Research goals	Data needs	Types of data		Data collecting method
		Primary	Secondary	
(1) Analyse production factors of floating cage cultivation	<ul style="list-style-type: none"> • Fish feed requirement per business unit; • Fish seed requirement per business unit; • Number of ponds/compartments of cages per business unit; • Number of workers per business unit 	V		<ul style="list-style-type: none"> • Observation • Questionnaire
(2) Analyse feasibility business of floating cage cultivation;	<ul style="list-style-type: none"> • Total sales of fish production per business unit • Operational cost in one production per business unit 	V		<ul style="list-style-type: none"> • Observation

2.2. Data analysis method

Data analysis is the process of systematically searching and compiling data obtained from interviews, field notes, and other materials, so that they can be easily understood, and the findings can be shared with others [7]. Data analysis was also carried out according to each stage to answer the research objectives. The analysis technique for each goal depends on the objectives to be answered in this study, as can be seen in Table 3 below.

Table 3. Data analysis method

Research goals	Data needs	Data analysis	Output
(1) Analyse production factors of floating cage cultivation	<ul style="list-style-type: none"> • Fish feed requirement per business unit; • Fish seed requirement per business unit; • Number of ponds/compartments of cages per business unit; • Number of workers per business unit 	<ul style="list-style-type: none"> • Descriptive statistical analysis 	<ul style="list-style-type: none"> • Descriptiveness impact of production factors on cultivation business
(2) Analyse feasibility business of floating cage cultivation;	<ul style="list-style-type: none"> • Total sales of fish production per business unit • Operational cost in one production per business unit 	<ul style="list-style-type: none"> • Total revenue analysis • Total cost analysis • Net income analysis • Feasibility business of floating cage cultivation analysis 	<ul style="list-style-type: none"> • Feasibility business of floating cage cultivation

2.2.1. Descriptive statistical analysis. Descriptive statistical analysis is an analytical technique used to describe conditions/facts descriptively in order to obtain a general conclusion. [8] states that descriptive statistical analysis accumulates data descriptively without describing relationships, testing hypotheses, and even drawing conclusions. The descriptive method aims to describe and interpret data relating to situations that occur systematically, factually and accurately regarding facts and relationships between variables to obtain the truth [9].

This study used descriptive statistical analysis to describe the production factors of floating cage cultivation. Data descriptions were carried out quantitatively and displayed in tables and graphs according to the needs of the analysis. The analysis was carried out with the help of Microsoft Excel.

2.2.2. Total revenue analysis. Total Revenue Analysis is an analytical method to calculate the total value obtained by a cultivation business actor in one production cycle. The calculation of the total revenue value according the formula [10]:

$$TR = p.h$$

where:

TR = total revenue (IDR)
 p = price of fish (IDR/kgs)
 h = biomass of fish (kgs)

2.2.3. Total cost analysis. Total cost analysis is intended to calculate the total costs incurred by the cultivation business actor in the production process. Production costs include all operational costs for fish farming activities from the hatchery to harvesting which are calculated as a production process. The calculation formula is referenced from [10] with units of measurement adapted to aquaculture, namely as follows:

$$TC = c.E$$

where:

TC = Total costs (IDR)
 c = Cost in one production cycle (IDR)
 E = Production cycle

2.2.4. Net income analysis. Analysis of net income is intended to calculate net income from cultivation received outside of production/operational costs. This method uses the calculation of the difference between revenue and total costs in units of rupiah (IDR). The formula for calculating net income as referred to [10] are as follows:

$$P = TR - TC$$

where:

P = net income (IDR)
 TR = total income (IDR)
 TC = Production costs (IDR)

2.2.5. Feasibility business of floating cage cultivation analysis. Business feasibility analysis is a method used to determine the ratio between total income and total costs as an instrument for assessing the feasibility of cultivation. The analysis technique uses the Revenue Cost Ratio (R/C) [11] with the following formula:

$$RCR = \frac{TR}{TC}$$

where:

RCR = Revenue Cost Ratio

TR = total revenue (IDR)

TC = total costs (IDR)

The feasibility of cultivation can be identified through the RCR assessment criteria as follows:

- If $RCR > 1$, then the cultivation business is profitable and feasible to continue;
- If $RCR < 1$, then the cultivation business suffers a loss and it is not feasible to continue; and
- If $RCR = 1$, then the business breaks even

Analysis of the feasibility of floating cage cultivation was continued by using the Payback Periods (PP) method. This calculation technique refers to the period of return on investment that will be paid through the profits earned by a business, meaning that the faster the payback period, the better the business will be to continue. Payback Periods calculation according to [12] was carried out with the following formula:

$$PP = \frac{I}{Bt}$$

where:

PP = Payback Periods

I = Total investment (IDR)

Bt = Average net benefit each year (IDR).

3. Result and Discussion

3.1. General description of the research location

Ambon Bay is a semi-closed bay ecosystem and tends to have limited physical characteristics, for example, the current speed is relatively slow, protected from waves, so the water circulation is limited. The dominant current in Ambon Bay is recorded to have tidal current with a speed of $<0,5$ m/s throughout the season. This shows that Ambon Bay during the season has a weak current speed except at the Seilale location (Outer Ambon Bay) continues to the outside, which sometimes has a current speed >0.5 m/s due to influence of the southwest wind that blows strong with speed >18 knots in a long time [13].

In the sea waters of Ambon City itself, there are two ecological areas that have strategic value or potential for the development of aquaculture activities. The ecological area referred to IAB and Baguala Bay. In General, existing aquaculture activities are carried out in Ambon City waters, concentrated in the IAB area [14]. This is supported by the availability and suitability of physical, chemical and biological factors in the area to support the sustainability of these aquaculture activities. Apart from that, internal factors that play a big role are the physical condition of IAB and Baguala Bay which are relatively protected which allows these activity to continue even during the bumpy season. In IAB itself, the aquaculture method developed is the method of fish cultivation using floating cages with the aim of cultivating commodities, namely groupers, trevallies, rabbit fishes and white snappers.

However, slightly different conditions were found in the waters of Baguala Bay where the periodization of aquaculture activities was relatively limited when compared to IAB. This is due to the influence of the season which has an impact on fairly bumpy waters which last for eight to nine months. This has an impact on the effectiveness of cultivation activities in this area which is only about three to four months [14]. In this area, a seaweed cultivation method was developed using the longline technique. This condition shows that actually the potential water area or land for the development of aquaculture activities in Ambon City is very limited. For this reason, the development of an intensification program for aquaculture is important and absolutely necessary in this region.

3.2. Production factors of trevallies cultivation in IAB

Production is any process that creates value or enlarges the value of an item or it can easily be said that every effort creates or increases the usability of goods. To be able to produce, people need human labor, natural resources, capital and all its forms as well as skills. All elements that support value creation efforts or efforts to increase the value of goods are referred as production factors. Production factors are the resources used in a process of producing goods and services.

3.2.1. *Feed.* Young individuals and adults of Trevallies are included in the carnivorous fish group. They include nocturnal animals, which are active including foraging at night [15]. Carnivorous fish groups tend to have relatively short intestines. The time for digestion of food is faster than herbivorous fish. This means that the eating habits of the Trevallies group re full quickly and also quickly experience hunger. This eating habit makes it easier for farmers to keep these fish. The type of feed given can be anything that have meat texture. On the other hand, eating habits that are fast hungry is the main problem for this fish enlargement. The supply of fresh feed, both in quality and quantity, will not be fulfilled when its availability is limited or not available. If it is forced, it will be faced with the problem of increasing feed costs. The availability of adequate, timely and nutritious feed is one of the most important factors in aquaculture business activities. Provision of feed that is not in accordance with the number of fish being kept causes the fish growth rate to slow down. As a result, production is not as expected.

