

BUKTI KORESPONDENSI

Nama Penulis : Ernaningsih, Ihsan, Hasrun, Kasmawati Saleh
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Submission Acknowledgement

1. Tanggal 19 September 2018

----- Forwarded Message -----

From: Erna Ningsih <ernaningsih36@yahoo.co.id> To: zoobiomag2004@yahoo.com <zoobiomag2004@yahoo.com> Sent: Wednesday, September 19, 2018, 5:30:34 AM GMT+3 Subject: Ernaningsih-Paper for Publication - AACL Bioflux

Dear Editor-in-Chief, Dr. Ioan Valentin Petrescu-Mag,
First of all, I am Ernaningsih acting as the corresponding author. I am a lecturer at Muslim University of Indonesia. We found interested in AACL Bioflux for our paper to be published. The paper title is "Financial Analysis of coral grouper using handline fishing gear in Sarappo Island, Pangkep Regency, South Sulawesi". (see attachment) I have also included the submission letter

Hopefully, the paper will be considered to be published in AACL Bioflux. I am looking forward to hearing from you soon

If you have any question, feel free to contact me at anytime
Kindly regards,

Ernaningsih, Senior lecturer at Muslim University of Indonesia

> Tampilkan pesan asli

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Ernaningsih... .doc
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Submission letter

Article title: Financial Analysis of Coral Grouper Caught using Handline Fishing Gear in Sarappo Island, Pangkep Regency, South Sulawesi

Name of the authors: Ernaningsih, Ihsan, Hasrun, Kasmawati Saleh

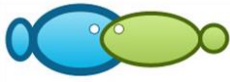
Hereby I would like to submit the manuscript entitled "**Financial Analysis of Coral Grouper Caught using Handline Fishing Gear in Sarappo Island, Pangkep Regency, South Sulawesi**" to Aquaculture, Aquarium, Conservation & Legislation - International Journal of the Bioflux Society.

This manuscript was not submitted or published to any other journal. The authors declare that the manuscript is an original paper and contain no plagiarised text. All authors declare that they are not currently affiliated or sponsored by any organization with a direct economic interest in subject of the article. My co-authors have all contributed to this manuscript and approve of this submission.

Corresponding author

Ernaningsih

08 September 2018



Financial Analysis of Coral Grouper using Handline Fishing Gear in Sarappo Island, Pangkep Regency, South Sulawesi

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Abstract

This study aimed to determine the production status and financial aspects of grouper commodity in Spermonde waters, Pangkep Regency, South Sulawesi. This study was carried out from January to December 2017 in Sarappo Lompo Island. A qualitative field research was applied for data collection starting with formulating the problem using the case study research strategy. The results of the study showed that the highest catches occurred from December to April (the peak season) with 357 fish. The fishing efforts were 97 trips with an average productivity of 4 kg per trip. The average capital investment of fishermen was IDR.9,931,880 and the total cost reached IDR.25,843,960. Furthermore, the average income per a year was IDR.57,443,100, with an average net profit reached IDR31,599,140. The result of BEP was IDR33,743 and 345 production BEPs and R/C ratio were 2.2.

Keywords: handline fishing gear, grouper, financial, Spermonde, Pangkep

Introduction. The increase of world demand for leopard coral grouper or *Epinephelus* spp as fish consumption affects the demand in the domestic level. The production of fish grouper are generated from fishing and mariculture activities. For example, the capture production for groupers reached 520.404 tonnes from 2011 to 2015 or the average increase of production was about 18% to 30% (BPS 2017).

The rapid population growth and increased per capita income also contribute to the demand for fresh marine fish, especially groupers. According to Chan (2000) and Tadjuddah (2012) said that 50% of live groupers traded in Hong Kong are imported from Indonesia. Furthermore, Indonesia holds 20% of International live grouper suppliers. In addition, the value of Indonesian exported grouper to various countries in 2016 reached IDR.427 billion.

South Sulawesi is one of the Indonesia's provinces that contribute approximately 22,709 tonnes of domestic capture fisheries for grouper commodity in 2015. Johannes and Riepen (1995) stated that Indonesia was the largest supplier of live groupers for Hong Kong in the 1990s. In the mid 1990s, 50% of stock of demand for live grouper consumption in Indonesia was derived from the Spermonde Islands, South Sulawesi (Suncoko 2013). Therefore, Spermonde Island is the largest live grouper fishery producer in Indonesia.

The high value of groupers in international trade has resulted in increased demand for these types of fish. Consequently, wild groupers experience considerable fishing pressure leads to overfishing (Sadovy 2005; Tadjuddah, (2012) and the use of unsustainable fishing methods such as cyanide use (Johannes and Riepen, 1995). According to The International Union for the Conservation of Nature and Natural Resources (IUCN) in 2006 included several types of grouper fish such as humpback grouper (*Cromileptes altivelis*), mud grouper (*Epinephelus lanceolatus* and *Epinephelus coioides*) and coral grouper (*Plectropomus leopardus*) as threatened species (red list of threatened species). Therefore, the aim of this study was to determine the current condition of groupers production and its financial aspect.

Materials and Methods. This study was conducted from May to July 2017 in Sarappo Lompo Island, Pangkep Regency, Spermonde Islands. Qualitative field study method was performed by formulating the problem with the case study research strategy. Purposively sampling was applied with interviews and field observations used for data collection according to (Berg 1991; Nugroho and Sulistiono 2017). Twenty two fishermen (5%) from 437 people from Sarappo Island are used in this study.

The data was descriptively and quantitatively analysed the social and economic conditions of the small fishermen of Sarappo Lompo Island through various stages of the variables in the study with the following descriptions;

Analysis of descriptive and quantitative was applied for investment value:

$$TC = TFC + TVC$$

Note:

TC = Total Cost (IDR)
TFC = Total Fixed Cost (IDR)
TVC = Total Variabel Cost (IDR)

1. The income of fishing rod business was calculated according to (Bangun, 2010) :

N = TR-TC
TR = P.Q
TC = FC+ VC

Note:

N = Profit
TR = Total Revenue
TC = Total Cost
P = Price
Q = Total fish sold
TC = Total cost
FC = Fixed cost
VC = Variable cost

2. Analysis of *break even point* according to Prawirosentoso (2001) as follows:

$$BEP (Unit) = \frac{BTp}{\frac{Py}{Unit} - \frac{BV}{Unit}} \dots\dots\dots(1)$$

$$BEP (Rp) = \frac{BTP}{1 - \frac{BV}{Py}} \dots\dots\dots(2)$$

Note:

BTp = Fixed Cost (IDR per Production)
BV = Variable Cost (IDR per Production)
Py = Fish Price (IDR per kg)

3. B/C Ratio or PI (Profit Ability Index) according to (Umar 2003) as follows:

$$PI = \frac{PV \text{ dari cash flow}}{\text{Initial cash flow}}$$

Note:

Feasible $PI > 1$

Not feasible $PI < 1$

Results and Discussion

Leopard Coral grouper Production

The average monthly production of coral grouper using handline fishing technique in Sarappo island was 64 fish with average number of trips in 2017 was 20 times. The production of coral grouper is shown in **Figure 1**.



Figure 1. the production of coral grouper using handline fishing obtained from fish landing of local fishermen in Sarappo lombo Island 2017.

In the present study, the number of catches in 2017 was 766 fish with a total trip of 235 times. The production pattern of coral grouper catches was fluctuative. The production of coral grouper in January from local fishermen in Sarappo Island was 100 fish with a total trip of 26 times.

High fishing activity occurred from December to April due to rainy season. The coral grouper is likely to stay at water depth of 25 -30 meters and the wave pattern of the water only temporarily took place during capture activity compared to during dry season. In the dry season, the weather tend to be calm but the intensity of the water waves was high during the fishing activity. As said by Ernaningsih et al (2017), the peak season of grouper fishing occurs during the rainy season.

Fishing Production and fishing efforts based on fishing seasons

Handline fishing technique are commonly operated for coral grouper fishing activity around Sarappo Lombo Island. Fishing season affects the number of fish in the local fish landing and fish merchant (**Figure 2**).

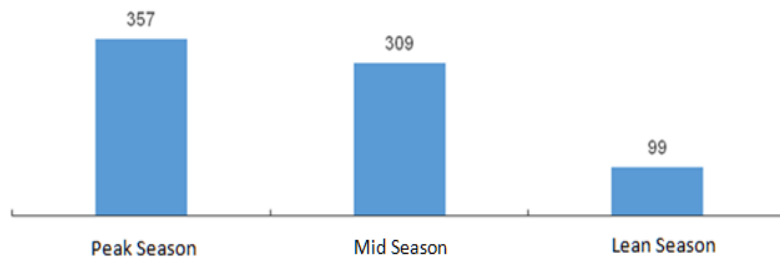


Figure 2. The fishing production of coral grouper (number of fish) based on the catching season category at the fish landing of Sarappo Lompo Island, Spermonde Waters, Pangkep Regency.

Figure 2 shows the production of leopard coral crouper capture based on the fishing season category. The number of fish in different fishing season category was 357 (peak season), 309 (yield season) and 99 (lean season). Therefore, the total fishing production was 765 fish. The fishing technique, food sources, fishing operation duration, environmental factor (weather) were some factors affecting fishing efforts by local fishermen of Sarappo Lompo Island. The fishing effort based on the fishing season category is shown in **Figure 3**.

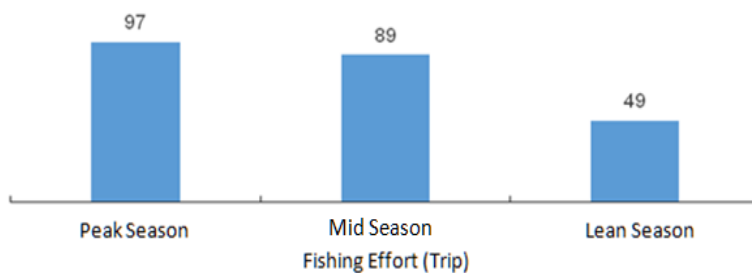


Figure 3. Fishing effort based on fishing season categories in Sarappo Island, Spermonde Island, Pangkep Regency

Figure 3 illustrates that the average number of fishing trip in catching season category. The average number of trip for each season was 97 times (peak season), 89 times (yield season), 49 times (lean season) respectively. The total fishing trip based on the fishing season reached 235 trip times. The difference in the number of fishing trip was caused by environmental factor such as waves around the Sarappo Lompo. The condition in the fishing ground made impossible to carry out fishing operations. The handline fishing technique based on fishing trip with the fishing season category is shown in **Figure 4**.

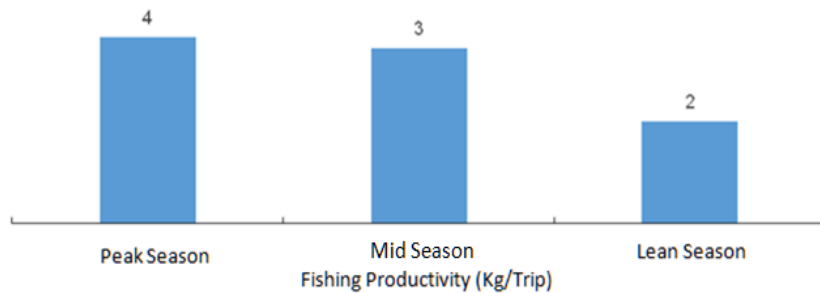


Figure 4. Fishing productivity based on fishing trips in the fishing season category at fish landing of Sarappo Lompo Island in Spermonde Waters in Pangkep Regency

Figure 4 illustrates the average productivity value each fishing trip in particular season was 4 fish per trip (peak season), 3 fish per trip (yield season) and 2 fish per trip (lean season). This condition provides information that the peak season average fishing ability using handline technique is able to obtain during one trip or one day of the fishing operation took place.

1. Economic aspects

a. Capital investment

Capital investment is required by local fishermen of Sarappo Island for running their fishing activity. According to Budiman et al (2014) stated that capital is an important factor in initiating a business unit which aims to earn the maximum profit with minimum operational costs. In the present study, the need of capital for fishing leopard coral grouper consisted of investment in providing fishing ships, fishing gear (fishing rods) and engines. The size of the capital depends on the type of business which is carried out. The capital for business can be successful, if it can provide economic benefits for the entrepreneur. The amount of capital needed can be seen in **Table 1**.

Table 1. The average capital investment of handline fishing gear for local fishermen of the Sarappo Lompo Island in the Spermonde waters of Pangkep Regency.

No	Details	Value (Rp)
1	Minimum	9.030.000
2	Maximum	13.535.000
	Average	10.931.880

Source: Research finding, 2017.

Generally, the amount of investment for fishermen in Sarappo Lompo island ranged from IDR.9,030,000, to IDR.13,535,000. However, the average cost was Rp. 10,931,880. The structure of the investment was categorized between IDR9,030,000, IDR9,931,000, IDR9,932,000, IDR10,883,000, IDR10,884,000, IDR11,735,000, IDR.11,736,000, IDR.12,637,000, and the investment cost ranged from IDR12,638,000, to IDR13,535,000. However, the highest range of investment costs for fishermen was the range of IDR11,736,000 to IDR12,637,000. The lowest was in the range of IDR. 12,638,000, and IDR13,535,000. The difference in the range of unit capture investment costs due to differences in the size of the ship, the brand of the engine, the fishing gear and the year of purchase. According to Yanuartoro (2013) stated that the price of each unit of a fishing

business owner is different from other business owners. Furthermore Budiman et al., (2014) claimed that several factors, including the year of purchase because each business unit is different between one fishing business owner to another, some items or equipment was purchase a second hand goods and some are new goods which are certainly more expensive the price is rather than the price of used goods. In addition, it is known that every year there is an increase in prices of each of the capture business units.

b. Fixed cost

In present study, the fixed costs allocated for fishing business in Sarappo Island consisted of the amount of depreciation and maintenance costs. Depreciation costs are component costs of fixed costs of fishing business, such as a reserve fund as replacement cost for the old fishing asset. Therefore, the fishing activities can be continued in the long term period (Panayotou, 1985; Utomo et al 2013). The maintenance costs are costs incurred in the small business unit for fishing rod to maintain fishing equipment in good condition. Hence, the equipment can be effectively used for fishing activity.

Fixed costs are always calculated as long as the business still running. The fixed costs of the fishermen in Sarappo Lompo Island was boat depreciation costs, engines and ship maintenance costs, fishing gear and engine maintenance costs with an average total cost of IDR2,736,080 for a year. The details of the average cost can be seen in **Table 2**.

Table 2. Average fixed costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

No	Fixed cost	Average of Fixed cost (IDR) per year
1	Depreciation cost	
	Ship cost	1,472,000
	Main Machine cost	708,000
2	Maintainance cost	
	Ship (paint)	449,000
	Fishing gear	47,080
	Machine	60,000
	Jumlah	2,736,080

Source: Research Finding, 2017

According to the results of the study, the boats and propulsion engines can be used for 5 years. The total expenditure for depreciation expense was IDR2,180,000 with details of the average boat cost per year amounting to IDR1,472,000, - and the main engine cost per year was IDR708,000. Whereas for the average annual maintenance expenditure was IDR556,080, per year with the details of the component consisted of a ship maintenance fee about IDR449,000, per year, the cost of maintaining fishing gear was Rp. 47,000 per year and the cost of maintaining the engine for an average year of Rp. 60,000.

As for the range of depreciation costs for each boat and the ship engine for fishing leopard coral grouper was generally in the range of IDR.1,200,000 - IDR.1,712,000, - with a grouping of the cost range of IDR.1,200. 000, - - IDR. 1,370,000, - IDR. 1,371,000 - - IDR. 1,541,000, - and in the range of IDR. 1,542,000, - - IDR. 1,712,000. However, the highest range of fixed depreciation costs for fishing boats was in the range of IDR. 1,542,000 - IDR. 1,712,000, and the lowest was in the range of IDR. 1,371,000 - IDR. 1,541,000.

For the range of fixed cost structure, the fishermen's machines for fishing boat in the Sarappo Lompo island every year was generally in the range of IDR.400,000 - IDR.1,122,000. The detail for range of cost was grouped into several cost groups such as IDR. 400,000 - IDR.640,000, -, IDR. .641,000, - - IDR.881,000, - and in the cost range of IDR. 882,000, - - IDR. 1,122,000. However, the highest range of fixed depreciation costs for the fishing machine was in the range of IDR.641,000, - - IDR.881,000, - and the lowest was in the range of IDR. 882,000, - - IDR. 1,122,000. Furthermore, the range of maintenance costs for fishermen in Sarappo Lompo island each year was generally in the range of IDR.230,000 - IDR.764,000, - with cost grouping only in the range of IDR.230,000 - IDR.336,000, -, IDR.444,000 , - - IDR. 550,000, -. However, the highest range of fishermen's maintenance costs was in the range of IDR.551,000, - - IDR.667,000, - and in the range of IDR.658,000, - - IDR.764,000, - while the lowest was in the range of IDR.230,000, - - IDR.336,000, -

b. Non-fixed cost

Non-fixed costs (variable costs) are costs that vary according to changes in production levels. Non-permanent costs include operating costs. Operational costs are costs spent by fishermen for supplies during the fishing operation. This fee consisted of fishermen's supply costs and fuel, cigarette and consumption costs during fishing operations. Generally, the amount of the average operational cost of fishermen spent by the fishermen of Sarappo Lompo Island was IDR. 23,107,880. The details of the average non-fixed costs are seen in Table 3.

Table 3. Average non-fixed costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear.

No	Non Fixed Cost	The average non fixed cost (IDR) per year
1	Operational cost	
	Fuel	14.128.400
	Oil	36.840
	Cigarette	3.203.040
	Food	5.739.600
	Total	23.107.880

Source: Research Finding, 2017

The structure of non-fixed costs of operational costs for leopard coral grouper in Pangkep Regency Spermonde waters was in the range of annual operational cost structure in the range of IDR.14,137,000 - IDR. 30,041,000. It can be gropued into the cost range, such as IDR. 14,137,000, - - IDR. 17,317,000, -, IDR. 17,318,000, - - IDR. 20,498,000, -, IDR. 20,499,000, IDR. 23,679,000, -, IDR. 23,680,000, - - IDR. 26,860,000, - and in the cost range of IDR. 26,861,000, - - IDR. 30,041,000. However, the highest range of operational costs for fishing activities was in the range of IDR.20,499,000 - IDR.23,679,000, - and the lowest was in the range of IDR.14,137,000 - IDR.17,317,000 and IDR. .17,318,000, - - IDR.20,498,000.

The difference in the non-fixed costs using handline fishing for fishing gear in the Island of Sarappo Lompo was caused by different fishing ground. The distance determined how much cost was need in term of fuel to reach fishing ground of leopard coral grouper. This is in line with Budiman et al (2014) stated that the size of the operational costs is influenced by the distance of fishing ground, the frequency of fishing, the length of fishing, and the amount of production.

c. Total cost

Wismanigrum et al (2013) stated that the total cost is the total amount of fixed costs and non-fixed costs. Fixed costs are derived from the amount of depreciation costs while the fixed costs are derived from the total operating costs and maintenance costs. The total cost of the leopard coral grouper fishing business used fishing rods in the water spermonde Pangkep Regency was IDR. 25,843,960 (Table 4).

Table 4. Average total costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear.

