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MAXIMIZATION INCOME OF FISHERMEN PANCING ULUR IN THE VILAGE TETE B TOJO UNA-UNA

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ABSTRACT

Beliefs about profitability of different locations and the decision of how long to fish in a particular location are likely to affect the variability of fishermen's incomes. This paper examine the Maximization of income of the fishermen fishing In the village of Tete B Tojo Una-Una. Data analysis using LINDO analysis. The population in this research are 54 house hold from fisherman pancingulur. Respondent performed by using simple random sampling method, therefore the number of samples in the study are 37 families. The analysis showed that the maximum income of fishermen fishing in the village Tete B is Rp 40.036.480**,**00 with the total production of 15.667 kg produced for one month period of catching. Resources used to obtain the maximum income is 4.856,67 liters of gasoline, lubricants or oils 47 liters, ice is 3.446.67packs, consumption is Rp 6.000.333,33 and cigarette is 1.096,67 wrap.

KeyWords: Fishing rod, Lindo, and maximization income.

INTRODUCTION

The development of the fisheries sector has an important contribution to regional and national economy. The main reason how important contribution in fisheries including fishery products is a major supplier of animal protein for the population in Indonesia, with numbermore than 200 million people (Pratt *et al.,* 2012). The other hand, the fishery is one man's attempt to earn income by managing or using the resources of fish and other organisms that have economic values to achieve prosperity. Fishermen is a term for people who do activities in thesea, and in general economic activity of the fishermen only catching fish in the sea.

Fishing for a livelihood, be it in commercial or artisanal fisheries, implies an economic environment characterized by financial risk. This follows from uncertainty about product prices, imperfect information about resource abundance and location, dynamic changes in both prices and abundance, and the evolution of fishing regulations (Smith and Wilen, 2005).

Tabel 1. The Development Production of Flying Fish, Mackerel and Mackerel Tuna in Tojo Una-una 2005–2009

No.	Year	Production (Ton)			Total
		Fish Flying	Mackerel	Tuna	
1.	2005	550,00	1.200,00	450,00	2.200,00
2.	2006	1.163,70	700,20	980,70	1.680,90
3.	2007	700,00	1.000,00	720,00	2.420,00
4.	2008	668,38	628,85	947,75	2.244,98
5.	2009	1.221,90	737,20	1.029,70	2.988,80
Amount		3.140,28	4.266,25	4.128,15	11.534,68
In Average		785,07	853,25	825,63	2.306,93

Source : Dinas Perikanan dan Kelautan Kabupaten Tojo Una-Una, 2010.

The increasing number of fishermen will lead to competition in the exploitation of fish resources will be even greater, on the other hand the condition of fish resources are dwindling. Fishing gear is passive tools to catch the fish become marginalized, despite the fact that this fishing gear has several advantages such as fishing more sustainable than any other fishing gear, the results obtained were relatively fish that have high economic value (Abida *et al.,* 2009).

The fishermen's problem is to select the location that will yield the highest expected utility. For the fishermen, the choice depends on their risk preferences, the distribution of the catch, and the costs associated with each fishing location. A key aspect of modeling and analyzing fishermen's behavioral motivations is uncertainty, which stresses the need to understand their risk preferences (Mistiaen and Strand, 2000).

Fishing rod back and forth is one type of fishing gear has been long time known by fishing community. The use of fishing is to put the bait on the hook, after the bait is eaten then hook also be inedible. Fishing activities are usually carried out at any time, usually early morning 4:00 to 6:00 and 16:00 to 18:00 in the afternoon and even into the evening at 20.00 (Watung *et al.,* 2013). Tuna, mackerel and kite fishing is a commodity, and the fishing gear used is fishing stalling (Sudirman and Mallawa, 2004), Tojo Una-una is one of the producers of flying fish, mackerel and tuna in Central Sulawesi. The development of flying fish production, mackerel and tuna in Tojo Una-una shown in Table 1.

Table 1 shows that the production of flying fish, mackerel and Tuna between 2005 to 2009 fluctuated. This is due to the weather or the uncertain climate and indicate the trait of fisheries production every year unpredictable.