Table 4. Ammount and cost of feed for the Trevallies in floating cage system business unit in Ambon City 2019

No.	Manager	Amount of Feed (Pan)	Feed Costs (IDR)
1.	Lukman Kaimudin	1,080	32,400,000
2.	Mansir	720	21,600,000
3.	Jafrudin	720	21,600,000
4.	Asmad Rahim	720	21,600,000
5.	Ariyanto	800	24,000,000
6.	La Musu	1,800	54,000,000
7.	La Olo	800	24,000,000
8.	Jaharudin	720	21,600,000
9.	La Edi Tomia	800	24,000,000
10.	Rahman	720	21,600,000

Note: 1 pan = 30 kgs. Cost per pan = IDR30,000

The feed given is trash fish (*rucah*). From the data above, it can be seen that the amount of feed per year provided by each unit of Trevallies cultivation in IAB ranges from 720-1,800 pans per year or if converted to IDR, the income is between IDR 21,600,000 to 54,000,000. One of respondent, La Musu, is the respondent with the largest expenditure for feed costs, namely IDR 54,000,000 in 2019. This condition is in line with the number of farmed fish and the volume of the cultivation pond that he manages. In intensive cultivation, the role of feed is very important because most of the operational costs are used for the purchase of feed. The management of feeding in the floating cage system is basically carried out to grow fish using the lowest cost of fish feed through the selection of quality feed, determining the adequate amount and the proper feeding method. Feeding is also carried out continuously, every day and twice a day. Feed is given every day at 10:00 AM and 3:00 PM local time. The amount of feed given will usually be adjusted every week with the weight of feed given about 5% of the weight of all fish in each pond. [16] reported the result of a study on the consumption and efficiency of trash meet feed for giant trevally fish with different treatments. Fish that are fed consistently every day will have a better growth in size and weight than fish with fasting time in feeding. However, if viewed in terms of feed efficiency, the results of this study found that the highest efficiency was found in the fish group that was fasted for one day, then followed by the fish group that was fasted

for two to three days, then the fish group that not fasted and the last one was the fish group that are fasted for more than three days. This reference will certainly be useful in making management decisions for the cultivation of trevally fish in the future with a number of possible scenarios that can be applied based on maximizing production or efficiency of feed expenditure.

Another problem related to Trevallies in Ambon City is the unavailability of natural feed suppliers. This causes cultivators to be creative in providing natural feed supplies for cultivation needs. Trash fish feed will experience problems when the price of fish in the market is high. This condition often impacts on the improper feeding of the cultivated organisms. Providing insufficient feed in quality and quantity will result in slow growth and lead to long maintenance times and increased operating costs.

3.2.2. Fish seed. Fish seed is one of the important factors in producing quality adult individuals. In order to facilitate the rearing of Trevallies in floating cage, usually the fish seeds to be kept are sourced from the hatchery. This is so that the seeds being maintained are of a uniform size, not defective and in large quantities.

The price of seed also contributes significantly to the expenditure of Trevallies in IAB cultivation business unit, after the price of fish feed. The range of costs incurred for seed procurement is from IDR 11,000,000 to IDR 44,000,000 in 2019 (Table 5). One of respondent Mr. La Musu is still the cultivator with the largest expenditure on seeds. In Ambon City, the production of seawater fish seeds, including Trevallies seeds is produced by the Marine Cultivation and Seed Center Waiheru Ambon. Overall, the respondents admitted that none of their seeds were obtained from nature but were supplied from this office.

Table 5. Amount and cost of seeds for the Trevallies in floating cage system business unit in Ambon City 2019

No.	Manager	Seeds were Sown (per head)	Seed Cost (IDR)
1.	Lukman Kaimudin	6,000	16,500,000
2.	Mansir	5,000	13,750,000
3.	Jafrudin	4,000	11,000,000
4.	Asmad Rahim	4,000	11,000,000
5.	Ariyanto	5,000	13,750,000
6.	La Musu	16,000	44,000,000
7.	La Olo	5,000	13,750,000
8.	Jaharudin	4,000	11,000,000
9.	La Edi Tomia	6,000	16,500,000
10.	Rahman	4,000	11,000,000

Note: Seed taken from Marine Cultivation and Seed Center Waiheru Ambon. Cost per cm = IDR 550. Seed sized that used are 5xIDR 550=IDR 2,750