Details	Cost (IDR) per Year
Fixed cost	2.736.080
Non fixed cost	23.107.880
Total cost	25.843.960

Source: Research finding, 2017

d. Income

Income is the value of money earned from the sale of fish production which affected by the large amount of fish caught and the market prices at the time of landing. The results of this study related to income can be seen in **table 5**.

Tabel 5. Average annual income per year of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear.

No	Uraian	Average production (fish)	Price (IDR/unit)	Total (IDR)
1	Income of peak season	357	75.000	26.775.000
2	Income of yield season	309	75.000	23.175.000
3	Income of lean season	99	75.000	7.425.000
4	Annual income per year	765	75.000	57.375.000
5	Annual income per trip	3	75.000	225.000
6	Minimum per year			54.648.750
7	Maximum per year			60.108.750
8	Average per year			57.443.100

Source: Research finding, 2017

Based on the table above the unit price of leopard coral grouper at collectors level was IDR. 75,000, Therefore, the average income at the peak season reached IDR.26,775,000, - mid season was IDR.23,175,000, and the lean season was Rp. 7,425,000 with an average annual income of IDR. 57,375,000. The income of fishermen who used fishing rod was influenced by the fishing season where the season can affect the number of catches due to different fishing trips done by fishermen. This is in accordance with Wasahua et al (2016) stated that the income of fishermen relies on the number of catches and the selling value of fish per kg in same season.

e. Profit

According to Ningsih (2013) and Budiman (2014) stated that a large profit can be obtained by reducing operational costs. Details of fishing business profits are seen in table 6.

Table 6. Average annual profit per year of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear.

No	Keterangan	Jumlah per tahun (Rp)
1	Annual income per year	57.443.100
2	Total cost	25.843.960
3	Non-fixed cost	23.107.880
	Gross profit (average annual income per year-non fixed cost)	34.335.220
	Net profit (average annual income per year-total cost)	31.599.140

Source: Research finding, 2017

2. Financial analysis

Break Event Point (BEP)

Break Event Point is a condition that describes the business profits obtained equal to the capital. In other words, the business conditions experiences profits or financial losses. According to Sunyoto (2013) and Suhardi (2016) stated analysis of break even point is an analytical technique that is shown to produce information and by focusing on determining a situation where the volume of activity does not generate profits but also does not experience losses. Handline fishing in Sarappo Lompo Island was reviewed based on selling price (BEP price) and production volume (production BEP).

BEP Price

The average number of fish production was 766 fish and the total cost was IDR. 25,843,960. In order to reach the break event point, the minimum fish selling price must be IDR. 33,743. While the price of leopard coral grouper was IDR. 75,000. Therefore, it can be concluded that the price of coral grouper was higher than BEP prices. This means that the business of fishing coral grouper is worth for further expansion (Table 7).

Table 7. Analisis BEP for selling price of fish caught using handline fishing in Sarappo Lompo Island

BEP (Rp) =	$\frac{\text{Total cost}}{\text{Annual cost production}}$
BEP (Rp) =	$\frac{25.843.960}{766}$
BEP (Rp) =	33.743

BEP for Production

Based on the results above, the BEP for production was 345 fish. In other word, the minimum number of break event sales must be achieved in a year was 345 fish. While coral grouper production can be produced in different season; the peak season (357), mid season (309), lean season (99), the average production per trip was 3 and 765 in a year. Thus, it can be concluded that the total production of sunu fish sold for a year is higher than BEP for production.

Table 8. Analysis of BEP production for handline fishing business of coral grouper fisheremen in Sarappo Lompo Island

BEP (Production) =	$\frac{\text{Total cost}}{\text{Price of product per unit}}$
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$$\text{BEP (Production)} = \frac{\text{IDR. 25.843.960}}{\text{IDR. 75.000}}$$

$$\text{BEP (Production)} = \frac{\text{345 fish}}{\text{345 fish}}$$

R/C (Revenue Cost) Ratio

R/C (Revenue Cost) Ratio adalah perbandingan antara total penerimaan dengan total biaya yang dikeluarkan. Untuk lebih jelasnya tentang hasil analisis R/C Rasio dalam setahun produksi dapat dilihat pada tabel 9 berikut.

Table 9. Analysis of R/C Ratio for fishing leopard coral grouper in Sarappo Lompo Island in Spermonde water, Pangkep Regency.

R/C =	$\frac{\text{Income}}{\text{Total cost}}$
R/C =	$\frac{\text{IDR. 57.443.100}}{\text{IDR. 25.843.960}}$
R/C =	2.2

The table above shows amount of total cost IDR 1 equal to IDR. 2.2 of profit. Therefore, this fishing business is feasible and profitable.

Conclusion

The average fish production for leopard coral grouper of fishermen in Sarappo Island per year was 766 fish with a total trip 235 times. The analysis of the grouper business for capital investment was IDR.9,931,880, - and the total cost reached IDR. 25,843,960. Furthermore, the average income per year was IDR. 57,375,000, with an average net profit reaching IDR. 31,599,140. For the financial analysis, the calculation of BEP was IDR. 33,743 and 345 production BEPs and R / C ratio 2.2. Therefore, it can be concluded that the fishing effort of Sarappo Lompo fishermen with leopard coral grouper using fishing rods in Spermonde Pangkep District was feasible.

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**Submission needing Revision
(Comment Reviewer)**

2. 20 September 2018

Dikirim dari ponsel cerdas Samsung Galaxy saya.

----- Pesan asli -----Dari: gavriloaie ionel claudiu <ionelclaudiu@yahoo.com>

Tanggal: 20/09/18 23:01 (GMT+08:00) Ke: ernaningsih36@yahoo.co.id Subjek: Fw: Ernaningsih-Paper for Publication - AACL Bioflux

Dear Dr. Erganingsih,

We received your manuscript and we will perform the preliminary evaluation in the shortest time. Thank you very much!

Sincerely yours, Claudiu Gavriloiu, PhD Editor-in-chief AACL Bioflux journal

On Wednesday, September 19, 2018 7:56 PM, Mag Ioan Valentin <zoobiomag2004@yahoo.com> wrote:

Petrescu-Mag I. V., PhD, Hab. Senior Lecturer & Senior Researcher (CSI) USAMV Cluj & Bioflux SRL & University of Oradea & University of Liege
Tel: 0040 744470794 ; e-mail zoobiomag2004@yahoo.com

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3. 15 Oktober 2018



Erna Ningsih

Dari: emaningsih36@yahoo.co.id
Kepada: Gavrioloie Ionel Claudiu



Sen, 15 Okt 2018 jam 10.11 ☆

Dear Claudiu,

I would like to hear the progress of my manuscript. If you have anything information related to the manuscript, feel free to drop me an email.

I am looking forward to hearing from you very soon

Emaningsih
Senior lecturer at Muslim University of Indonesia

4. 16 Oktober 2018



gavrioloie ionel claudiu

Dari: ionelclaudiu@yahoo.com
Kepada: Erna Ningsih



Sel, 16 Okt 2018 jam 03.42 ☆

Dear Dr. Emaningsih,

Actually we are still analyzing the paper. We have to clarify few things, that is why we needed more time than usual. Anyway, in few days you will have the results of the preliminary evaluation.
Thank you very much for your patience!

Sincerely yours,
Claudiu Gavrioloie

> Tampilkan pesan asli



5. 17 November 2018



Erna Ningsih

Dari: emaningsih36@yahoo.co.id
Kepada: gavrioloie ionel claudiu



Sab, 17 Nov 2018 jam 15.17 ☆

Dear Gavrioloie ionel claudiu,

Would like to inform me any progress for my paper? if you have anything about it, feel free to contact me at anytime.

Thank you

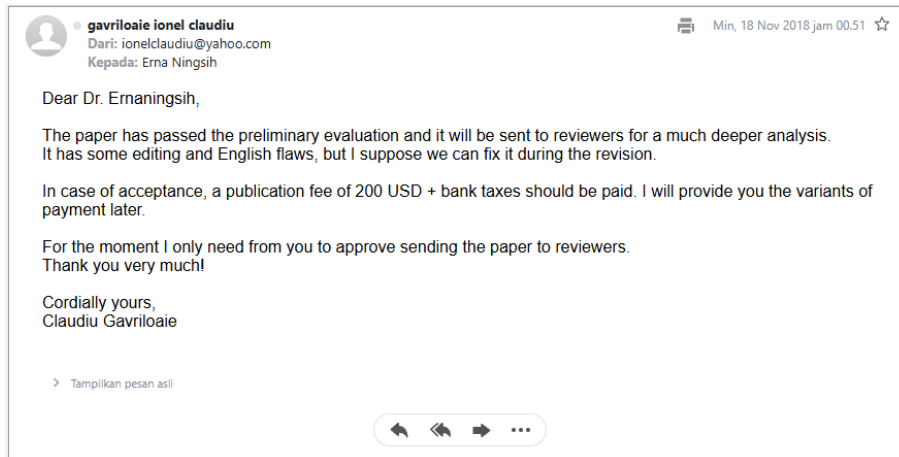
Sincerely yours,

Emaningsih

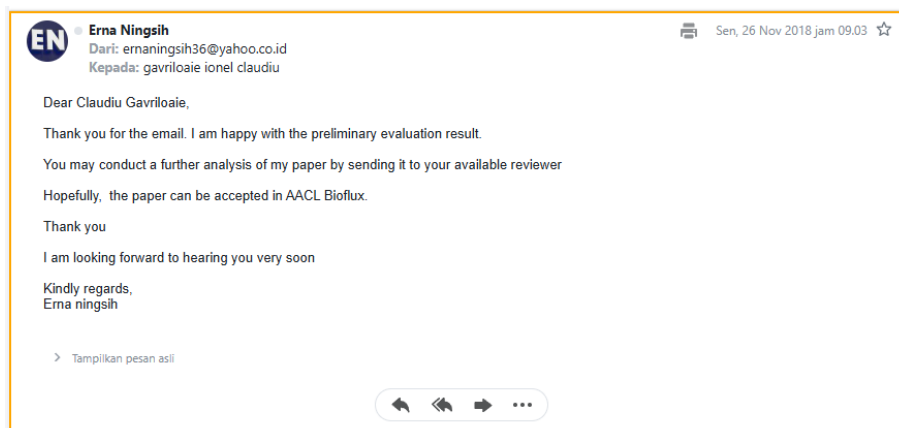
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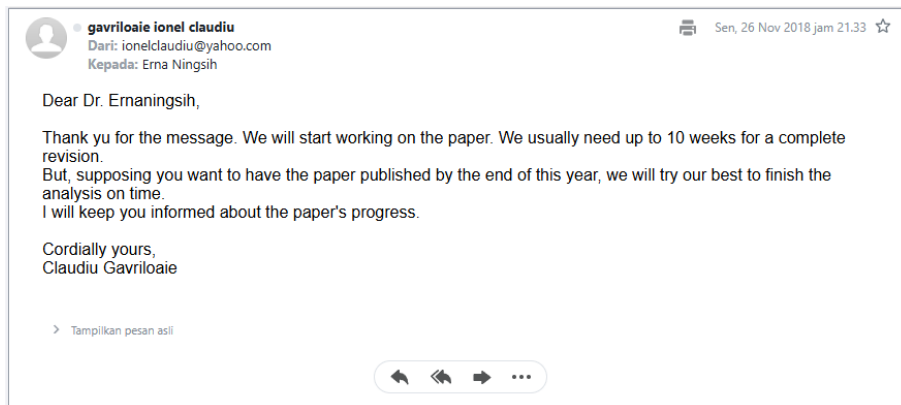
6. 18 November 2018



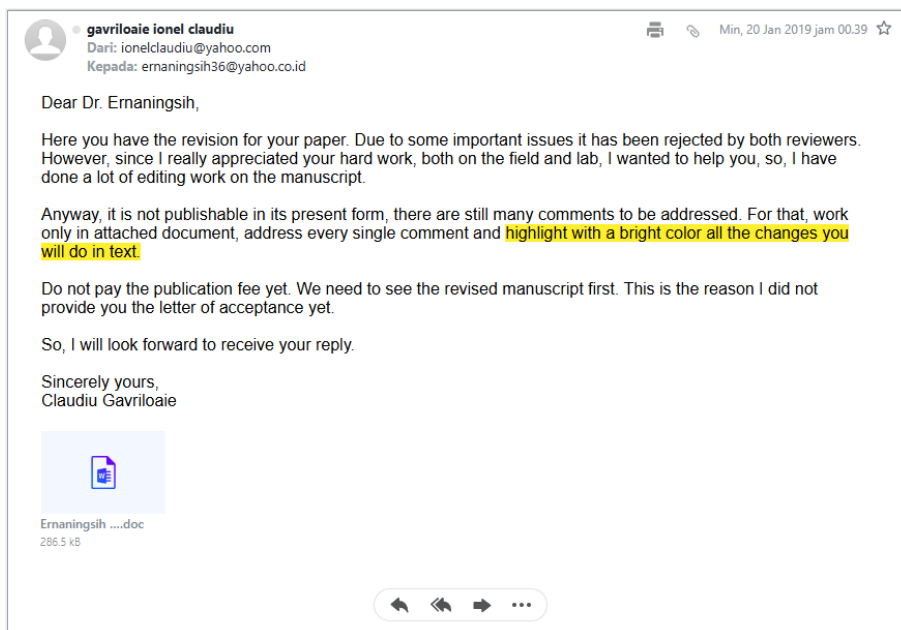
7. 26 November 2018



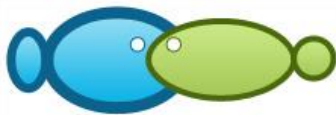
8. 26 November 2018



9. 20 Januari 2019



Submission needing Revision
(Comment Reviewer)



Financial analysis of coral grouper using handline fishing gear in Sarappo Island, Pangkep Regency, South Sulawesi

Ernaningsih, Ihsan, Hasrun, Kasmawati Saleh

Department of Marine Resource Utilisation, Faculty of Fisheries and Marine Science,
Muslim University of Indonesia.

Abstract. This study aimed to determine the production status and financial aspects of grouper commodity in Spermonde waters, Pangkep Regency, South Sulawesi. This study was carried out from January to December 2017 in Sarappo Lompo Island. A qualitative field research was applied for data collection starting with formulating the problem using the case study research strategy. The results of the study showed that the highest catches occurred from December to April (the peak season) with 357 fish. The fishing efforts were 97 trips with an average productivity of 4 kg per trip. The average capital investment of fishermen was IDR 9,931,880 and the total cost reached IDR 25,843,960. Furthermore, the average income per a year was IDR 57,443,100, with an average net profit reached IDR 31,599,140. The result of BEP was IDR 33,743 and 345 production BEPs and R/C ratio were 2.2.

Key Words: handline fishing gear, grouper, financial, Spermonde, Pangkep.

Introduction. The increase of world demand for leopard coral grouper or *Epinephelus* spp. as fish consumption affects the demand in the domestic level. The production of fish grouper is generated from fishing and mariculture activities. For example, the capture production for groupers reached 520.404 tonnes from 2011 to 2015 or the average increase of production was about 18 to 30% (BPS 2017).

The rapid population growth and increased per capita income also contribute to the demand for fresh marine fish, especially groupers. According to Chan (2000) and Tadjuddah (2012), 50% of live groupers traded in Hong Kong are imported from Indonesia. Furthermore, Indonesia holds 20% of international live grouper suppliers. In addition, the value of Indonesian exported grouper to various countries in 2016 reached IDR 427 billion.

South Sulawesi is one of the Indonesia's provinces that contribute approximately 22,709 tonnes of domestic capture fisheries for grouper commodity in 2015. Johannes & Riepen (1995) stated that Indonesia was the largest supplier of live groupers for Hong Kong in the 1990s. In the mid 1990s, 50% of stock of demand for live grouper consumption in Indonesia was derived from the Spermonde Islands, South Sulawesi (Suncoko 2013). Therefore, Spermonde Island is the largest live grouper fishery producer in Indonesia.

The high value of groupers in international trade has resulted in increased demand for these types of fish. Consequently, wild groupers experience considerable fishing pressure leading to overfishing (Sadovy 2005; Tadjuddah (2012) and the use of unsustainable fishing methods such as cyanide use (Johannes & Riepen 1995). According to The International Union for the Conservation of Nature and Natural Resources (IUCN) in 2006 included several types of grouper fish such as humpback grouper (*Cromileptes altivelis*), mud grouper (*Epinephelus lanceolatus* and *Epinephelus coioides*) and coral grouper (*Plectropomus leopardus*) as threatened species (red list of threatened species). Therefore, the aim of this study was to determine the current condition of groupers production and its financial aspect.

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Commented [indra2]: in text, in the Material and Method section you said that May to July 2017 was the study period

Commented [indra3]: which December? 2017? Which April? Also see the comment above

Commented [indra4]: in total for all these 5 months?

Commented [indra5]: provide 4-6 key words which are different from the paper's title

Commented [indra6]: as far as we know, the coral groupers are species in the genus *Plectropomus*

Commented [indra7]: 520.404 or 520,404?

Commented [indra8]: on the references list there are two papers of Chan 2000, which we noted 2000a and 2000b respectively. So, which one is the one here: 2000a, 2000b or both?

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Commented [indra10]: you do not have such reference on the list

Commented [indra11]: this should be added to the references list

Commented [indra12]: be more specific: which species exactly?

Material and Method. This study was conducted from May to July 2017 in Sarappo Lompo Island, Pangkep Regency, Spermonde Islands. Qualitative field study method was performed by formulating the problem with the case study research strategy. Purposively sampling was applied with interviews and field observations used for data collection according to Berg (1991) and Nugroho & Sulistiono (2017). Twenty two fishermen (5%) from 437 people from Sarappo Island are used in this study.

The data has descriptively and quantitatively analysed the social and economic conditions of the small fishermen of Sarappo Lompo Island through various stages of the variables in the study with the following descriptions:

a. Analysis of descriptive and quantitative was applied for investment value:

$$TC = TFC + TVC$$

where: TC = total cost (IDR);

TFC = total fixed cost (IDR);

TVC = total variable cost (IDR).

b. The income of fishing rod business was calculated according to Bangun (2010):

$$N = TR - TC$$

$$TR = P \times Q$$

$$TC = FC + VC$$

where: N = profit;

TR = total revenue;

TC = total cost;

P = price;

Q = total fish sold;

FC = fixed cost;

VC = variable cost.

c. Analysis of break even point (BEP) according to Prawirosentoso (2001) as follows:

$$BEP (Unit) = \frac{BTp}{\frac{Py}{Unit} - \frac{BV}{Unit}}$$

$$BEP (Rp) = \frac{BTP}{1 - \frac{BV}{Py}}$$

where: BTp = fixed cost (IDR per production);

BV = variable cost (IDR per production);

Py = fish price (IDR per kg).

d. B/C Ratio or profit ability index (PI) according to Umar (2003) as follows:

$$PI = \frac{PV \text{ dari cash flow}}{\text{Initial cash flow}}$$

where: ...

Decision criteria: feasible if $PI > 1$; not feasible if $PI < 1$.

Results and Discussion

Leopard coral grouper production. The average monthly production of coral grouper using handline fishing technique in Sarappo island was 64 fish with average number of trips in 2017 was 20 times. The production of coral grouper is shown in Figure 1.

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Commented [indra14]: to be added to the references list

Commented [indra15]: same

Commented [indra16]: reformulate please. Small fishermen mean fishermen which are small in size/height

Commented [indra17]: descriptive and quantitative ... what?

Commented [indra18]: sustain with reference

Commented [indra19]: to be added to the references list

Commented [indra20]: provide the measure unit for all these parameters (I suppose it is IDR), like you did for the first equation terms.

Commented [indra21]: please draw the following equations in the same style as the first equations, for consistency.

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Commented [indra23]: what PV term means?

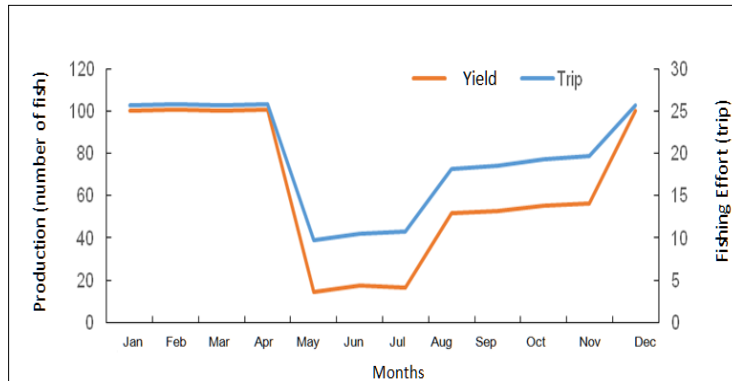


Figure 1. The production of coral grouper using handline fishing obtained from fish landing of local fishermen in Sarappo Lompo Island 2017.

In the present study, the number of catches in 2017 was 765 fish with a total trip of 235 times. The production pattern of coral grouper catches was fluctuative. The production of coral grouper in January from local fishermen in Sarappo Island was 100 fish with a total trip of 26 times.

High fishing activity occurred from December to April due to rainy season. The coral grouper is likely to stay at water depth of 25-30 meters and the wave pattern of the water only temporarily took place during capture activity compared to dry season. In the dry season, the weather tend to be calm but the intensity of the water waves was high during the fishing activity. As said by Ernaningsih et al (2017), the peak season of grouper fishing occurs during the rainy season.

Fishing production and fishing efforts based on fishing seasons. Handline fishing technique are commonly operated for coral grouper fishing activity around Sarappo Lompo Island. Fishing season affects the number of fish in the local fish landing and fish merchant (Figure 2).

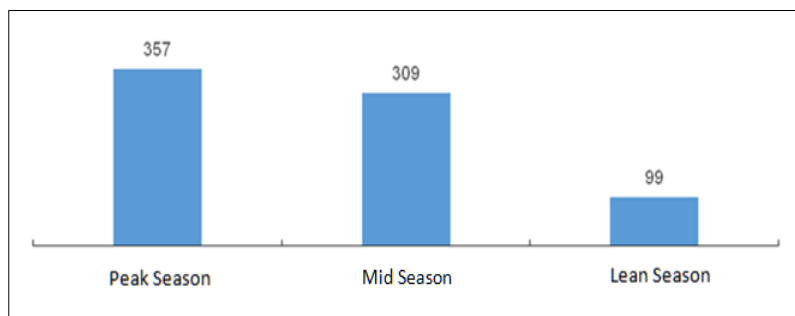


Figure 2. The fishing production of coral grouper (number of fish) based on the catching season category at the fish landing of Sarappo Lompo Island, Spermonde Waters, Pangkep Regency.

Figure 2 shows the production of leopard coral crouper capture based on the fishing season category. The number of fish in different fishing season category was 357 (peak season), 309 (yield season) and 99 (lean season). Therefore, the total fishing production was 765 fish. The fishing technique, food sources, fishing operation duration, environmental factor

Commented [indra24]: which year? It is obvious it cannot be December 2017.
When you say something like this: "December to April", it means there was December of 2016, then the months of January until April from 2017.

If your December is of 2017 too, you need to rephrase.

Commented [indra25]: which months are during this season?

Commented [indra26]: to be added to the references list

Commented [indra27]: be more specific her, please: which months are included in each of the seasons: peak, mid and lean, respectively?

(weather) were some factors affecting fishing efforts by local fishermen of Sarappo Lompo Island. The fishing effort based on the fishing season category is shown in Figure 3.

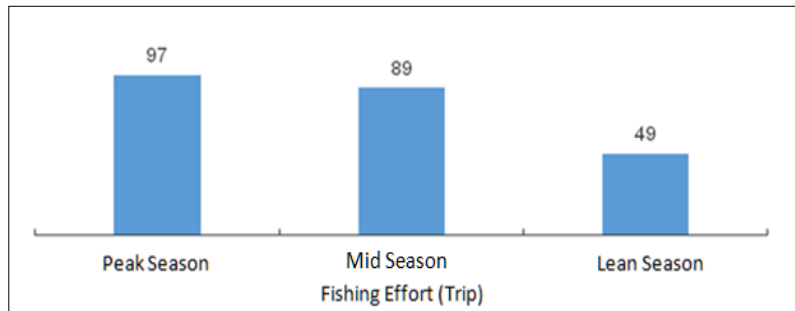


Figure 3. Fishing effort based on fishing season categories in Sarappo Island, Spermonde Island, Pangkep Regency.

Figure 3 illustrates that the average number of fishing trip in catching season category. The average number of trip for each season was 97 times (peak season), 89 times (yield season), 49 times (lean season) respectively. The total fishing trip based on the fishing season reached 235 trip times. The difference in the number of fishing trip was caused by environmental factors such as waves around the Sarappo Lompo. The condition in the fishing ground made impossible to carry out fishing operations. The handline fishing technique based on fishing trip with the fishing season category is shown in Figure 4.

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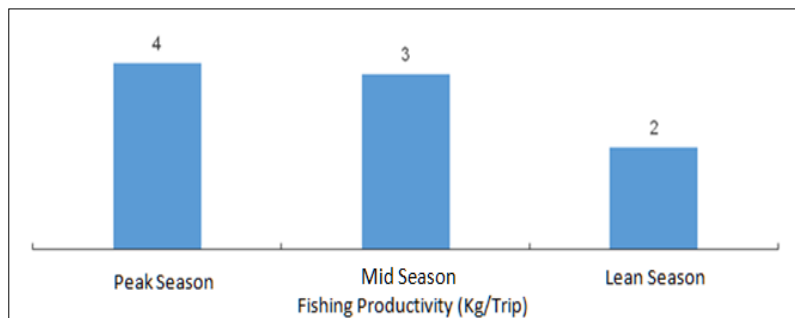


Figure 4. Fishing productivity based on fishing trips in the fishing season category at fish landing of Sarappo Lompo Island in Spermonde Waters in Pangkep Regency.

Figure 4 illustrates the average productivity value for each fishing trip; in particular season was 4 fish per trip (peak season), 3 fish per trip (yield season) and 2 fish per trip (lean season). This condition provides information that the peak season average fishing ability using handline technique is able to obtain during one trip or one day of the fishing operation took place.

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Economic aspects

Capital investment. Capital investment is required by local fishermen of Sarappo Island for running their fishing activity. According to Budiman et al (2014), the capital is an important factor in initiating a business unit which aims to earn the maximum profit with minimum operational costs. In the present study, the need of capital for fishing leopard coral grouper consisted of investment in providing fishing ships, fishing gear (fishing rods) and engines. The size of the capital depends on the type of business which is carried out.

The capital for business can be successful, if it can provide economic benefits for the entrepreneur. The amount of capital needed can be seen in Table 1.

Table 1
The average capital investment of handline fishing gear for local fishermen of the Sarappo Lompo Island in the Spermonde waters of Pangkep Regency

No	Details	Value (IDR)
1	Minimum	9,030,000
2	Maximum	13,535,000
	Average	10,931,880

Source: Research finding, 2017.

Generally, the amount of investment for fishermen in Sarappo Lompo island ranged from IDR 9,030,000, to IDR 13,535,000. However, the average cost was Rp. 10,931,880. The structure of the investment was categorized between IDR 9,030,000, IDR 9,931,000, IDR 9,932,000, IDR 10,883,000, IDR 10,884,000, IDR 11,735,000, IDR 11,736,000, IDR 12,637,000, and the investment cost ranged from IDR 12,638,000 to IDR 13,535,000. However, the highest range of investment costs for fishermen was the range of IDR 11,736,000 to IDR 12,637,000. The lowest was in the range of IDR 12,638,000, and IDR 13,535,000. The difference in the range of unit capture investment costs due to differences in the size of the ship, the brand of the engine, the fishing gear and the year of purchase. According to Yanuartoro (2013) stated that the price of each unit of a fishing business owner is different from other business owners. Furthermore Budiman et al (2014) claimed that several factors, including the year of purchase because each business unit is different between one fishing business owner to another, some items or equipment was purchase a second hand goods and some are new goods which are certainly more expensive the price is rather than the price of used goods. In addition, it is known that every year there is an increase in prices of each of the capture business units.

Fixed cost. In present study, the fixed costs allocated for fishing business in Sarappo Island consisted of the amount of depreciation and maintenance costs. Depreciation costs are component costs of fixed costs of fishing business, such as a reserve fund as replacement cost for the old fishing asset. Therefore, the fishing activities can be continued in the long term period (Panayotou 1985; Utomo et al 2013). The maintenance costs are costs incurred in the small business unit for fishing rod to maintain fishing equipment in good condition. Hence, the equipment can be effectively used for fishing activity.

Fixed costs are always calculated as long as the business still running. The fixed costs of the fishermen in Sarappo Lompo Island was boat depreciation costs, engines and ship maintenance costs, fishing gear and engine maintenance costs with an average total cost of IDR 2,736,080 for a year. The details of the average cost can be seen in Table 2.

Table 2
Average fixed costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

No	Fixed cost	Average of fixed cost (IDR) per year
1	Depreciation cost	
	Ship cost	1,472,000
	Main machine cost	708,000
2	Maintainance cost	
	Ship (paint)	449,000
	Fishing gear	47,080
	Machine	60,000
	Jumlah	2,736,080

Source: Research finding, 2017.

According to the results of the study, the boats and propulsion engines can be used for 5 years. The total expenditure for depreciation expense was IDR 2,180,000 with details

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Commented [indra32]: be more specific here? Where from are all these values?

Commented [indra33R32]: From different fishermen? Different times...?

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Commented [indra36]: to be added to the references list

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of the average boat cost per year amounting to IDR 1,472,000 and the main engine cost per year was IDR 708,000. Whereas for the average annual maintenance expenditure was IDR 556,080 per year with the details of the component consisted of a ship maintenance fee about IDR 449,000 per year, the cost of maintaining fishing gear was Rp. 47,000 per year and the cost of maintaining the engine for an average year of Rp. 60,000.

As for the range of depreciation costs for each boat and the ship engine for fishing leopard coral grouper was generally in the range of IDR.1,200,000 - IDR.1,712,000, - with a grouping of the cost range of IDR.1,200. 000, - - IDR. 1,370,000, - IDR. 1,371,000 - - IDR. 1,541,000, - and in the range of IDR. 1,542,000, - - IDR. 1,712,000. However, the highest range of fixed depreciation costs for fishing boats was in the range of IDR. 1,542,000 - IDR. 1,712,000, and the lowest was in the range of IDR. 1,371,000 - IDR. 1,541,000.

For the range of fixed cost structure, the fishermen's machines for fishing boat in the Sarappo Lompo island every year was generally in the range of IDR.400,000 - IDR.1,122,000. The detail for range of cost was grouped into several cost groups such as IDR. 400,000 - IDR.640,000, -, IDR. .641,000, - - IDR.881,000, - and in the cost range of IDR. 882,000, - - IDR. 1,122,000. However, the highest range of fixed depreciation costs for the fishing machine was in the range of IDR.641,000, - - IDR.881,000, - and the lowest was in the range of IDR. 882,000, - - IDR. 1,122,000. Furthermore, the range of maintenance costs for fishermen in Sarappo Lompo island each year was generally in the range of IDR.230,000 - IDR.764,000, - with cost grouping only in the range of IDR.230,000 - IDR.336,000, -, IDR.444,000 , - - IDR. 550,000, -. However, the highest range of fishermen's maintenance costs was in the range of IDR.551,000, - - IDR.667,000, - and in the range of IDR.658,000, - - IDR.764,000, - while the lowest was in the range of IDR.230,000, - - IDR.336,000, -.

Non-fixed cost. Non-fixed costs (variable costs) are costs that vary according to changes in production levels. Non-permanent costs include operating costs. Operational costs are costs spent by fishermen for supplies during the fishing operation. This fee consisted of fishermen's supply costs and fuel, cigarette and consumption costs during fishing operations. Generally, the amount of the average operational cost of fishermen spent by the fishermen of Sarappo Lompo Island was IDR. 23,107,880. The details of the average non-fixed costs are seen in Table 3.

Table 3
Average non-fixed costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

<i>Non fixed cost (operational cost)</i>	<i>The average non fixed cost (IDR) per year</i>
Fuel	14,128,400
Oil	36,840
Cigarette	3,203,040
Food	5,739,600
Total	23,107,880

Source: Research finding, 2017.

The structure of non-fixed costs of operational costs for leopard coral grouper in Pangkep Regency Spermonde waters was in the range of annual operational cost structure in the range of IDR 14,137,000 - IDR 30,041,000. It can be grouped into the cost range, such as IDR. 14,137,000, - - IDR. 17,317,000, -, IDR. 17,318,000, - - IDR. 20,498,000, -, IDR. 20,499,000, IDR. 23,679,000, -, IDR. 23,680,000, - - IDR. 26,860,000, - and in the cost range of IDR. 26,861,000, - - IDR. 30,041,000. However, the highest range of operational costs for fishing activities was in the range of IDR.20,499,000 - IDR.23,679,000, - and the lowest was in the range of IDR 14,137,000 - IDR.17,317,000 and IDR 17,318,000, - - IDR.20,498,000.

The difference in the non-fixed costs using handline fishing for fishing gear in the Island of Sarappo Lompo was caused by different fishing ground. The distance determined

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how much cost was need in term of fuel to reach fishing ground of leopard coral grouper. This is in line with Budiman et al (2014) stated that the size of the operational costs is influenced by the distance of fishing ground, the frequency of fishing, the length of fishing, and the amount of production.

Total cost. Wismanigrum et al (2013) stated that the total cost is the total amount of fixed costs and non-fixed costs. Fixed costs are derived from the amount of depreciation costs while the fixed costs are derived from the total operating costs and maintenance costs. The total cost of the leopard coral grouper fishing business used fishing rods in the water spermonde Pangkep Regency was IDR 25,843,960 (Table 4).

Table 4

Average total costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

Details	Cost (IDR) per year
Fixed cost	2,736,080
Non fixed cost	23,107,880
Total cost	25,843,960

Source: Research finding, 2017.

Income. Income is the value of money earned from the sale of fish production which affected by the large amount of fish caught and the market prices at the time of landing. The results of this study related to income can be seen in Table 5.

Table 5

Average annual income per year of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

No	Uraian	Average production (fish)	Price (IDR/unit)	Total (IDR)
1	Income of peak season	357	75,000	26,775,000
2	Income of yield season	309	75,000	23,175,000
3	Income of lean season	99	75,000	7,425,000
4	Annual income per year	765	75,000	57,375,000
5	Annual income per trip	3	75,000	225,000
6	Minimum per year			54,648,750
7	Maximum per year			60,108,750
8	Average per year			57,443,100

Source: Research finding, 2017.

Based on the table above the unit price of leopard coral grouper at collectors level was IDR. 75,000. Therefore, the average income at the peak season reached IDR.26,775,000, - mid season was IDR.23,175,000, and the lean season was Rp. 7,425,000 with an average annual income of IDR. 57,375,000. The income of fishermen who used fishing rod was influenced by the fishing season where the season can affect the number of catches due to different fishing trips done by fishermen. This is in accordance with Wasahua et al (2016) stated that the income of fishermen relies on the number of catches and the selling value of fish per kg in same season.

Profit. According to Ningsih et al (2013) and Budiman (2014) stated that a large profit can be obtained by reducing operational costs. Details of fishing business profits are seen in Table 6.

Table 6

Average annual profit per year of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

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No	Keterangan	Jumlah per tahun (Rp)
1	Annual income per year	57,443,100
2	Total cost	25,843,960
3	Non-fixed cost	23,107,880
	Gross profit (average annual income per year-non fixed cost)	34,335,220
	Net profit (average annual income per year-total cost)	31,599,140

Source: Research finding, 2017.

Financial analysis

Break Event Point (BEP). BEP is a condition that describes the business profits obtained equal to the capital. In other words, the business conditions experiences profits or financial losses. According to Sunyoto (2013) and Suhardi (2016) stated analysis of break even point is an analytical technique that is shown to produce information and by focusing on determining a situation where the volume of activity does not generate profits but also does not experience losses. Handline fishing in Sarappo Lompo Island was reviewed based on selling price (BEP price) and production volume (production BEP).

BEP price. The average number of fish production was 766 fish and the total cost was IDR. 25,843,960. In order to reach the break event point, the minimum fish selling price must be IDR. 33,743. While the price of leopard coral grouper was IDR. 75,000. Therefore, it can be concluded that the price of coral grouper was higher than BEP prices. This means that the business of fishing coral grouper is worth for further expansion (Table 7).

Table 7

Analisis BEP for selling price of fish caught using handline fishing in Sarappo Lompo Island

BEP (Rp) =	$\frac{\text{Total cost}}{\text{Annual cost production}}$
BEP (Rp) =	$\frac{25,843,960}{766}$
BEP (Rp) =	33,743

BEP for production. Based on the results above, the BEP for production was 345 fish. In other word, the minimum number of break event sales must be achieved in a year was 345 fish. While coral grouper production can be produced in different season; the peak season (357), mid season (309), lean season (99), the average production per trip was 3 and 765 in a year. Thus, it can be concluded that the total production of sunu fish sold for a year is higher than BEP for production.

Table 8

Analysis of BEP production for handline fishing business of coral grouper fisheremen in Sarappo Lompo Island

BEP (Production) =	$\frac{\text{Total cost}}{\text{Price of product per unit}}$
BEP (Production) =	$\frac{\text{IDR. 25,843,960}}{\text{IDR. 75,000}}$
BEP (Production) =	345 fish

R/C (revenue cost) ratio. R/C (Revenue Cost) Ratio adalah perbandingan antara total penerimaan dengan total biaya yang dikeluarkan. Untuk lebih jelasnya tentang hasil analisis R/C Rasio dalam setahun produksi dapat dilihat pada tabel 9 berikut.

Table 9

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Analysis of R/C Ratio for fishing leopard coral grouper in Sarappo Lompo Island in Spermonde water, Pangkep Regency

R/C =	$\frac{\text{Income}}{\text{Total cost}}$
R/C =	$\frac{\text{IDR. 57,443,100}}{\text{IDR. 25,843,960}}$
R/C =	2.2

The Table 9 shows amount of total cost IDR 1 equal to IDR. 2.2 of profit. Therefore, this fishing business is feasible and profitable.

Conclusions. The average fish production for leopard coral grouper of fishermen in Sarappo Island per year was 766 fish with a total trip 235 times. The analysis of the grouper business for capital investment was IDR.9,931,880, - and the total cost reached IDR. 25,843,960. Furthermore, the average income per year was IDR. 57,375,000, with an average net profit reaching IDR. 31,599,140. For the financial analysis, the calculation of BEP was IDR. 33,743 and 345 production BEPs and R / C ratio 2.2. Therefore, it can be concluded that the fishing effort of Sarappo Lompo fishermen with leopard coral grouper using fishing rods in Spermonde Pangkep District was feasible.