Data for 2018, at Marine Cultivation and Seed Center Waiheru Ambon, the stock of active Trevallies was recorded at 73-100 prospective trevallies stock. The brood stock has an average weight of 7-12 Kgs which takes 3-4 years to get an active brood stock. In the future, the main stock will continue to be added according to the need for seed supply which is sure to increase every year. Currently, the ability of Marine Cultivation and Seed Center Waiheru Ambon to produce giant trevally fish seeds has doubled compared to previous years. If previously they were able to produce 500,000 Trevallies, now they are able to produce as many as 1,000,000 Trevallies per year [17]. From the size of the seeds obtained from Marine Cultivation and Seed Center Waiheru Ambon to reaching the size ready for harvest, the survival rate (SR) value is high, reaching up to 90%.

3.2.3. Supporting Infrastructure. The supporting infrastructure referred to here is the presence of the Ambon Marine Cultivation Fisheries Center, which is one of the Central Technical Implementing Units of the Directorate General of Aquaculture, the Ministry of Marine Affairs and Fisheries which is stipulated by the Regulation Ministerial Regulation Number 10 on January 12, 2006 about the work area of Marine Cultivation and Seed Center Waiheru Ambon covers Sulawesi, Maluku, North Maluku, Papua and West Papua. Its role is quite large in supplying Trevallies seeds and developing fish farming technology.

3.2.4. Labor availability. The availability of labor in aquaculture is one of the important factors that need to be taken into account in the production process. The workforce must have advanced thinking qualities in order to be able to adopt new innovations, especially in using technology to develop a business [18]. The number of workers in the floating cage business unit for the Trevallies commodity in Ambon City ranges from two to five people. For more details, see Table 6.

Table 6. Number of workers employed by the Trevallies in floating cage system business unit in Ambon City 2019

No.	Manager	Total Manpower (person)	Pool Area (m ²)	Production (Kgs)
1.	Lukman Kaimudin	5	54	2,060
2.	Mansir	4	36	1,830
3.	Jafrudin	2	36	1,505
4.	Asmad Rahim	4	36	1,500
5.	Ariyanto	4	36	1,750
6.	La Musu	2	144	5,200
7.	La Olo	4	36	1,600
8.	Jaharudin	2	36	1,350
9.	La Edi Tomia	3	54	2,000
10.	Rahman	4	36	1,300

Lukman Kaimudin employed the highest number of workers, who employed five people in 2019. Meanwhile, floating cage with the least number of workers was managed by Jafrudin, La Musu and Jaharudin who each employed only two workers in the year 2019. When compared with the pond area and production value in the same year, it can be seen from the data that the number of workers is not always in sync with the floating cage pond area and its production value. For the La Musu, for example, even though it has the least number of workers, the pond area and the production it produces are the largest among cultivators. The area of the pond reaches 144 m² while the production reaches 5,200 kgs. Meanwhile, for the Lukman Kaimudin with the largest number of workers (five people), the pool area and production value were among the largest after La Musu. A different case was found in the respondent Rahman, whose production value was the smallest, namely 36 m². However, this respondent employs a fairly large workforce of around four people.

Meanwhile, for Jaharudian and Jafrudin, with the same pool area but a smaller number of workers employed (only two people), the production value in 2019 was actually higher, namely 1,350 kgs and 1,505 kgs, respectively. This shows that the efficiency of production factors is important to be taken into account in reducing expenditure costs and increasing aquaculture income. [18] reported the results of research on the cultivation of pompano (*Caranx sp.*) in floating cages in Banu-banua Jaya Village which found that the number of workers employed was less efficient so it needed to be reduced.

3.3. Financial aspect of trevallies cultivation in IAB

The financial aspect is the aspect used to assess the finances of a business as a whole and is one of the most important aspects to assess the feasibility of a business. Aquaculture business is faced with costs which, if not managed properly, tend to suffer losses rather than profits. The costs of cultivating trevally fish in IAB consist of initial investment costs, fixed costs and variable costs.

3.3.1. Initial investment. Investment or business capital in an economic sense is goods or money that are used together with land and labour production factors to produce new goods. The business capital can be in the form of fixed capital and working capital that has a long turnaround process, its structure is relatively permanent and the amount is relatively difficult to change [19].