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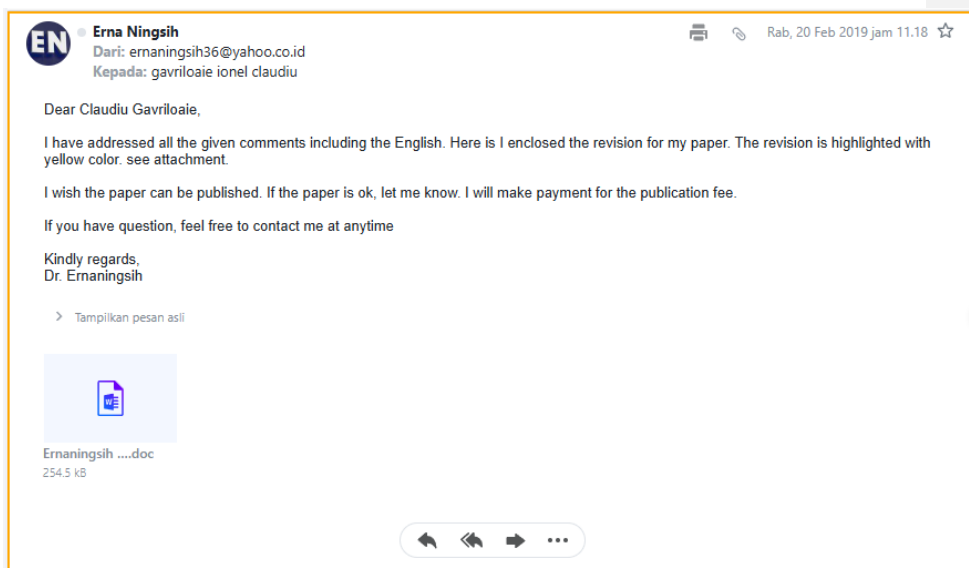
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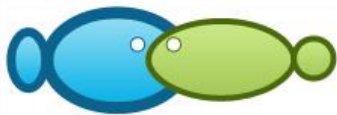
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Revision based on suggestion of
Reviewer

10. 20 Februari 2019





Financial analysis of coral trout *Plectropomus leopardus* using handline fishing gear in Sarappo Island, Pangkep Regency, South Sulawesi

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Abstract. This study aimed to determine the production status and financial aspects of coral trout commodity in Spermonde waters, Pangkep Regency, South Sulawesi. This study was carried out from January to December 2017 in Sarappo Lompo Island. Qualitative field research was applied for data collection starting with formulating the problem using the case study research strategy. The results of the study showed that the highest catches occurred in April and December 2017 (the peak season) with a total of 357 fish. The fishing efforts were 97 trips with average productivity of 4 kg per trip. The average capital investments of fishermen were IDR 9,931,880 and the total cost reached IDR 25,843,960. Furthermore, the average income per a year was IDR 57,443,100, with an average net profit reached IDR 31,599,140. The result of BEP was IDR 33,743 and 345 production BEPs and R/C ratio were 2.2.

Key Words: handline fishing gear, grouper, financial, capital investment, peak season, Pangkep.

Introduction. The increase of world demand for coral trout or *Plectropomus leopardus* as fish consumption affects the demand in the domestic level. In general, the production of fish grouper is generated from fishing and mariculture activities. For example, the capture production for groupers reached 520,404 tonnes from 2011 to 2015 or the average increase of production was about 18 to 30% (BPS 2017).

The rapid population growth and increased income per capita also contribute to the demand for fresh marine fish, especially groupers. According to Chan (2000a) and Tadjuddah (2012), 50% of live groupers traded in Hong Kong are imported from Indonesia. Furthermore, Indonesia holds 20% of international live grouper suppliers. Consequently, wild capture of coral trout juvenile for grow out business rapidly increases which lead to decline in population (Made 2017).

South Sulawesi is one of the Indonesia's provinces that contribute approximately 22,709 tonnes of domestic capture fisheries for grouper commodity in 2015. Johannes & Riepen (1995) stated that Indonesia was the largest supplier of live groupers for Hong Kong in the 1990s. In the mid 1990s,

50% of stock of demand for live grouper consumption in Indonesia was derived from the Spermonde Islands, South Sulawesi (Suncoko 2013). Therefore, Spermonde Island is the largest live grouper fishery producer in Indonesia.

The high value of groupers in international trade has resulted in increased demand for these types of fish. Consequently, wild groupers experience considerable fishing pressure leading to overfishing (Sadovy & Vincent 2002; Tadjuddah 2012) and the use of unsustainable fishing methods such as cyanide use (Johannes & Riepen 1995). According to The International Union for the Conservation of Nature and Natural Resources (IUCN) in 2006 included several types of grouper fish such as humpback grouper (*Cromileptes altivelis*), mud grouper (*Epinephelus lanceolatus* and *Epinephelus coioides*) and coral

grouper (*Plectropomus leopardus*) as threatened species (red list of threatened species) (Sadovy et al. 2018). Therefore, the aim of this study was to determine the current condition of coral trout production and its financial aspect.

Materials and Methods. This study was conducted from January to December 2017 in Sarappo Lompo Island, Pangkep Regency, Spermonde Islands. Qualitative field study method was performed by formulating the problem with the case study research strategy. Purposively sampling was applied with interviews and field observations used for data collection according to Berg (1991) and Nugroho & Sulistiono (2017). Twenty two fishermen (5%) from 437 people from Sarappo Island are used in this study.

The data has descriptively and quantitatively analysed the social and economic conditions of the local fishermen of Sarappo Lompo Island through various stages of the variables in the study with the following descriptions:

a. Analysis of descriptive used the explanation and quantitative used several calculation were applied for investment value according to Nicholson (2009):

$$TC = TFC + TVC$$

where: TC = total cost (IDR);
TFC = total fixed cost (IDR);
TVC = total variable cost (IDR).

b. The income of fishing rod business was calculated according to Tibrani (2013) and Budiman (2014):

$$\pi = TR - TC$$

where: π = profit (IDR);
TR = total revenue (IDR);
TC = total cost (IDR);

c. Analysis of break even point (BEP) according to Prawirosentoso (2001) as follows:

$$BEP \text{ (Unit)} = \frac{BTp}{\frac{Py}{\text{Unit}} - \frac{BV}{\text{Unit}}}$$

$$BEP \text{ (IDR)} = \frac{BTp}{1 - \frac{BV}{Py}}$$

where: BTp = fixed cost (IDR per production);
BV = variable cost (IDR per production);
Py = fish price (IDR per kg).

d. B/C Ratio or profit ability index (PI) according to Umar (2003) as follows:

$$PI = \frac{PV \text{ of cash flow}}{\text{Initial cash flow}}$$

where: PI = Profit ability index (IDR)
PV = Profit variable (IDR)

Decision criteria: feasible if $PI > 1$; not feasible if $PI < 1$.

Results and Discussion

Coral grouper production. The average monthly production of coral grouper using handline fishing technique in Sarappo island was 64 fish with average number of trips in 2017 was 20 times. The production of coral grouper is shown in Figure 1.

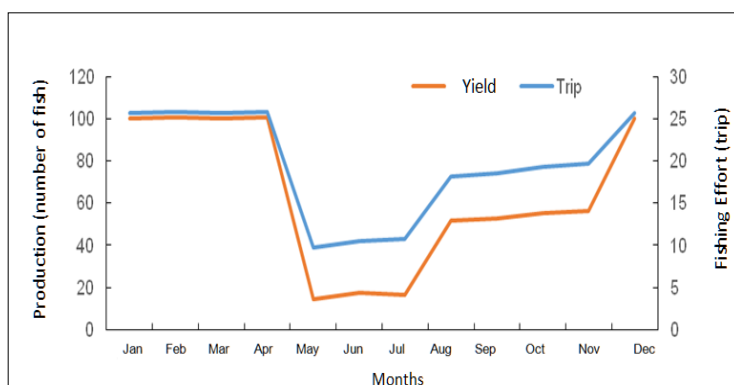


Figure 1. The production of coral grouper using handline fishing obtained from fish landing of local fishermen in Sarappo Lompo Island 2017.

In the present study, the number of catches in 2017 was 765 fish with a total trip of 235 times. The production pattern of coral trout catches was fluctuative. The production of coral grouper in January from local fishermen in Sarappo Island was 100 fish with a total trip of 26 times.

In addition, high fishing activity occurred in April and December during rainy season. In this circumstances, the coral grouper is likely to inhabit at water depth of 25-30 meters and the wave pattern of the water only temporarily took place during capture activity compared to dry season (January to early April). In the dry season, the weather tend to be calm but the intensity of the water waves was high during the fishing activity due to wind blow intensively. Based on the direct observation, it appears that the peak season of coral trout occurred during the rainy season (April and December). Nonetheless, the weather is now unpredictable due to effect of global warming lead to climate change in several fishing ground. In fact, this condition caused local fishermen problem to adapt the enviromental changes. The traditonal fishermen adapt the fishing activity based on the weather or season, but not according to monthly fishing.

Fishing production and fishing efforts based on fishing seasons. Based on the interview of local fishermen during the data collection period, the Handline fishing technique are commonly operated for coral grouper fishing activity around Sarappo Lompo Island. Fishing season affects the number of fish in the local fish landing and fish merchant (Figure 2).

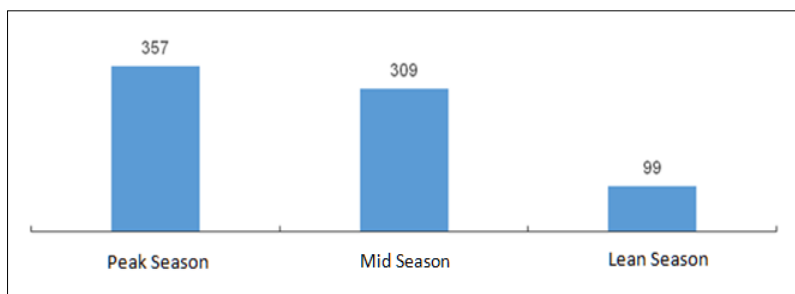


Figure 2. The fishing production of coral trout (number of fish) based on the catching season category at the fish landing of Sarappo Lompo Island, Spermonde Waters, Pangkep Regency.

Figure 2 shows a total number of fish in different fishing per season was 357 (peak season from August to October), 309 (mid season from March to July) and 99 (lean season between December and January). Therefore, the total fishing production was 765 fish. The fishing technique, food sources, fishing operation duration, environmental factor (weather) were some factors affecting the fishing efforts of local fishermen in Sarappo Lompo Island. The fishing effort based on the fishing season category is shown in Figure 3.

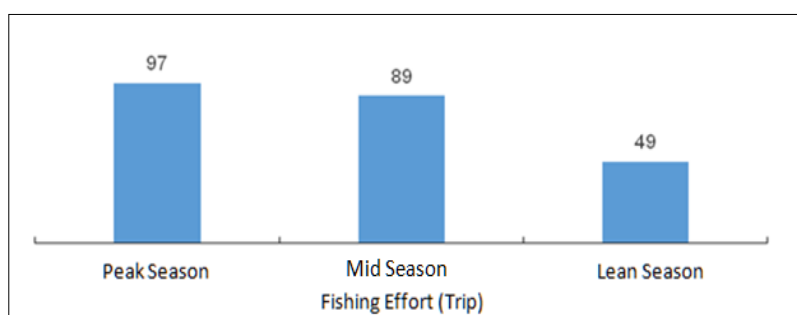


Figure 3. Fishing effort based on fishing season categories in Sarappo Island, Spermonde Island, Pangkep Regency.

Figure 3 shows the average number of trip for each season was 97 times (peak season,), 89 times (yield season), 49 times (lean season) respectively. The total fishing trip based on the fishing season reached 235 trip times. The difference in the number of fishing trip was caused by environmental factors such as waves around the Sarappo Lompo. The condition in the fishing ground made impossible to carry out fishing operations. The handline fishing technique based on fishing trip with the fishing season category is shown in Figure 4.

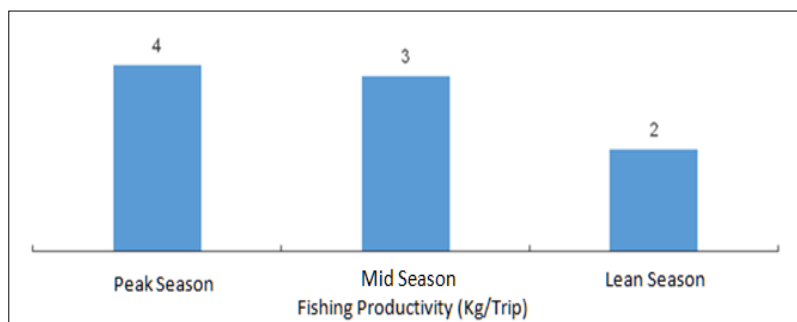


Figure 4. Fishing productivity based on fishing trips in the fishing season category at fish landing of Sarappo Lompo Island in Spermonde Waters in Pangkep Regency.

Figure 4 illustrates the average productivity value for each fishing trip; in particular season was 4 fish per trip (peak season), 3 fish per trip (yield season) and 2 fish per trip (lean season). This fishing productivity indicates the average fishing ability using the handline technique obtained during one trip of the fishing operation.

Economic aspects

Capital investment. Capital investment is required by local fishermen of Sarappo Island for running their fishing activity. According to Budiman et al (2014), the capital is an important factor in initiating a business unit which aims to earn the maximum profit with minimum operational costs. In the present study, the need of capital for fishing leopard coral grouper consisted of investment in providing fishing ships, fishing gear (fishing rods) and engines. The size of the capital depends on the type of business which is carried out. The capital for business can be successful, if it can provide economic benefits for the entrepreneur. The amount of capital needed can be seen in Table 1.

Table 1
The average capital investment of handline fishing gear for local fishermen of the Sarappo Lompo Island in the Spermonde waters of Pangkep Regency

No	Details	Value (IDR)
1	Minimum	9,030,000
2	Maximum	13,535,000
	Average	11,282,500

Source: Research finding, 2017.

Generally, the amount of initial investment of fishermen in Sarappo Lompo Island ranged from IDR 9,030,000, to IDR 13,535,000. However, the average cost was IDR. 11,282,500. The structure of the investment obtained from different group of investment including IDR 9,030,000 (Fishermen A), IDR 9,931,000 (Fishermen B), IDR 9,932,000 (Fishermen C), IDR 10,883,000 (Fisheremen D), IDR 10,884,000 (Fisheremen E), IDR 11,735,000 (Fisheremen F), IDR 11,736,000 (Fishermen G), IDR 12,637,000 (Fishermen H), and the investment cost ranged from IDR 12,638,000 to IDR 13,535,000. Those average investments obtained from group of investment from several groups of local fishermen. The data was collected from different fishermen in the same times of data collection. The highest range of investment costs for fishermen was the range of IDR 11,736,000 to IDR. 12,637,000. The lowest was in the range of IDR 12,638,000, and IDR 13,535,000. The different in investment costs is caused by the differences size of the ship, the brand of the engine, the fishing gear and the year of purchase. According to Yanuartoro (2013) stated that the price of each unit of a fishing business owner is different from other business owners. Furthermore Budiman et al (2014) claimed the year of buying the equipment, second hand equipments lead to different investment. Moreover, the price of new goods are certainly more expensive than the price of second hand goods. In addition, an increase in prices of each of the capture business units are also recorded.

Fixed cost. In present study, the fixed costs for operational fishing business in Sarappo Island consisted of depreciation costs and maintenance expenses. Depreciation costs are reserve fund used for replacing the old fishing asset thus the operational fishing activity can be done continuously (Panayotou 1985; Utomo et al 2013). Meanwhile, the maintenance costs are costs incurred in the micro business unit for fishing rod. Fixed costs are always calculated as long as the business still running. The fixed costs of the fishermen in Sarappo Lompo Island was depreciation costs, engines and ship maintenance costs, fishing gear and engine maintenance costs with an average total cost of IDR 2,736,080 for a year. The details of the average cost can be seen in Table 2.

Table 2
Average fixed costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

No	Fixed cost	Average of fixed cost (IDR) per year
1	Depreciation cost	
	Ship cost	1,472,000
	Main machine cost	708,000

2	Maintainance cost	
	Ship (paint)	449,000
	Fishing gear	47,080
	Machine	60,000
	total	2,736,080

Source: Research finding, 2017.

The fishing boats and propulsion engines may operated for 5 years. The total expenditure for depreciation expense is IDR 2,180,000 with details of the average boat cost per year amounting to IDR 1,472,000 and the main engine cost per year is IDR 708,000. Whereas the average annual maintenance expenditure is at IDR 556,080 per year with the details of the component consisted of a ship maintenance services (IDR 449,000 per year), the maintainance cost for fishing gear is IDR. 47,000 per year and the engine maintainance cost is IDR. 60,000.

The depreciation costs for each boat and the ship engine for fishing coral trout are generally in the range of IDR.1,200,000 and IDR.1,712,000 with a grouping of the cost range from IDR.1,200,000 to IDR. 1,370,000, IDR. 1,371,000, IDR. 1,541,000, and in the range between IDR. 1,542,000 and IDR. 1,712,000. However, the highest range of fixed depreciation costs for fishing boats was in the range from IDR. 1,542,000 to IDR. 1,712,000, and the lowest was in the range from IDR. 1,371,000 to IDR. 1,541,000.

In addition, the fixed cost structure for local fishermen's fishing boat of Sarappo Lompo Island per year was generally in the range between IDR. 400,000 and IDR. 1,122,000. The detail for range of cost is grouped into several cost groups such as IDR. 400,000 - IDR. 640,000, IDR. 641,000, IDR.881,000, IDR. 882,000, IDR. 1,122,000. However, the highest range of fixed depreciation costs for the fishing boat machine are found in the depreciation cost range from IDR. 641,000 to IDR.881,000 and the lowest is in the range of IDR. 882,000, IDR. 1,122,000.

Furthermore, the range of maintenance costs per year was mostly in the range from IDR.230,000 to IDR.764,000 with investment group only in the range from IDR.230,000 to IDR.336,000, IDR.444,000, IDR. 550,000. However, the highest range of fishermen's boat maintenance costs was in the range from IDR.551,000 to IDR.764,000, while the lowest was in the range from IDR.230,000 to IDR.336,000.

Non-fixed cost. Non-fixed costs (variable costs) are costs that vary according to changes in production levels. Non-permanent costs include operating costs. Operational costs are costs spent by fishermen for supplies during the fishing operation. This fee consisted of fishermen's supply costs and fuel, cigarette and consumption costs during fishing operations. Generally, the amount of the average operational cost of fishermen spent by the fishermen of Sarappo Lompo Island was IDR. 23,107,880. The details of the average non-fixed costs are seen in Table 3.

Table 3
Average non-fixed costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

<i>Non fixed cost (operational cost)</i>	<i>The average non fixed cost (IDR) per year</i>
Fuel	14,128,400
Oil	36,840
Food	8,942,640
Total	23,107,880

Source: Research finding, 2017.

The structure of non-fixed costs of operational costs for leopard coral grouper in Pangkep Regency Spermonde waters was in the range of annual operational cost structure in the range from IDR 14,137,000 to IDR 30,041,000. It can be gropued into the cost range, such as IDR. 14,137,000, IDR. 17,317,000, IDR. 17,318,000, IDR. 20,498,000, IDR. 20,499,000, IDR. 23,679,000, IDR. 23,680,000, IDR. 26,860,000, and in the cost range

from IDR. 26,861,000 to IDR. 30,041,000. However, the highest range of operational costs for fishing activities was in the range from IDR.20,499,000 to IDR.23,679,000, and the lowest was in the range from IDR 14,137,000 to IDR.17,317,000 and IDR 17,318,000 to IDR.20,498,000.

The difference in the non-fixed costs using handline fishing for fishing gear in the Island of Sarappo Lompo was caused by different fishing ground. The distance determined how much cost was need in term of fuel to reach fishing ground of leopard coral grouper. This is in line with Budiman et al (2014) stated that the size of the operational costs is influenced by the distance of fishing ground, the frequency of fishing, the length of fishing, and the amount of production.

Total cost. Wismanigrum et al (2013) stated that the total cost is the total amount of fixed costs and non-fixed costs. Fixed costs are derived from the amount of depreciation costs while the fixed costs are derived from the total operating costs and maintenance costs. The total cost of the leopard coral grouper fishing business used fishing rods in the water spermonde Pangkep Regency was IDR 25,843,960 (Table 4).

Table 4

Average total costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

Details	Cost (IDR) per year
Fixed cost	2,736,080
Non fixed cost	23,107,880
Total cost	25,843,960

Source: Research finding, 2017.

Income. Income is the value of money earned from the sale of fish production which affected by the large amount of fish caught and the market prices at the time of landing. The results of this study related to income can be seen in Table 5.

Table 5

Average annual income per year of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

No	Type of Income	Average production (fish)	Price (IDR/unit)	Total (IDR)
1	Income of peak season	357	75,000	26,775,000
2	Income of yield season	309	75,000	23,175,000
3	Income of lean season	99	75,000	7,425,000
4	Annual income per year	765	75,000	57,375,000
5	Annual income per trip	3	75,000	225,000
6	Minimum per year			54,648,750
7	Maximum per year			60,108,750
8	Average per year			57,443,100

Source: Research finding, 2017.

Based on the table above the unit price of leopard coral grouper at collectors level was IDR. 75,000. Therefore, the average income at the peak season reached IDR.26, 775,000, mid season was IDR. 23,175,000, and the lean season was IDR. 7,425,000 with an average annual income of IDR. 57,375,000. The income of fishermen who used fishing rod was influenced by the fishing season where the season can affect the number of catches due to different fishing trips done by fishermen. This is in accordance with Wasahua et al (2016) stated that the income of local fishermen relies on the number of catches and the selling value of fish per kg in same season.

Profit. According to Ningsih *et al* (2013) and Budiman (2014) stated that a large profit can be obtained by reducing operational costs. Details of fishing business profits are seen in Table 6.

Table 6

Average annual profit per year of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

No	Information	Total per year (IDR)
1	Annual income per year	57,443,100
2	Total cost	25,843,960
3	Non-fixed cost	23,107,880
	Gross profit (average annual income per year-non fixed cost)	34,335,220
	Net profit (average annual income per year-total cost)	31,599,140

Source: Research finding, 2017.

Financial analysis

Break Event Point (BEP). BEP is a condition that describes the business profits obtained equal to the capital. In other words, the business conditions experiences profits or financial losses. According to Sunyoto (2013) and Suhardi (2016) stated analysis of break even point is an analytical technique that is shown to produce information and by focusing on determining a situation where the volume of activity does not generate profits but also does not experience losses. Handline fishing in Sarappo Lompo Island was reviewed based on selling price (BEP price) and production volume (production BEP).

BEP price. The average number of fish production was 766 fish and the total cost was IDR. 25,843,960. In order to reach the break event point, the minimum fish selling price must be IDR. 33,743. While the price of leopard coral grouper was IDR. 75,000. Therefore, it can be concluded that the price of coral grouper was higher than BEP prices. This means that the business of fishing coral grouper is worth for further expansion (Table 7).

Analisis BEP for selling price of fish caught using handline fishing in Sarappo Lompo Island

$$\begin{aligned} \text{BEP (price)} &= \text{total cost} / \text{Annual cost production} \\ &= 25,843,960 / 766 \\ &= \text{IDR. } 33,743 \end{aligned}$$

BEP for production. Based on the results above, the BEP for production was 345 fish. In other word, the minimum number of break event sales must be achieved in a year was 345 fish. While coral grouper production can be produced in different season; the peak season (357), mid season (309), lean season (99), the average production per trip was 3 and 765 in a year. Thus, it can be concluded that the total production of sunu fish sold for a year is higher than BEP for production.

Analysis of BEP production for handline fishing business of coral grouper fishermen in Sarappo Lompo Island

$$\begin{aligned} \text{BEP (Production)} &= \text{total cost} / \text{price of product per unit} \\ &= \text{IDR. } 25,843,960 / \text{IDR. } 75,000 \\ &= 345 \end{aligned}$$

R/C (revenue cost) ratio. R/C (Revenue Cost) Ratio is the ratio between total revenues and total costs incurred. For more details about the results of the R / C ratio analysis in a year of production can be seen in table 9 below:

Analysis of R/C Ratio for fishing leopard coral grouper in Sarappo Lompo Island in Spermonde water, Pangkep Regency

$$\begin{aligned} \text{R/C} &= \text{Income} / \text{Total cost} \\ &= \text{IDR. } 57,443,100 / \text{IDR. } 25,843,960 \\ &= 2.2 \end{aligned}$$

The calculation shows amount of total cost IDR 1 equal to IDR. 2.2 of profit. Therefore, this fishing business is feasible and profitable.

Conclusions. The average fish production for leopard coral grouper of fishermen in Sarappo Island per year was 766 fish with a total trip 235 times. The analysis of the grouper business for capital investment was IDR.9,931,880, - and the total cost reached IDR. 25,843,960. Furthermore, the average income per year was IDR. 57,375,000, with an average net profit reaching IDR. 31,599,140. For the financial analysis, the calculation of BEP was IDR. 33,743 and 345 production BEPs and R/C ratio 2.2. Therefore, it can be concluded that the fishing effort of Sarappo Lompo fishermen with leopard coral grouper using fishing rods in Spermonde Pangkep District was feasible.

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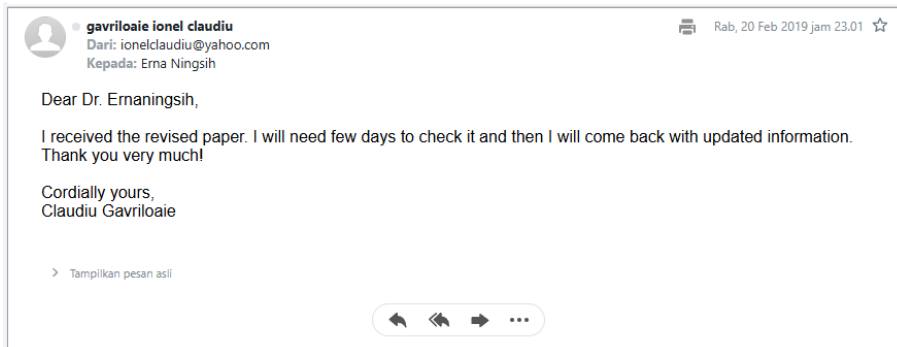
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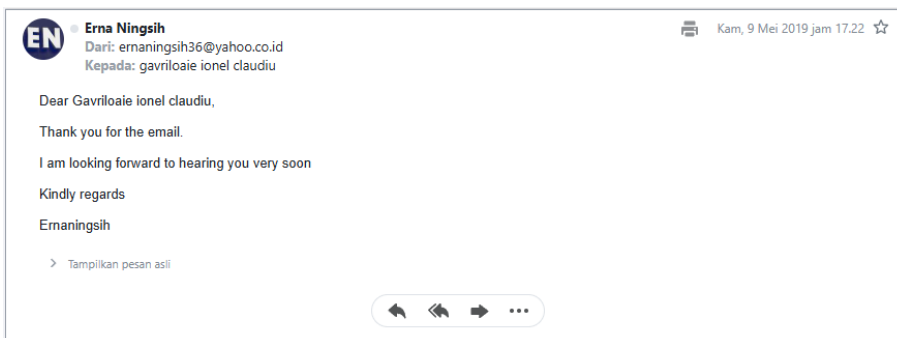
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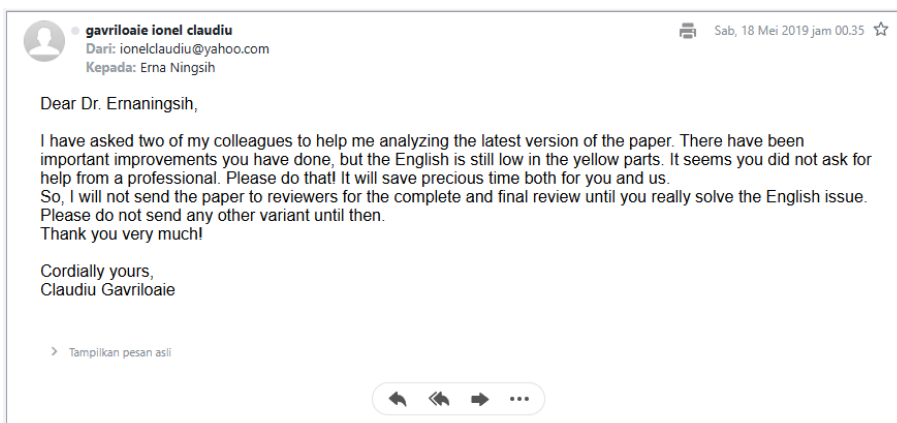
11. 20 Februari 2019



12. 09 Mei 2019



13. 18 Mei 2019



14. 08 Juni 2019

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Kepada: gavriloaie ionel claudiu

Sab, 8 Jun 2019 jam 23.09 

Dear Claudiu Gavriloaie,

Here is I enclosed the latest revision of my paper. I have addressed all your comments, especially English. I have tried the best and send the paper to others for peer-reviewed. The changes are indicated by the green color.

I really hope and wish the paper can be published this month. I need to include it to my research report.

Thank you very much for the considerable assistance for the paper.

I am looking forward to hearing from you very soon

Kindly regards,

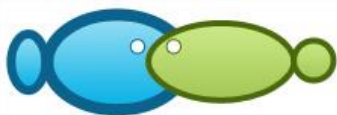
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Financial analysis of coral trout *Plectropomus leopardus* using handline fishing gear in Sarappo Island, Pangkep Regency, South Sulawesi

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Abstract. The present study aims to determine the current state of coral trout *Plectropomus leopardus* catch and its financial aspects in Sarappo Island waters, Pangkep Regency, South Sulawesi Indonesia. This study was carried out from January to December 2017. The case study as a research strategy was used for data collection. A total of 357 fish were caught from April and December 2017 with 97 fishing trips. The average productivity of 4 kg per trip. The average initial capital investments of fishermen were IDR 9,931,880 and the total cost was IDR 25,843,960. In addition, the average income per year was IDR 57,443,100, with an average net profit of business about IDR 31,599,140. The result of BEP was IDR 33,743 and 345 production BEPs and R/C ratio were 2.2.

Keywords: handline fishing gear, grouper, financial, capital investment, peak season, Pangkep.

Introduction. The increase of world demand for coral trout *Plectropomus leopardus* as fish consumption affects the domestic production of coral trout in Indonesia. In 2015, the capture production for groupers reached 520,404 tonnes with the increased from 18 to 30% per year (BPS 2017). According to Chan (2000a) and Tadjuddah (2012), 50% of live groupers traded in Hong Kong are imported from Indonesia. Furthermore, Indonesia holds 20% of international live grouper suppliers. Consequently, wild capture of juvenile coral trout for grow out rapidly increases which lead to a decline in the wild stock of coral trout (Made 2017).

South Sulawesi is one of Indonesia's provinces that contribute approximately 22,709 tonnes of domestic capture fisheries for grouper fish in 2015. Johannes & Riepen (1995) stated that Indonesia was the largest supplier of live groupers for Hong Kong in the early 1990s to the mid-1990s. 50% of live grouper for domestic and International consumption derived from the Spermonde Islands, South Sulawesi (Suncoko 2013) which makes Spermonde Island as the largest live grouper fishery producer in Indonesia. Consequently, wild groupers stock experience considerable fishing pressure leading to overfishing (Sadovy & Vincent 2002; Tadjuddah 2012) and the use of unsustainable fishing methods such as cyanide use (Johannes & Riepen 1995) increased a further decline for wild groupers.

According to The International Union for the Conservation of Nature and Natural Resources (IUCN) in 2006 included several types of grouper fish such as humpback grouper (*Cromileptes altivelis*), mud grouper (*Epinephelus lanceolatus* and *Epinephelus coioides*) and coral trout (*Plectropomus leopardus*) as threatened species (red list of threatened species) (Sadovy et al. 2018). Therefore, the present study aims to determine the current state of coral trout *Plectropomus leopardus* catch and its financial aspects.

Materials and Methods. The present study was carried out from January to December 2017 in Sarappo Lompo Island, Pangkep Regency, Spermonde Islands Indonesia. The case

study as a research strategy was used for data collection based on Berg (1991) and Nugroho and Sulistiono (2017) methods. A total of 25 fisheremans (5% from 437 local community in Sarappo Island were used as respondents during the study period.

The data has descriptively and quantitatively analysed the social and economic conditions of the local fishermen of Sarappo Lompo Island through various stages of the variables in the study with the following descriptions:

a. Analysis of descriptive used the explanation and quantitative used several calculation were applied for investment value according to Nicholson (2009):

$$TC = TFC + TVC$$

where: TC = total cost (IDR);

TFC = total fixed cost (IDR);

TVC = total variable cost (IDR).

b. The income of fishing rod business was calculated according to Tibrani (2013) and Budiman (2014):

$$\pi = TR - TC$$

where: π = profit (IDR);

TR = total revenue (IDR);

TC = total cost (IDR);

c. Analysis of break even point (BEP) according to Prawirosentoso (2001) as follows:

$$BEP \text{ (Unit)} = \frac{BTp}{\frac{Py}{\text{Unit}} - \frac{BV}{\text{Unit}}}$$

$$BEP \text{ (IDR)} = \frac{BTp}{1 - \frac{BV}{Py}}$$

where: BTp = fixed cost (IDR per production);

BV = variable cost (IDR per production);

Py = fish price (IDR per kg).

d. B/C Ratio or profit ability index (PI) according to Umar (2003) as follows:

$$PI = \frac{PV \text{ of cash flow}}{\text{Initial cash flow}}$$

where: PI = Profit ability index (IDR)

PV = Profit variable (IDR)

Decision criteria: feasible if $PI > 1$; not feasible if $PI < 1$.

Results and Discussion

Coral grouper production. Average monthly production of coral trout in Sarappo Island was 64 fish with 20 times of fishing trips (figure 1).

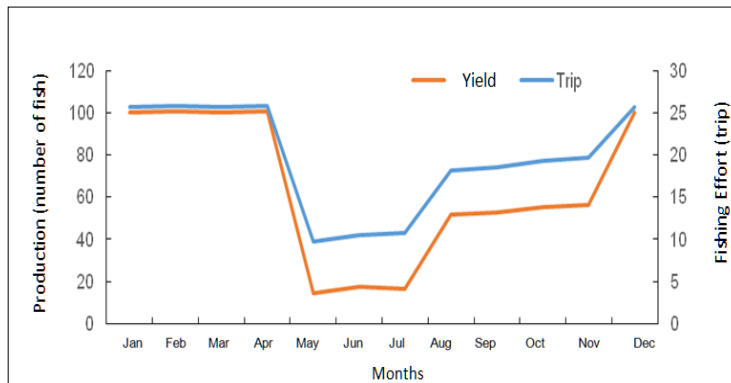


Figure 1. The production of coral trout using handline fishing obtained from fish landing of local fishermen in Sarappo Lompo Island 2017.

In the present study, the total number of fish catches was 765 fish with a total trip of 235 times. Nonetheless, the coral trout catches tend to be fluctuating. In addition, high fishing activity occurred in April and December during the rainy season. In this circumstances, the coral trout is more likely to spend time at a water depth of 25-30 meters and the wave pattern of the water only temporarily took place during capture activity compared to the dry season (January to early April). In the dry season, the weather tends to be calm but the intensity of the water waves was high during the fishing activity due to wind blow intensively. Based on the direct observation, it appears that the peak season of coral trout occurred during the rainy season (April and December). Nonetheless, the weather is now unpredictable due to the effect of global warming lead to climate change in some fishing ground. In fact, this condition caused local fishermen problem to adapt the environmental changes. The traditional fishermen adapt the fishing activity based on the weather or season, but not according to monthly fishing.

Fishing production and fishing efforts based on fishing seasons. Based on the interview with local fishermen, the Handline fishing technique was commonly operated for coral grouper fishing activity around Sarappo Lompo Island. Fishing season affects the number of fish in the local fish landing and fish merchant (Figure 2).

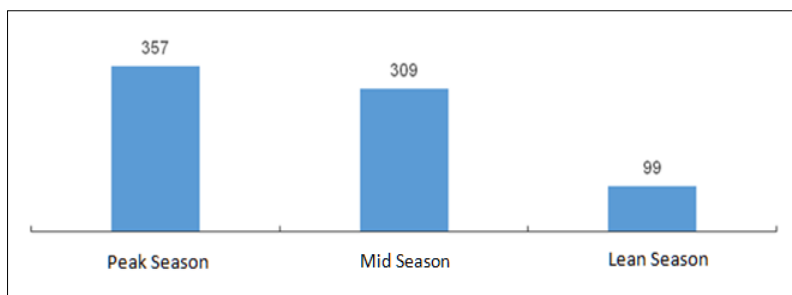


Figure 2. The fishing production of coral trout (number of fish) based on the catching season category at the fish landing of Sarappo Lompo Island, Spermonde Waters, Pangkep Regency.

Figure 2 shows a total of 765 fish in different fishing per season was recorded during the study period which consisted of 3 different fishing times. A total 357 of fish captured during the peak season from August to October, 309 fish (mid-season from March to July) and 99 fish (lean season between December and January) respectively. The fishing technique, food sources, fishing operation duration, environmental factor (weather) are some factors may affecting the number of fish catch.

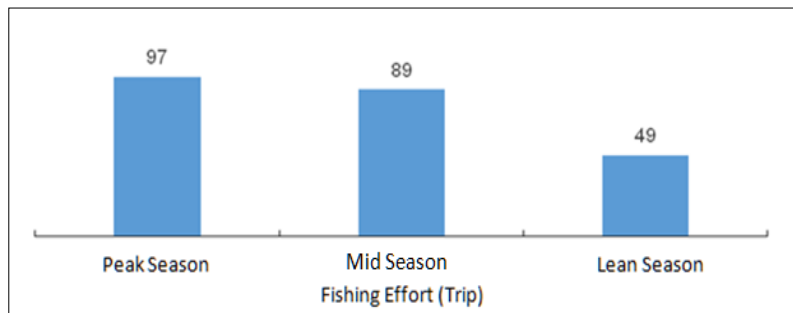


Figure 3. Fishing effort based on fishing season in Sarappo Island, Spermonde Island, Pangkep Regency.

Figure 3 shows the average number of trip for each season was 97 times (peak season), 89 times (yield season), 49 times (lean season) respectively. The total fishing trip based on the fishing season reached 235 trip times. The difference in the number of fishing trip caused by the environmental factors such as strong waves and bad weather. The condition in the fishing ground hampered the fishing operations.