The results showed that the average initial investment or capital for cultivation of trevally fish was IDR 20,832,500 with an average depreciation cost of 10%, which is IDR 32,832,500. The average variable cost for one harvest cycle is IDR 25,857,500, while the average fixed costs for labour, maintenance and depreciation costs are IDR 26,383,250. The total requirement for the average operating cost is IDR 25,857,500.

3.3.2. Production cost. Cost is a risk that must be borne by cultivators in conducting their cultivation business. Business scale, both large and small businesses still require costs in order to produce products in the form of goods or services. The components of costs incurred in the operation of the trevally aquaculture business unit in IAB consist of fixed costs and variable costs. The fixed cost component consists of labour wages and maintenance costs. The average number of workers employed by the Trevallies cultivation business unit in IAB is four people per business unit. With an average monthly wage of IDR 1,000,000 per person, in one harvest period (six months), the average amount of wages for workers is IDR 24,000,000.

Meanwhile, the next fixed cost component is maintenance of cultivation facilities and infrastructure with an average allocation of IDR 300,000 per harvest period. The variable cost component consists of the cost of fish seeds, the cost of fish feed, the cost of fuel, the cost of medicines and other costs. For the needs of fish seeds, in each maintenance period, an average of one unit spreads 2,950 fish seeds measuring 5 cm at a price of IDR 2,750 per cm. This means that in one maintenance period, the average cost spent for fish seeds is IDR 8,112,500. For fish feed needs, the average cost incurred is IDR 13,320,000 for the needs of 444 fish feed parts (assuming 1 trash fish pan = 30kgs).

On the other hand, the average cost spent for fuel consumption during one harvest period, the results of the interview revealed that it was IDR 425,000. Apart from that, the cultivators also entered expenditure items for the cost of medicines and others with an average amount of IDR 2,000,000 for each post. Overall, the average variable costs incurred per one harvest period reached IDR 25,857,500.

3.3.3. Cash receipt and net income. Net income is obtained from the total cash receipts less cash disbursements or expenses incurred during the production process. Cash receipts are obtained from the selling price multiplied by the amount of production. The selling price of the trevally fish during the study was generally the same, which is IDR 65,000/kg. In general, the average sales of trevally fish in one harvest period is 1,004 kgs. Thus the average amount of cash receipts reached IDR 65,308,750 per one harvest period. For more details, see Table 7.

Table 7. Average cash receipts from the floating cage business unit for Trevallies in Ambon City in 1 harvest period

No.	Reception component	Unit	Average total unit	Price (Rp/Unit)	Average amount of cash receipts
1.	Value of Trevallies production	Kgs	1,004.8	65,000	65,308,750

Meanwhile, to calculate the net income, you must also look at the value of cash flow which consists of cash inflow and cash out flow. Cash receipts consist of the production value per unit. The production value of trevally fish is obtained from the sale of fish cultivators at the cultivator price level. Cash outflows include investment costs, fixed costs and variable costs. For more details, see Table 8.

Table 8. Value of cash flow business unit for Trevallies in Ambon in 1 harvest period

No.	Description	Initiated year (IDR)	First year (IDR)		Second year (IDR)		Third year (IDR)	
			1 st Period	2 nd Period	1 st Period	2 nd Period	1 st Period	2 nd Period
1.	Revenue Trevallies production value	0	65,308,750	65,308,750	65,308,750	65,308,750	65,308,750	65,308,750
	Revenue total	0	65,308,750	65,308,750	65,308,750	65,308,750	65,308,750	65,308,750
2.	Expenditure							
	a. Investment costs	20,832,500	0	0	0	0	0	0
	b. Fixed costs	0	26,083,250	26,083,250	26,383,250	26,383,250	26,383,250	26,383,250
	c. Variable costs	0	21,857,500	21,857,500	21,857,500	21,857,500	21,857,500	21,857,500
	Expenditure total	20,832,500	51,940,750	51,940,750	52,240,750	52,240,750	52,240,750	52,240,750
3.	Net income							
	Net income total	(20,832,500)	13,368,000	13,368,000	13,068,000	13,068,000	13,068,000	13,068,000