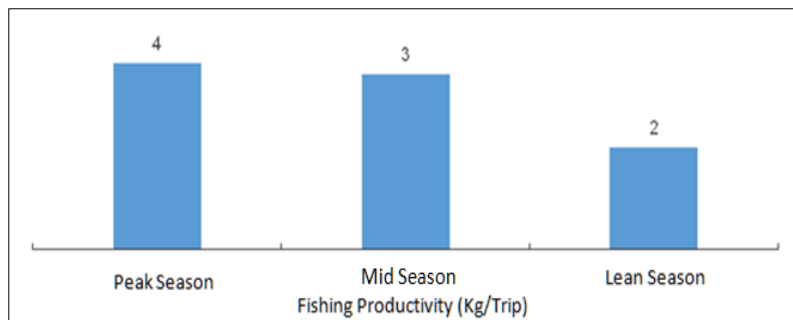


Figure 4. Fishing productivity based on fishing trips in the fishing season at fish landing of Sarappo Lompo Island Waters in Pangkep Regency.

Figure 4 illustrates the average productivity value for each fishing trip; in particular season was 4 fish per trip (peak season), 3 fish per trip (yield season) and 2 fish per trip (lean season) respectively. This fishing productivity indicates the average fishing ability using the handline technique obtained during one trip of the fishing operation.

Economic aspects

Capital investment. According to Budiman et al (2014), the capital is an important factor in initiating a business unit which aims to earn the maximum profit with minimum operational costs. In the present study, the business capital for fishing coral trout consisted of several investments such as providing fishing ships, fishing gear, and ship engines. The size of the capital depends on the scale of the business. The amount of capital needed by the local fishermen during the study period can be seen in Table 1.

Table 1

The average capital investment of handline fishing gear for local fishermen of the Sarappo Lompo Island waters in Pangkep Regency

No	Details	Value (IDR)
1	Minimum	9,030,000
2	Maximum	13,535,000
	Average	11,282,500

Source: Research finding, 2017.

The amount of initial investment of fishermen in Sarappo Lompo Island ranged from IDR 9,030,000 to IDR 13,535,000. However, the average cost was about IDR. 11,282,500. The structure of the investment obtained from a different group of fishermen. A total of eight group of fishermen with the total investment as follows; IDR 9,030,000 of total investment (Fishermen A), IDR 9,931,000 of total investment (Fishermen B), IDR 9,932,000 of total investment (Fishermen C), IDR 10,883,000 of total investment (Fishermen D), IDR 10,884,000 of total investment (Fishermen E), IDR 11,735,000 of total investment (Fishermen F), IDR 11,736,000 of total investment (Fishermen G), IDR 12,637,000 of total investment (Fishermen H), and the investment cost ranged from IDR 12,638,000 to IDR 13,535,000. Those average investments obtained from a group of investment from several groups of local fishermen. The data was collected from different fishermen at the same times of data collection. The highest range of investment costs for fishermen was the range of IDR 11,736,000 to IDR. 12,637,000. The lowest was in the range of IDR 12,638,000, and IDR 13,535,000. The difference in investment costs is caused by the size of the ship, the brand of the engine, the fishing gear and the year of purchase. According to Yanuartoro (2013) stated that the price of each unit of a fishing business owner is different from other business owners. Furthermore, Budiman et al (2014) claimed the year of buying the equipment, second-hand equipment leads to differences in total investment for each fishermen group. Moreover, the price of new goods is certainly more expensive than the price of second-hand goods. In addition, an increase in prices of each of the capture business units is also recorded.

Fixed cost. In the present study, the fixed costs for operational fishing business in Sarappo Island consisted of depreciation costs and maintenance expenses. Depreciation costs are reserve fund used for replacing the old fishing asset thus the operational fishing activity can be done continuously (Panayotou 1985; Utomo et al 2013). Meanwhile, the maintenance costs are costs incurred in the micro business unit for the fishing rod. Fixed costs are always calculated as long as the business still running. The fixed costs of the fishermen in Sarappo Lompo Island was depreciation costs, engines and ship maintenance costs, fishing gear and engine maintenance costs with an average total cost of IDR 2,736,080 for a year. The details of the average cost can be seen in Table 2

Table 2

Average fixed costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

No	Fixed cost	Average of fixed cost (IDR) per year
1	Depreciation cost	
	Ship cost	1,472,000
	Main machine cost	708,000
2	Maintenance cost	
	Ship (paint)	449,000
	Fishing gear	47,080
	Machine	60,000
	Total	2,736,080

Source: Research finding, 2017.

The fishing boats and propulsion engines may be operated for 5 years. The total expenditure for depreciation expense was IDR 2,180,000 with details of the average boat cost per year amounting to IDR 1,472,000 and the main engine cost per year was IDR 708,000. Whereas the average annual maintenance expenditure was at IDR 556,080 per year with the details of the component consisted of a fishing boat maintenance and services (IDR 449,000 per year), the maintenance cost for fishing gear was IDR. 47,000 per year and the engine maintenance cost was IDR. 60,000.

The depreciation costs for each boat and the ship engine for fishing coral trout ranged from IDR.1,200,000 to IDR.1,712,000 with a grouping of the cost ranged from IDR.1,200,000 to IDR. 1,370,000, IDR. 1,371,000, IDR. 1,541,000, and in the range between IDR. 1,542,000 and IDR. 1,712,000. However, the highest range of fixed depreciation costs for fishing boats ranged from IDR. 1,542,000 to IDR. 1,712,000, and the lowest ranged from IDR. 1,371,000 to IDR. 1,541,000.

In addition, the fixed cost structure for local fishermen's fishing boat of Sarappo Lompo Island per year ranged from IDR. 400,000 to IDR. 1,122,000. The detail for the range of cost was grouped into several cost groups such as IDR. 400,000 - IDR. 640,000, IDR. 641,000, IDR.881,000, IDR. 882,000, IDR. 1,122,000. However, the highest range of fixed depreciation costs for the fishing boat machine found in the depreciation cost which ranged from IDR. 641,000 to IDR.881,000 and the lowest ranged from IDR. 882,000 to IDR. 1,122,000.

Furthermore, the range of maintenance costs per year was mostly in the range from IDR.230,000 to IDR.764,000 with investment group only in the range from IDR.230,000 to IDR.336,000, IDR.444,000, IDR. 550,000. However, the highest range of fishermen's boat maintenance costs ranged from IDR.551,000 to IDR.764,000, while the lowest ranged from IDR.230,000 to IDR.336,000.

Non-fixed cost. Non-fixed costs (variable costs) are costs that vary according to changes in production levels such as operational costs. This cost consisted of fishermen's supply costs and fuel, and logistics during fishing operations. The amount of the average operational cost of fishermen spent by the fishermen was IDR. 23,107,880. The details of the average non-fixed costs are seen in Table 3.

Table 3

Average non-fixed costs of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

<i>Non fixed cost (operational cost)</i>	<i>The average non fixed cost (IDR) per year</i>
Fuel	14,128,400
Oil	36,840
Food	8,942,640
Total	23,107,880

Source: Research finding, 2017.

In the present study, the structure of non-fixed costs of operational costs for coral trout ranged from IDR 14,137,000 to IDR 30,041,000. It can be grouped into several group of costs as follows IDR. 14,137,000, IDR. 17,317,000, IDR. 17,318,000, IDR. 20,498,000, IDR. 20,499,000, IDR. 23,679,000, IDR. 23,680,000, IDR. 26,860,000, and IDR. 26,861,000 to IDR. 30,041,000. However, the highest range of operational costs ranged from IDR.20,499,000 to IDR.23,679,000, and the lowest ranged from IDR 14,137,000 to IDR.17,317,000 and IDR 17,318,000 to IDR.20,498,000.

The difference in the non-fixed costs caused by different fishing ground which determined by the location of the fishing ground and how much fuel to reach the fishing ground of coral trout. This is in line with Budiman et al (2014) stated that the size of the

operational costs is influenced by the distance of fishing ground, the frequency of fishing, the length of fishing, and the amount of production.

Total cost. Wismanigrum et al (2013) stated that the total cost is the total amount of fixed costs and non-fixed costs. Fixed costs are derived from the depreciation costs while the fixed costs are derived from the total operating costs and maintenance costs. The total cost of the leopard coral grouper fishing business used fishing rods in the water spermonde Pangkep Regency was IDR 25,843,960 (Table 4).

Table 4
Average total costs of fishing activity for coral trout in Sarappo Lompo Island using handline fishing gear

Details	Cost (IDR) per year
Fixed cost	2,736,080
Non fixed cost	23,107,880
Total cost	25,843,960

Source: Research finding, 2017.

Income. Income is the value of money earned from the sale of fish which affected by the number of fish caught and the market prices. The results of this study related to income can be seen in Table 5.

Table 5
Average annual income per year of fishing activity for coral trout in Sarappo Lompo Island using handline fishing gear

No	Type of Income	Average production (fish)	Price (IDR/unit)	Total (IDR)
1	Income of peak season	357	75,000	26,775,000
2	Income of yield season	309	75,000	23,175,000
3	Income of lean season	99	75,000	7,425,000
4	Annual income per year	765	75,000	57,375,000
5	Annual income per trip	3	75,000	225,000
6	Minimum per year			54,648,750
7	Maximum per year			60,108,750
8	Average per year			57,443,100

Source: Research finding, 2017.

Based on the table above the unit price of coral trout at local wholesale and brokers was IDR. 75,000. Therefore, the average income at the peak season reached IDR. 26,775,000, midseason was IDR. 23,175,000, and the lean season was IDR. 7,425,000 with an average annual income of IDR. 57,375,000. The income of handline fishermen influenced by the fishing season where the season can affect the number of catches due to different fishing trips. This is in accordance with Wasahua et al (2016) stated that the income of local fishermen relies on the number of catches and the selling value of fish per kg in the same season.

Profit. According to Ningsih et al (2013) and Budiman (2014) stated that a large profit can be obtained by reducing operational costs. Details of fishing business profits are seen in Table 6.

Table 6
Average annual profit per year of fishing activity for leopard coral grouper in Sarappo Lompo Island using handline fishing gear

No	Information	Total per year (IDR)
1	Annual income per year	57,443,100
2	Total cost	25,843,960
3	Non-fixed cost	23,107,880
	Gross profit (average annual income per year-non fixed cost)	34,335,220
	Net profit (average annual income per year-total cost)	31,599,140

Source: Research finding, 2017.

Financial analysis

Break Event Point (BEP). BEP is a condition that describes the business profits obtained equal to the capital. In other words, business conditions experience profits or financial losses. According to Sunyoto (2013) and Suhardi (2016) stated analysis of break-even point is an analytical technique that is shown to produce information and by focusing on determining a situation where the volume of activity does not generate profits but also does not experience losses. Handline fishing in Sarappo Lompo Island was reviewed based on selling price (BEP price) and production volume (production BEP).

BEP price. The average number of fish production was 765 fish and the total cost was IDR. 25,843,960. In order to reach the break-even point, the minimum fish selling price must be IDR. 33,743. While the price of coral trout was IDR. 75,000. Therefore, it can be concluded that the price of coral grouper was higher than BEP prices. It means that the coral trout business is worth for further expansion (Table 7).

Analysis BEP for selling price of fish caught using handline fishing in Sarappo Lompo Island

$$\begin{aligned}\text{BEP (price)} &= \text{total cost} / \text{Annual cost production} \\ &= 25,843,960 / 765 \\ &= \text{IDR. } 33,782\end{aligned}$$

In order to achieve the BEP in a year, a total of 345 fish need to sale in the market. While coral grouper production can be produced in different season; the peak season (357), mid-season (309), lean season (99), the average production per trip was 3 and 765 in a year. Thus, it can be concluded that the total production of coral trout sold for a year is higher than BEP for production.

Analysis of BEP production for handline fishing business of coral trout fishermen in Sarappo Lompo Island

$$\begin{aligned}\text{BEP (Production)} &= \text{total cost} / \text{price of product per unit} \\ &= \text{IDR. } 25,843,960 / \text{IDR. } 75,000 \\ &= 345\end{aligned}$$

R/C (revenue cost) ratio. R/C (Revenue Cost) Ratio is the ratio between total revenues and total costs incurred. For more details about the results of the R / C ratio analysis in a year of production can be seen in table 9 below:

Analysis of R/C Ratio for fishing leopard coral grouper in Sarappo Lompo Island in Spermonde water, Pangkep Regency

$$\begin{aligned}\text{R/C} &= \text{Income} / \text{Total cost} \\ &= \text{IDR. } 57,443,100 / \text{IDR. } 25,843,960 \\ &= 2.2\end{aligned}$$

The calculation shows amount of total cost IDR 1 equal to IDR. 2.2 of profit. Therefore, this fishing business is feasible and profitable.

Conclusions. The average fish production for coral trout of fishermen in Sarappo Island per year was 765 fish with a total trip 235 times. Based on BEP, the minimum selling price is IDR. 33,782 and a total of 345 fish and R/C ratio 2.2. Therefore, the handline fishing for coral trout in Sarappo island waters is feasible.

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15. 14 Juni 2019



gavriloaie ionel claudiu
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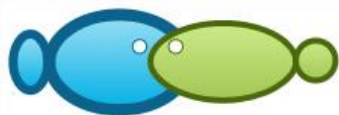
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Financial analysis of coral trout *Plectropomus leopardus* using handline fishing gear in Sarappo Island, Pangkep Regency, South Sulawesi

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Abstract. The aim of this study was to determine the current state of coral trout *Plectropomus leopardus* yields and its financial contribution to Sarappo Island waters of Pangkep Regency, South Sulawesi, Indonesia. This study was carried out from January to December 2017. Handline fishing techniques were used to acquire the fish sample. The number of each yield and costs were recorded for data collection. The total cost profit, Break-Even Point (BEP) and Profitability Index (PI) were used for data analysis. A total of 765 fish were caught from 235 fishing trips. The average initial capital investment for fishing operations was IDR 9,931,880, and the total cost was IDR 25,843,963. In addition, the average annual income was IDR 57,443,100, with an average net profit of about IDR 31,599,140. The BEP was a selling 345 fish at IDR 33,743 each, and the R/C ratio was 2.2.

Keywords: handline fishing gear, grouper, financial, capital investment, peak season, Pangkep.

Introduction. An increase of grouper fish world demand has also caused an increase of grouper fish domestic productions in Indonesia. In 2015, the total yield for grouper fish reached 520,404 tonnes, an increase from 18% to 30% per year (BPS 2017). According to Chan (2000a) and Tadjuddah (2012), 50% of the total exports of live grouper fish were from Hong Kong and 20% of the international market was supplied by Indonesia. Consequently, wild capture for juvenile groupers fish also influences the wild stock of grouper fish commodity as well as a stock of coral trout *Plectropomus leopardus* in South Sulawesi (Made, 2017).

South Sulawesi is one of Indonesia's provinces that contributes approximately 22,709 tonnes of domestic productions of grouper fish in 2015. Approximately 50% of live grouper for domestic and International consumption derived from the Spermonde Islands, South Sulawesi (Suncoko 2013) which makes Spermonde Island the largest live grouper fishery producer in Indonesia. Consequently, wild grouper fishing leads to overfishing (Sadovy & Vincent 2002; Tadjuddah 2012) and the use of unsustainable fishing methods, such as cyanide use, can cause a further decline for wild grouper fish (Johannes & Riepen 1995).

According to the International Union for the Conservation of Nature and Natural Resources (IUCN) in 2006, coral trout (*Plectropomus leopardus*) was categorized as a threatened species and is included in a red list of threatened species (Sadovy et al. 2018). The market price of coral trout is very expensive making it a sought after commodity. The availability of wild coral trout can be preserved with sustainable fishing management. Therefore, this study is aimed to determine the current state of coral trout fishing and its financial aspects.

Materials and Methods. The present study was carried out from January to December 2017 in the Sarappo Lompo Island, Pangkep Regency, Spermonde Islands Indonesia. The

research strategy used for data collection was based on Berg (1991) and Nugroho and Sulistiono's (2017) methods. A total of 25 fishermen (5% of the 437 individuals) from the local community of Sarappo Island were chosen as respondents during the study period. The data that was descriptively and quantitatively analyzed included social and economic conditions of the local fishermen through various stages of the variables in the study with the following descriptions:

a. Analysis of the descriptive was through explanation and quantitative calculation which were applied for investment value according to Nicholson (2009):

$$TC = TFC + TVC$$

where: TC = total cost (IDR);
TFC = total fixed cost (IDR);
TVC = total variable cost (IDR).

b. The income of there fishing rod business was calculated through a formula by Tibrani (2013) and Budiman (2014):

$$n = TR - TC$$

where: n = profit (IDR);
TR = total revenue (IDR);
TC = total cost (IDR);

c. Analysis of break even point (BEP) according to Prawirosentoso (2001) as follows:

$$BEP \text{ (Unit)} = \frac{BTp}{\frac{Py}{\text{Unit}} - \frac{BV}{\text{Unit}}}$$

$$BEP \text{ (IDR)} = \frac{BTp}{1 - \frac{BV}{Py}}$$

where: BTp = fixed cost (IDR per production);
BV = variable cost (IDR per production);
Py = fish price (IDR per kg).

d. B/C Ratio or profit ability index (PI) according to Umar (2003) as follows:

$$PI = \frac{PV \text{ of cash flow}}{\text{Initial cash flow}}$$

where: PI = Profit ability index (IDR)
PV = Profit variable (IDR)

Decision criteria: feasible if $PI > 1$; not feasible if $PI < 1$.

Results and Discussion

Coral trout production. In the study, a total of 765 fish in a total of 235 trips were captured. Nonetheless, the coral trouts that were fished showed fluctuation (Figure 1). The number of fish that was caught was affected by the technical and environmental factor. The technical factor could be the fishing method, size of their fishing boats, technology, experiences, and knowledge. Meanwhile, the environmental factor might have been caused by the season, weather, waves, and fish behavior.

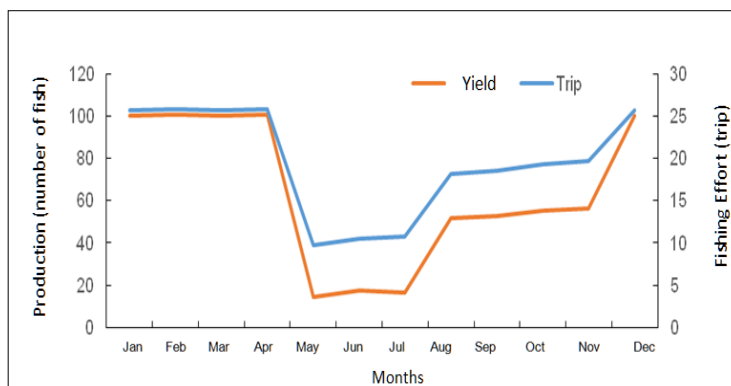


Figure 1. The production of coral trout using handline fishing obtained from the coast by the local fishermen from Sarappo Lompo Island 2017.

In addition, the highest fishing activity occurred from December to April during the rainy season. In this circumstances, the coral trout is more likely to spend time at a water depth of 25-30 meters and the water's wave pattern temporarily took place during capture activity compared to the dry season (May to November). During the dry season, the weather tends to be calm but the intensity of the water waves are high during the fishing activity due to strong winds blowing intensively. Based on the observation, the peak season of coral trouts occurred during the rainy season (December to April). Nonetheless, the weather is now unpredictable due to the effect of global warming leading to climate change in some fishing grounds. This condition caused problems for local fishermen to adapt to environmental changes. The traditional fishermen adapt to the fishing activity based on the weather or season, but not according to monthly fishing.

Fishing production and fishing efforts based on fishing seasons. Based on the interviews with the local fishermen, the handline fishing technique was commonly used for fishing coral trout around Sarappo Lompo Island. Fishing season affects the number of fish in the local fish landings and fish merchants (Figure 2).

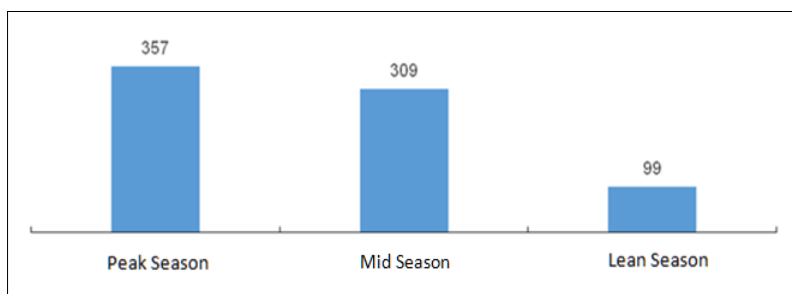


Figure 2. The fishing production of coral trout (number of fish) based on the fishing seasons categorized at the fish landing of Sarappo Lompo Island, Spermonde Waters, Pangkep Regency.

Figure 2 shows a total of 765 fish in different fishing seasons that were recorded during the study period, consisting of 3 different fishing periods. A total of 357 fish were captured during the peak season from August to October, 309 fish in mid-season from March to July, and 99 fish in the lean season between December and January.

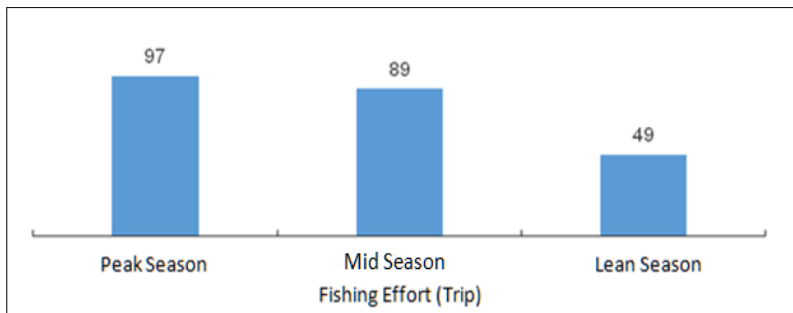


Figure 3. Fishing effort based on fishing seasons in Sarappo Island, Spermonde Island, Pangkep Regency.

Figure 3 shows the average number of trips for each season. At 97 trips in the peak season, 89 trips in the yield season, and 49 trips in the lean season. The total fishing trip based on the fishing season reached 235 trips. The difference between the total amount of fishing trips of each season was caused by environmental factors such as strong waves and bad weather. The condition in the fishing ground hampered the fishing operations.

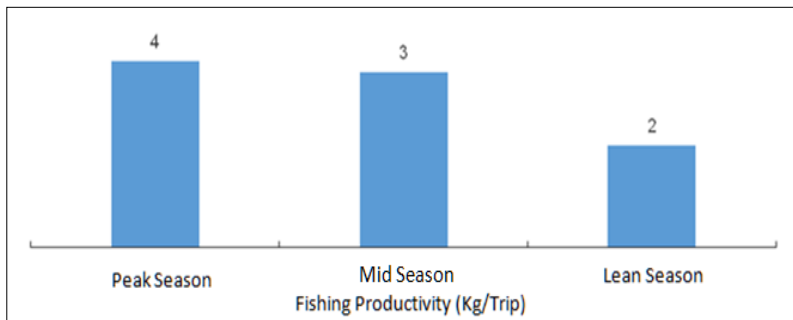


Figure 4. Fishing productivity based on fishing trips between each season conducted at the fish landing of Sarappo Lompo Island Waters in the Pangkep Regency.

Figure 4 illustrates the average fishing productivity of each fishing trip with the peak season at an average of four fish per trip, three fish each trip in the yield season, and two fish per trip in the lean season. The data shows the average fishing productivity using the handline technique from each trip of the fishing operation.

Economic aspects

Capital investment. According to Budiman et al (2014), capital is an important factor in business to earn the maximum profit with minimum operational costs. In this study, the business capital for fishing coral trout consisted of several investments such as providing fishing ships, fishing gear, and ship engines. The scale of the business also plays a role in

the amount of capital needed. The amount of capital needed by the local fishermen during the study period can be seen in Table 1.

Table 1

The average capital investment for handline fishing gear for local fishermen of the Sarappo Lompo Island in the Pangkep Regency

No	Details	Value (IDR)
1	Minimum	9,030,000
2	Maximum	13,535,000
	Average	11,282,500

Source: Research finding, 2017.

The amount of initial investment by the fishermen groups in Sarappo Lompo Island ranged from IDR 9,030,000 to IDR 13,535,000. However, the average investment was IDR. 11,282,500. The structure of the investment was obtained from different groups of fishermen. The following data shows the total amount of investment from eight groups of fishermen with group A investing IDR 9,030,000, group B invested IDR 9,931,000, group C invested IDR 9,932,000, group D invested IDR 10,883,000, group E invested IDR 10,884,000, group F invested IDR 11,735,000, group G invested IDR 11,736,000, and group H invested IDR 12,637,000. The data was collected from different fishermen at the same time. The high tier of investment costs for the fishermen ranged from IDR 11,736,000 to IDR. 12,637,000 and the lowest investment costs ranged between IDR 12,638,000 and IDR 13,535,000. The difference in investment costs is caused by the size of the ship, the brand of the engine, fishing gear, and the year of purchase. Yanuartoro (2013) stated that the investment costs are different from each fishing business owner from one another. Furthermore, Budiman et al (2014) claimed that the year of buying the equipment and second-hand equipment leads to differences in total investment for each fishermen group. Moreover, the price of new goods is certainly more expensive than the price of second-hand goods. Also, an increase in market prices of each of the businesses was recorded.

Fixed costs. The fixed costs for operating fishing businesses in Sarappo Island are depreciation and maintenance costs. Depreciation costs are reserve funds used for replacing old fishing assets, thus allowing the continuation of the fishing activities (Panayotou 1985; Utomo et al 2013). Meanwhile, the maintenance costs are from occurrences within the business, such as changing the fishing rods. Fixed costs are always calculated as long as the business is still running. The fixed costs, according to the fishermen in Sarappo Lompo Island, included depreciation costs, engine maintenance, ship maintenance, and fishing gear with an average total cost of IDR 2,736,080 a year. The details of the average costs can be seen in Table 2.

Table 2. Average fixed costs for coral trout fishing activities in Sarappo Lompo Island using handline fishing gear

No	Fixed cost	Average of fixed cost (IDR) per year
1	Depreciation cost	
	Ship cost	1,472,000
	Main machine cost	708,000
2	Maintainance cost	
	Ship (paint)	449,000
	Fishing gear	47,080
	Machine	60,000
	Total	2,736,080

Source: Research finding, 2017.

The fishing boats and propulsion engines may be operated for 5 years. The total expenditure for depreciation expense was IDR 2,180,000 with details of the average boat cost per year amounting to IDR 1,472,000 and the main engine cost per year was IDR 708,000. Whereas the average annual maintenance expenditure was at IDR 556,080 per year with the details of the components consisting of fishing boat maintenance and services (IDR 449,000 per year), the maintenance cost for fishing gear was IDR. 47,000 per year and the engine maintenance cost was IDR. 60,000.

The depreciation costs for each boat and the ship engine for fishing coral trout ranged from IDR.1,200,000 to IDR.1,712,000 and fishing grouper fish costs ranged from IDR.1,200,000 to IDR. 1,370,000, IDR. 1,371,000, IDR. 1,541,000, and in the range between IDR. 1,542,000 and IDR. 1,712,000. However, the highest range of fixed depreciation costs for fishing boats ranged from IDR. 1,542,000 to IDR. 1,712,000, and the lowest ranged from IDR. 1,371,000 to IDR. 1,541,000.

In addition, the fixed costs structure for local fishermen's fishing boat of Sarappo Lombo Island per year ranged from IDR. 400,000 to IDR. 1,122,000. The detailed range of cost was grouped into several cost groups such as IDR. 400,000 to IDR. 640,000, IDR. 641,000, IDR.881,000, IDR. 882,000, IDR. 1,122,000. However, the highest range of fixed depreciation costs for the fishing boat machine ranged from IDR. 641,000 to IDR.881,000 and the lowest ranged from IDR. 882,000 to IDR. 1,122,000.

Furthermore, the range of maintenance costs per year was mostly in the range from IDR.230,000 to IDR.764,000 with investments from IDR.230,000 to IDR.336,000, IDR.444,000, and IDR. 550,000. However, the highest range of fishermen's boat maintenance costs ranged from IDR.551,000 to IDR.764,000, while the lowest ranged from IDR.230,000 to IDR.336,000.

Non-fixed costs. Non-fixed costs (variable costs) are costs that vary according to changes in production levels such as operational costs. This type of costs consists of fishermen's supplies, fuel, and logistics during their fishing operations. The amount of the average operational costs spent by the fishermen was IDR. 23,107,880. The details of the average non-fixed costs are seen in Table 3.

Table 3

Average non-fixed costs for leopard coral trout fishing activities in Sarappo Lombo Island using handline fishing gear

<i>Non fixed cost (operational cost)</i>	<i>The average non fixed cost (IDR) per year</i>
Fuel	14,128,400
Oil	36,840
Food	8,942,640
Total	23,107,880

Source: Research finding, 2017.

The structure of non-fixed costs for coral trout ranged from IDR 14,137,000 to IDR 30,041,000. It can be grouped into several group of costs as a follows IDR. 14,137,000, IDR. 17,317,000, IDR. 17,318,000, IDR. 20,498,000, IDR. 20,499,000, IDR. 23,679,000, IDR. 23,680,000, IDR. 26,860,000, and IDR. 26,861,000 to IDR. 30,041,000. However, the highest range of operational costs ranged from IDR.20,499,000 to IDR.23,679,000, and the lowest ranged from IDR 14,137,000 to IDR.17,317,000 and IDR 17,318,000 to IDR.20,498,000.

The difference in the non-fixed costs is caused by the difference of the fishing grounds locations and how much fuel to reach the various coral trout fishing grounds. Budiman et al (2014) stated that the size of the operational costs is influenced by the distance of fishing ground, the frequency of fishing, the length of fishing, and the amount of production.

Total costs. Wismanigrum et al (2013) stated that the total cost is the total amount of fixed costs and non-fixed costs. Fixed costs are derived from the depreciation costs while the fixed costs are derived from the total operating costs and maintenance costs. The total cost of the coral trout fishing business using fishing rods in Spermonde Pangkep Regency was IDR 25,843,960 (Table 4).

Table 4

Average total costs for coral trout fishing activities in Sarappo Lompo Island using handline fishing gear

<i>Details</i>	<i>Cost (IDR) per year</i>
Fixed cost	2,736,080
Non fixed cost	23,107,880
Total cost	25,843,960

Source: Research finding, 2017.

Income. Income is the value of money earned from the sale of fish which is affected by the number of fish caught and the market prices. The income data is in Table 5.

Table 5

Average annual income per year for coral trout fishing activities in Sarappo Lompo Island using handline fishing gear

<i>No</i>	<i>Type of Income</i>	<i>Average production (fish)</i>	<i>Price (IDR/unit)</i>	<i>Total (IDR)</i>
1	Income of peak season	357	75,000	26,775,000
2	Income of yield season	309	75,000	23,175,000
3	Income of lean season	99	75,000	7,425,000
4	Annual income per year	765	75,000	57,375,000
5	Annual income per trip	3	75,000	225,000
6	Minimum per year			54,648,750
7	Maximum per year			60,108,750
8	Average per year			57,443,100

Source: Research finding, 2017.

Based on the table above, the unit price of coral trout at wholesale and local markets was IDR. 75,000. The average income in the peak season reached IDR.26,775,000, midseason was IDR. 23,175,000, and the lean season was IDR. 7,425,000 with an average annual income of IDR. 57,375,000. The income of handline fishermen is influenced by the fishing season when the season can affect the number of catches due to different amounts of trips and the weather. Wasahua et al (2016) stated that the income of local fishermen relies on the number of catches and the selling value of fish per kg in the same season.

Profit. Ningsih et al (2013) and Budiman (2014) stated that larger profits can be achieved by reducing operational costs. Details of fishing business profits are seen in Table 6.

Table 6

Average annual profit per year fom coral trout fishing activities in Sarappo Lompo Island using handline fishing gear

<i>No</i>	<i>Information</i>	<i>Total per year (IDR)</i>
1	Annual income per year	57,443,100
2	Total cost	25,843,960
3	Non-fixed cost	23,107,880
	Gross profit (average annual income per year-non fixed cost)	34,335,220
	Net profit (average annual income per year-total cost)	31,599,140

Source: Research finding, 2017.

Financial analysis

Break Event Point (BEP). BEP is a condition that describes the business profits obtained equal to the capital. In other words, business conditions experience profits or financial losses. According to Sunyoto (2013) and Suhardi (2016) stated analysis of break-even point is an analytical technique that is shown to produce information and by focusing on determining a situation where the volume of activity does not generate profits but also does not experience losses. Handline fishing in Sarappo Lompo Island was reviewed based on selling price (BEP price) and production volume (production BEP).

BEP price. The average number of fish production was 765 fish and the total cost was IDR. 25,843,960. To reach the break-even point, the minimum fish selling price must be IDR. 33,743 for each fish. However, the market price of coral trout was IDR. 75,000. Therefore, it can be concluded that the price of coral trout was higher than BEP prices, meaning that the coral trout business is worth for further expansion (Table 7).

Analysis of the BEP from using handline fishing of coral trout in the Sarappo Lompo Island

$$\begin{aligned}\text{BEP (price)} &= \text{total cost} / \text{Annual cost production} \\ &= 25,843,960 / 765 \\ &= \text{IDR. } 33,782\end{aligned}$$

In order to achieve the BEP in a year, a total of 345 fish is needed to be sold in the market. Meanwhile, coral trout production can be produced in different seasons; the peak season at an average of 357 fish, mid-season at 309 fish, and the lean season at around 99 fish. The average production was 3 fish per trip and an amount of 765 fish in a year. Thus, it can be concluded that the total production of coral trout sold for a year is higher than BEP for production.

Analysis of BEP production for handline fishing coral trout in Sarappo Lompo Island

$$\begin{aligned}\text{BEP (Production)} &= \text{total cost} / \text{price of product per unit} \\ &= \text{IDR. } 25,843,960 / \text{IDR. } 75,000 \\ &= 345\end{aligned}$$

R/C (revenue cost) ratio. R/C (Revenue Cost) Ratio is the ratio between total revenues and total costs incurred. For more details about the results of the R/C ratio, analysis in a year of production can be seen in table 9 below:

Analysis of R/C Ratio for fishing coral trout in Sarappo Lompo Island in Spermonde, Pangkep Regency

$$\begin{aligned}\text{R/C} &= \text{Income} / \text{Total cost} \\ &= \text{IDR. } 57,443,100 / \text{IDR. } 25,843,960 \\ &= 2.2\end{aligned}$$

The calculation shows the amount of total cost equals 1 to 2.2 times of profit. Therefore, this fishing business is feasible and profitable.

Conclusions. The average fish production for coral trout of fishermen in the Sarappo Island per year was 765 fish with a total trip 235 times. Based on the BEP analysis, the minimum selling price is IDR. 33,782 and a total of 345 fish and R/C ratio 2.2. Therefore, handline fishing for coral trout in Sarappo island waters is feasible and profitable.

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appreciate the support and cooperation of local fishermen in Sarappo Island during sample collections.

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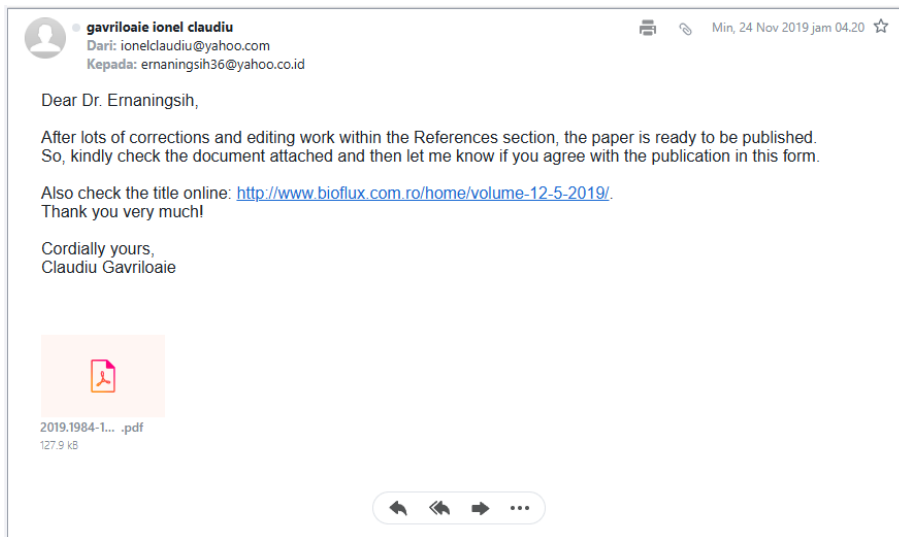
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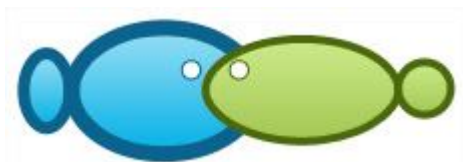
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Financial analysis of coral trout *Plectropomus leopardus* using handline fishing gear in Sarappo Island, Pangkep Regency, South Sulawesi

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Abstract. The aim of this study was to determine the current state of coral trout *Plectropomus leopardus* yields and its financial contribution to Sarappo Island waters of Pangkep Regency, South Sulawesi, Indonesia. This study was carried out from January to December 2017. Handline fishing techniques were used to acquire the fish sample. The number of each yield and costs were recorded for data collection. The total cost profit, Break-Even Point (BEP) and Profitability Index (PI) were used for data analysis. A total of 765 fish were caught from 235 fishing trips. The average initial capital investment for fishing operations was IDR 9,931,880, and the total cost was IDR 25,843,963. In addition, the average annual income was IDR 57,443,100, with an average net profit of about IDR 31,599,140. The BEP was a selling 345 fish at IDR 33,743 each, and the R/C ratio was 2.2.

Key Words: handline fishing gear, grouper, financial, capital investment, peak season, Pangkep.

Introduction. An increase of grouper fish world demand has also caused an increase of grouper fish domestic productions in Indonesia (Ahmad et al 2018). In 2015, the total yield for grouper fish reached 520,404 tonnes, an increase from 18 to 30% per year (BPS 2017). According to Chan (2000) and Tadjuddah et al (2012), 50% of the total exports of live grouper fish were from Hong Kong and 20% of the international market was supplied by Indonesia. Consequently, wild capture for juvenile groupers fish also influences the wild stock of grouper fish commodity as well as a stock of coral trout *Plectropomus leopardus* in South Sulawesi (Made et al 2017).

South Sulawesi is one of Indonesia's provinces that contribute approximately 22,709 tonnes of domestic productions of grouper fish in 2015. Approximately 50% of live grouper for domestic and international consumption derived from the Spermonde Islands, South Sulawesi (Suncoko 2013) which makes Spermonde Island the largest live grouper fishery producer in Indonesia. Consequently, wild grouper fishing leads to overfishing (Sadovy & Vincent 2002; Tadjuddah et al 2012) and the use of unsustainable fishing methods, such as cyanide use, can cause a further decline for wild grouper fish (Johannes & Riepen 1995).