Data in table 8 shows that the cash flow calculation in this business unit is calculated every six months, which is a period of harvest for the cultivation of Trevallies in IAB. In other words, since 2017 until this research was conducted, there have been six harvests. The production value received at each harvest is IDR 65,308,750. Net income in initial year is negative, which is minus IDR 20,832,500 due to the absence of farmers' acceptance from the yields that are sold. Net income in first period and second period in First year is same, which is IDR 13,368,000. However this value is bigger than in first period and second period in the following years, which only reached IDR 13,068,000. This happen because of it has been reduced by maintenance costs.

3.3.4. Feasibility of cultivating Trevallies in IAB. Study or business feasibility analysis, which is a study or analysis of whether a business should be carried out profitably on a continuous basis. The results of this analysis can be used in making decisions whether a business can provide benefits or benefits to be carried out or continued. In assessing the feasibility of trevally fish cultivating in IAB, which is carried out using the KJA method, several aspects of business feasibility are studied, namely Break Even Point (BEP), business feasibility based on Revenue Cost Ratio (RCR) and Payback Period (PP).

a. Break even point (BEP)

Break Even Point (BEP) is a condition that describes the business profits obtained equal to the capital issued. In other words, this is a condition where the business experiences neither profit nor loss. The value of BEP production in the cultivation of Trevallies in IAB is 824 Kgs per one harvest period. This means that in one harvest period, the minimum amount of fish production that must be sold so as to experience a profit must be above 824 kgs. The average production of trevally fish cultivated in KJA in IAB is 1004. 8 kgs in one harvest period. This value actually exceeds the BEP production value.

However, if we look deeper, there are still some cultivators with production value in one harvest period is still below the BEP production value. This means that they need to be encouraged to increase their production volume. The BEP price in this study was found to be IDR 53,288/kg. This means that in order for this business to continue to experience profits, the break-even price that can be offered for the sale of Trevallies is IDR 53,288/kg. The selling price of Trevallies in Ambon currently reaches IDR

65,000/kg. Thus it can be said that the current price has exceeded the BEP price value. This BEP value is greater than the research of [20] who examined the cultivation of trevally fish in floating cages in Batulubang Village, Bitung City and found that the BEP value was only 334.31kgs. This may also be because the investment costs, fixed costs and variable costs incurred for the business studied by [20] are smaller than those incurred in this study.

b. Business feasibility

Business feasibility based on Revenue Cost Ratio (R/C) is an analysis tool that uses a comparison between revenue and costs to determine whether the cultivation of trevally fish in IAB is feasible or not to run. A business is said to be feasible and profitable if the value of R/C is greater than 1 ($R/C > 1$). The greater the R/C value, the more feasible an effort is to do. The results of the analysis show that the R/C value of all the giant trevally aquaculture business units in IAB is more than 1 (>1) with an average R/C of 1.22 so it can be concluded that this business belongs to the worth running. In other words, it can be also concluded that every IDR 100,000 costs incurred, then the cultivation of giant trevally fish in IAB will receive an income of IDR 122.000. This value is higher than found in the same business and commodities in Layeun Village, Leupung District, Aceh Besar, the R/C value found in that study was 1,07 [21].

c. Payback period

Payback period is an analysis used to determine the period of return on investment incurred through the profits obtained in the cultivation of Trevallies in IAB using the floating cage method. The results showed that the average value of payback period for 10 units of Trevallies aquaculture in IAB was 2.70. It means that the investment spent in the business will return in an average period of 2.70 harvest period or an average of about 16 months. The payback period for this business investment is still faster than the research by [21], in her study, the payback period time was eight years.

4. Conclusion

Based on the results in this research, several things can be concluded, namely:

- a. The factors of production in the Trevallies aquaculture business unit in IAB are supply of feed that cover mostly operational cost and unavailability of feed suppliers, supply of fish seeds from Marine Cultivation and Seed Center Waiheru Ambon and the availability of labour ranging from 2-5 people per business unit.
- b. The cultivation of Trevallies in IAB using the floating cage method is very feasible and profitable to run.

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