According to the International Union for the Conservation of Nature and Natural Resources (IUCN) in 2006, coral trout was categorized as a threatened species and is included in a red list of threatened species (Sadovy et al 2018). The market price of coral trout is very expensive making it a sought after commodity. The availability of wild coral trout can be preserved with sustainable fishing management. Therefore, this study is aimed to determine the current state of coral trout fishing and its financial aspects.

Material and Method. The present study was carried out from January to December 2017 in the Sarappo Lompo Island, Pangkep Regency, Spermonde Islands, Indonesia. The research strategy used for data collection was based on Berg (1991) and Nugroho & Sulistiono's (2017) methods. A total of 25 fishermen (5% of the 437 individuals) from the local community of Sarappo Island were chosen as respondents during the study period.

The data that was descriptively and quantitatively analyzed, and included social and economic conditions of the local fishermen through various stages of the variables in the study with the following descriptions:

- a. Total cost was evaluated according to Nicholson & Snyder (2009):

$$TC = TFC + TVC$$

where: TC = total cost (IDR);

TFC = total fixed cost (IDR);

TVC = total variable cost (IDR).

- b. The profit of fishing rod business was calculated according to Budiman et al (2014):

$$\pi = TR - TC$$

where: π = profit (IDR);

TR = total revenue (IDR);

TC = total cost (IDR).

- c. Analysis of break even point (BEP) according to Prawirasentoso (2001) as follows:

$$BEP \text{ (Unit)} = \frac{BTp}{\frac{Py}{\text{Unit}} - \frac{BV}{\text{Unit}}}$$

$$BEP \text{ (IDR)} = \frac{BTp}{1 - \frac{BV}{Py}}$$

where: BTp = fixed cost (IDR per production);

BV = variable cost (IDR per production);

Py = fish price (IDR per kg).

- d. R/C ratio or profit ability index (PI) according to Umar (2003) as follows:

$$PI = \frac{PV \text{ of cash flow}}{\text{Initial cash flow}}$$

where: PI = profit ability index (IDR);

PV = profit variable (IDR).

Decision criteria: feasible if $PI > 1$; not feasible if $PI < 1$.

Results and Discussion

Coral trout production. In the study, a total of 765 fish in a total of 235 trips were captured. Nonetheless, the coral trouts that were fished showed fluctuation (Figure 1). The number of fish that was caught was affected by the technical and environmental factors. The technical factors could be the fishing method, size of their fishing boats, technology, experiences, and knowledge. Meanwhile, the environmental factors might have been caused by the season, weather, waves, and fish behavior.

In addition, the highest fishing activity occurred from December to April during the rainy season. In this circumstances, the coral trout is more likely to spend time at a water depth of 25-30 meters and the water's wave pattern temporarily took place during capture activity compared to the dry season (May to November). During the dry season, the weather tends to be calm but the intensity of the water waves are high during the fishing activity due to strong winds blowing intensively. Based on the observation, the peak season of coral trouts occurred during the rainy season (December to April). Nonetheless, the weather is now unpredictable due to the effect of global warming leading to climate change in some fishing grounds. This condition caused problems for

local fishermen to adapt to environmental changes. The traditional fishermen adapt to the fishing activity based on the weather or season, but not according to monthly fishing.



Figure 1. The production of coral trout using handline fishing obtained from the coast by the local fishermen from Sarappo Lompo Island 2017.

Fishing production and fishing efforts based on fishing seasons. Based on the interviews with the local fishermen, the handline fishing technique was commonly used for fishing coral trout around Sarappo Lompo Island. Fishing season affects the number of fish in the local fish landings and fish merchants (Figure 2).

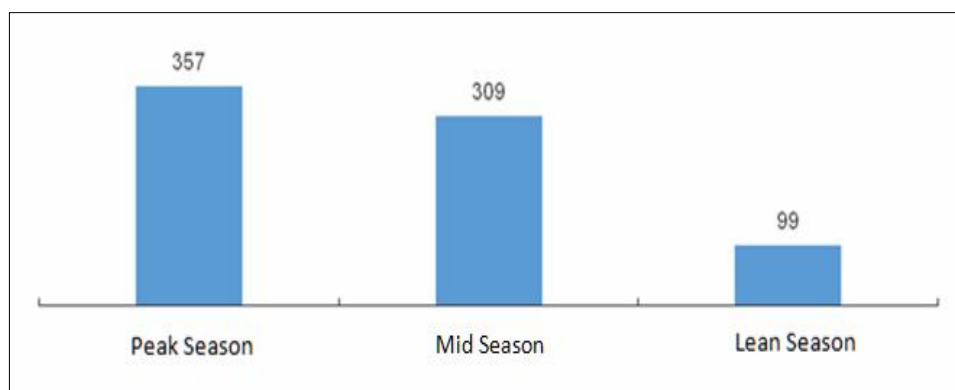


Figure 2. The fishing production of coral trout (number of fish) based on the fishing seasons categorized at the fish landing of Sarappo Lompo Island, Spermonde Waters, Pangkep Regency.

Figure 2 shows a total of 765 fish in different fishing seasons that were recorded during the study period, consisting of 3 different fishing periods. A total of 357 fish were captured during the peak season from August to October, 309 fish in mid-season from March to July, and 99 fish in the lean season between December and January.

Figure 3 shows the average number of trips for each season. At 97 trips in the peak season, 89 trips in the yield season, and 49 trips in the lean season. The total fishing trip based on the fishing season reached 235 trips. The difference between the total amount of fishing trips of each season was caused by environmental factors such as strong waves and bad weather. The condition in the fishing ground hampered the fishing operations.

Figure 4 illustrates the average fishing productivity of each fishing trip with the peak season at an average of four fish per trip, three fish each trip in the yield season, and two fish per trip in the lean season. The data shows the average fishing productivity using the handline technique from each trip of the fishing operation.

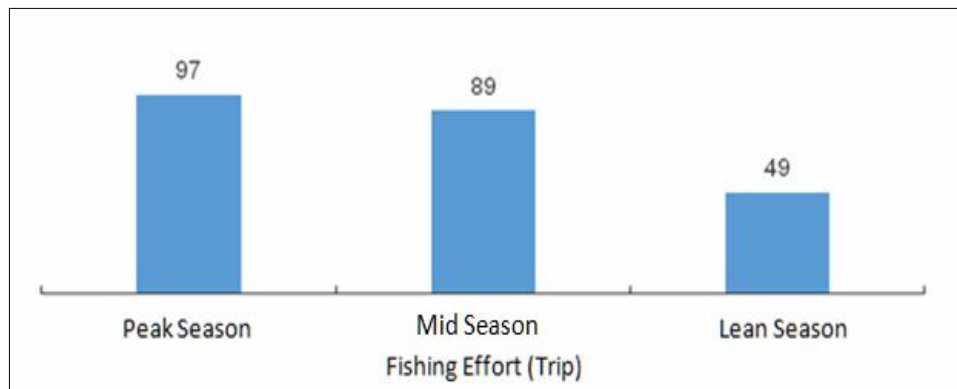


Figure 3. Fishing effort based on fishing seasons in Sarappo Island, Spermonde Island, Pangkep Regency.

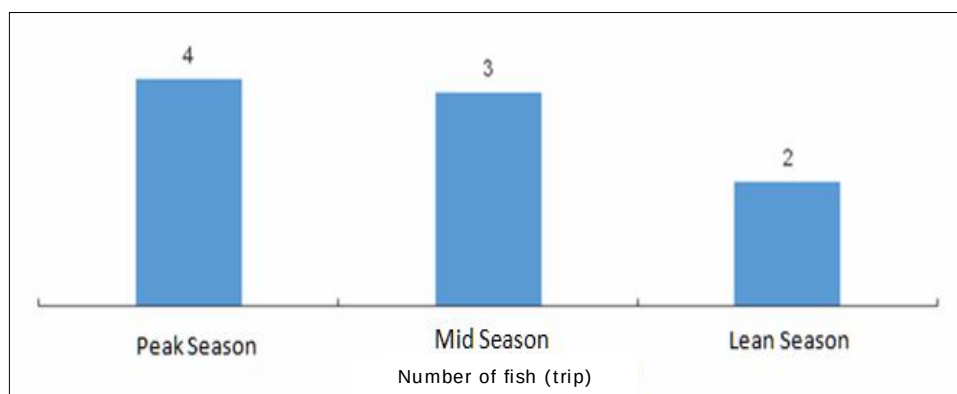


Figure 4. Fishing productivity based on fishing trips between each season conducted at the fish landing of Sarappo Lompo Island Waters in the Pangkep Regency.

Economic aspects

Capital investment. According to Budiman et al (2014), capital is an important factor in business to earn the maximum profit with minimum operational costs. In this study, the business capital for fishing coral trout consisted of several investments such as providing fishing ships, fishing gear, and ship engines. The scale of the business also plays a role in the amount of capital needed. The amount of capital needed by the local fishermen during the study period can be seen in Table 1.

Table 1

The average capital investment for handline fishing gear for local fishermen of the Sarappo Lompo Island in the Pangkep Regency

No	Details	Value (IDR)
1	Minimum	9,030,000
2	Maximum	13,535,000
	Average	11,282,500

Source: Research finding, 2017.

The amount of initial investment by the fishermen groups in Sarappo Lompo Island ranged from IDR 9,030,000 to IDR 13,535,000. However, the average investment was IDR. 11,282,500. The structure of the investment was obtained from different groups of fishermen. The following data shows the total amount of investment from eight groups of fishermen with group A investing IDR 9,030,000, group B invested IDR 9,931,000, group C invested IDR 9,932,000, group D invested IDR 10,883,000, group E invested IDR 10,884,000, group F invested IDR 11,735,000, group G invested IDR 11,736,000, and

group H invested IDR 12,637,000. The data was collected from different fishermen at the same time. The high tier of investment costs for the fishermen ranged from IDR 11,736,000 to IDR 12,637,000 and the lowest investment costs ranged between IDR 12,638,000 and IDR 13,535,000. The difference in investment costs is caused by the size of the ship, the brand of the engine, fishing gear, and the year of purchase. Yanuartoro et al (2013) stated that the investment costs are different from a fishing business owner to another. Furthermore, Budiman et al (2014) claimed that the year of buying the equipment and second-hand equipment leads to differences in total investment for each fishermen group. Moreover, the price of new goods is certainly more expensive than the price of second-hand goods.

Fixed costs. The fixed costs for operating fishing businesses in Sarappo Island are depreciation and maintenance costs. Depreciation costs are reserve funds used for replacing old fishing assets, thus allowing the continuation of the fishing activities (Panayotou 1985; Utomo et al 2013). Meanwhile, the maintenance costs are from occurrences within the business, such as changing the fishing rods. Fixed costs are always calculated as long as the business is still running. The fixed costs, according to the fishermen in Sarappo Lompo Island, included depreciation costs, engine maintenance, ship maintenance, and fishing gear with an average total cost of IDR 2,736,080 a year. The details of the average costs can be seen in Table 2.

Table 2

Average fixed costs for coral trout fishing activities in Sarappo Lompo Island
using handline fishing gear

No	Fixed cost	Average of fixed cost (IDR) per year
1	<i>Depreciation cost</i>	
	Ship cost	1,472,000
	Main machine cost	708,000
2	<i>Maintainance cost</i>	
	Ship (paint)	449,000
	Fishing gear	47,080
	Machine	60,000
	Total	2,736,080

Source: Research finding, 2017.

The fishing boats and propulsion engines may be operated for 5 years. The total expenditure for depreciation expense was IDR 2,180,000 with details of the average boat cost per year amounting to IDR 1,472,000 and the main engine cost per year was IDR 708,000. Whereas the average annual maintenance expenditure was at IDR 556,080 per year with the details of the components consisting of fishing boat maintenance and services (IDR 449,000 per year), the maintenance cost for fishing gear was IDR. 47,000 per year and the engine maintenance cost was IDR. 60,000.

The depreciation costs for each boat and the ship engine for fishing coral trout ranged from IDR 1,200,000 to IDR 1,712,000 and fishing grouper fish costs ranged from IDR 1,200,000 to IDR 1,370,000. However, the highest range of fixed depreciation costs for fishing boats ranged from IDR 1,542,000 to IDR 1,712,000, and the lowest ranged from IDR 1,371,000 to IDR 1,541,000.

In addition, the fixed costs structure for local fishermen's fishing boat of Sarappo Lompo Island per year ranged from IDR 400,000 to IDR 1,122,000. However, the highest range of fixed depreciation costs for the fishing boat machine ranged from IDR 641,000 to IDR 881,000 and the lowest ranged from IDR 882,000 to IDR 1,122,000.

Furthermore, the range of maintenance costs per year ranged from IDR 230,000 to IDR 764,000 with initial investments from IDR 230,000 to IDR 550,000. However, the highest range of fishermen's boat maintenance costs ranged from IDR 551,000 to IDR 764,000, while the lowest ranged from IDR 230,000 to IDR 336,000.

Non-fixed costs. Non-fixed costs (variable costs) are costs that vary according to changes in production levels such as operational costs. This type of costs consists of fishermen's supplies, fuel, and logistics during their fishing operations. The amount of the average operational costs spent by the fishermen was IDR 23,107,880. The details of the average non-fixed costs are seen in Table 3.

Table 3

Average non-fixed costs for leopard coral trout fishing activities in Sarappo Lompo Island using handline fishing gear

<i>Non fixed cost (operational cost)</i>	<i>The average non fixed cost (IDR) per year</i>
Fuel	14,128,400
Oil	36,840
Food	8,942,640
Total	23,107,880

Source: Research finding, 2017.

The structure of non-fixed costs for coral trout ranged from IDR 14,137,000 to IDR 30,041,000. However, the highest range of operational costs ranged from IDR 20,499,000 to IDR 23,679,000, and the lowest ranged from IDR 14,137,000 to IDR 20,499,000.

The difference in the non-fixed costs is caused by the difference of the fishing grounds locations and how much fuel to reach the various coral trout fishing grounds. Budiman et al (2014) stated that the size of the operational costs is influenced by the distance of fishing ground, the frequency of fishing, the length of fishing days, and the amount of production.

Total costs. Wismanigrum et al (2013) stated that the total cost is the total amount of fixed costs and non-fixed costs. Fixed costs are derived from the depreciation costs while the non-fixed costs are derived from the total operating costs and maintenance costs. The total cost of the coral trout fishing business using fishing rods in Spermonde Pangkep Regency was IDR 25,843,960 (Table 4).

Table 4

Average total costs for coral trout fishing activities in Sarappo Lompo Island using handline fishing gear

<i>Details</i>	<i>Cost (IDR) per year</i>
Fixed cost	2,736,080
Non fixed cost	23,107,880
Total cost	25,843,960

Source: Research finding, 2017.

Income. Income is the value of money earned from the sale of fish which is affected by the number of fish caught and the market prices. The income data is in Table 5.

Based on the Table 5, the unit price of coral trout at wholesale and local markets was IDR 75,000. The average income in the peak season reached IDR 26,775,000, midseason was IDR 23,175,000, and the lean season was IDR 7,425,000 with an average annual income of IDR 57,375,000. The income of handline fishermen is influenced by the fishing season when the season can affect the number of catches due to different amounts of trips and the weather. Wasahua & Lukman (2016) stated that the income of local fishermen relies on the number of catches and the selling value of fish per kg in the same season.

Table 5

Average annual income for coral trout fishing activities in Sarappo Lompo Island using handline fishing gear

No	Type of income	Average production (fish)	Price (IDR/unit)	Total (IDR)
1	Income of peak season	357	75,000	26,775,000
2	Income of yield season	309	75,000	23,175,000
3	Income of lean season	99	75,000	7,425,000
4	Annual income per year	765	75,000	57,375,000
5	Annual income per trip	3	75,000	225,000
6		Minimum per year		54,648,750
7		Maximum per year		60,108,750
8		Average per year		57,443,100

Source: Research finding, 2017.

Profit. Ningsih et al (2013) and Budiman et al (2014) stated that larger profits can be achieved by reducing operational costs. Details of fishing business profits can be seen in Table 6.

Table 6

Average annual profit per year fom coral trout fishing activities in Sarappo Lompo Island using handline fishing gear

No	Information	Total per year (IDR)
1	Annual income per year	57,443,100
2	Total cost	25,843,960
3	Non-fixed cost	23,107,880
	Gross profit (average annual income per year-non fixed cost)	34,335,220
	Net profit (average annual income per year-total cost)	31,599,140

Source: Research finding, 2017.

Financial analysis

Break Event Point (BEP). BEP is a condition that describes the business profits obtained equal to the capital. In other words, business conditions experience profits or financial losses. According to Sunyoto & Danang (2013) and Suhardi (2016) the analysis of break-even point is an analytical technique that is shown to produce information and by focusing on determining a situation where the volume of activity does not generate profits but also does not experience losses. Handline fishing in Sarappo Lompo Island was reviewed based on selling price (BEP price) and production volume (production BEP).

BEP price. The average number of fish production was 765 fish and the total cost was IDR 25,843,960. To reach the BEP, the minimum fish selling price must be IDR 33,743 for each fish. However, the market price of coral trout was IDR 75,000. Therefore, it can be concluded that the price of coral trout was higher than BEP prices, meaning that the coral trout business is worth for further expansion. Analysis of the BEP from using handline fishing of coral trout in the Sarappo Lompo Island is as follows:

$$\begin{aligned}
 \text{BEP (price)} &= \text{total cost} / \text{annual cost production} \\
 &= 25,843,960 / 765 \\
 &= \text{IDR } 33,782
 \end{aligned}$$

In order to achieve the BEP in a year, a total of 345 fish is needed to be sold in the market. Meanwhile, coral trout production can be produced in different seasons; the peak season at an average of 357 fish, mid-season at 309 fish, and the lean season at around 99 fish. The average production was 3 fish per trip and an amount of 765 fish in a

year. Thus, it can be concluded that the total production of coral trout sold for a year is higher than BEP for production.

Analysis of BEP production for handline fishing coral trout in Sarappo Lompo Island is as follows:

$$\begin{aligned}\text{BEP (production)} &= \text{total cost} / \text{price of product per unit} \\ &= \text{IDR } 25,843,960 / \text{IDR } 75,000 \\ &= 345\end{aligned}$$

R/C (revenue cost) ratio. R/C (revenue / cost) ratio is the ratio between total revenues and total costs incurred. For more details about the results of the R/C ratio, analysis of annual production can be seen below:

Analysis of R/C ratio for fishing coral trout in Sarappo Lompo Island in Spermonde, Pangkep Regency is as follows:

$$\begin{aligned}\text{R/C} &= \text{income} / \text{total cost} \\ &= \text{IDR } 57,443,100 / \text{IDR } 25,843,960 \\ &= 2.2\end{aligned}$$

The calculation shows the amount of total cost equals 1 to 2.2 times of profit. Therefore, this fishing business is feasible and profitable.

Conclusions. The average fish production for coral trout of fishermen in the Sarappo Island per year was 765 fish with a total trip 235 times. Based on the BEP analysis, the minimum selling price is IDR 33,782 and a total of 345 fish and R/C ratio 2.2. Therefore, handline fishing for coral trout in Sarappo island waters is feasible and profitable.

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