Fishermen are expected to increase the using of production factor to increase the productivity of the fishing catch. Economic activities did by the fishermen will affect the amount of the income earned. Therefore, this study aims to analyze the amount of income earned in the stalling of fishermen fishing in the Village Tete B Tojo Una-una.

Determination of Location and Data Collection. The research was conducted in the Tete B Village, Ampana Tojo Una-una, which is determined by intentionally (purposive) with the consideration that most of the population there are fishermen. The type of data in this research is the primary data on the catching period from March to April 2012 and secondary data (secondary data, ie supporting data collected from many literature and other agencies/departments related to this research.

The population in this research are 54 house hold from fisherman pancingulur. Respondent performed by using simple random sampling method, therefore the number of samples in the study are 37 families.

MATERIALS AND METHOD

Analysis Method. The data analysis is a quantitative analysis with linear programming models one purpose, by knowing the maximum revenue if resources are used optimally. The processing linear program using computerization with the program names Lindo (Linear Interactive Discrete Optimizer) (Nasendi and Anwar, 1985).

In mathematics, linear programming issues include optimization linear objective function that should be established a series of limitations in form of linear equality and unequal. Informally, goal of linear programming is using mathematical model to get the best output linear (e.g. maximum profit, minimum working).

The standard form of linear programming can be displayed:

Maximize cTx

Subject to $Ax \leq b$

$x \geq 0$

X represents a vector of variables and c and b are the vector of coefficients. A is matrix

of coefficients. Words that must be maximized or minimized that is called the objective function. In this case, cTx term b Ax ≤ is conditions that show a convex polyhedral and the objective function should be optimized on. Linear programming can be used in various fields of study. Linear programming is mainly used in commercial and economic situation; however, it can be used for some engineering problems. Some of the industries that used linear programmingare transportation, energy, telecommunications and factories (Chasten, 2001).

Formulation of linear programming models in research revenue maximization income fisherman pancingulur in the Village Tete B Tojo Una-Una, mathematically like this:

1. Purpose Function
   Maximize Z = A. X
2. Constraints Function
   Gasoline b. X ≤ B
   Lubricants / oil c. X ≤ C
   Ice d. X ≤ D
   Consumption e. X ≤ E
   Cigarette f. X ≤ F

Where :

Z = Objective function (maximum income) (USD)
A = Income per kilogram of fishing catch(flying fish, mackerel, and tuna) (USD/oneperiod of the catch)
X = Production of the fish (flying fish, mackerel, and tuna) (kg/one period of the catch)
b = Coefficient of gasoline used (liters/kg of fish caught)
B = Number of gasoline available (ltr/ a period of catch)
c = Coefficient of lubricant/oil used (liters/kg of fish caught)
C = Number of lube/oil available (liters/kg of fish caught)
d = Coefficient of ice were used (packs/kg of fish caught)
D = The number of available ice (packs/ a period of catch)
e = Coefficient of consumption is used (USD/kg of fish caught)
E = Availability consumption (USD/one period of the catch)
f = Coefficient used cigarettes (packs/kg of fish caught)
F = The availability of smoking (pack/one period of the catch).

Linear model formulation obtained after searching for receipts and expenses incurred by fisherman in fishing, so that the income earned in the first period of the catch. Income is derived from the formula $\pi = TR - TC$,

Where : TR = Total revenue
TC = Total cost.

RESULTS AND DISCUSSION

Village Tete B is a village located in the district of Tete Ampana which is part Ampana Capital coast. The area of the village approximately 430 hectares, most of the land and others are costal area. Climate is one of the main requirements to catch the fish. This condition can be rainfall and wind, whereas affects the frequency and number of fishing and fish Populations. Climate conditions are relatively normal in Tete B that is suitable as a central fisheries production.

The lack of fund and technology makethe fishermen in Tojo Una-una still concentrated in the nearsea shore. Based on data from the Department of Fisheries and Marine Tojo Una-una until 2010 fishing gear owned by communities include coastal trawl, purse seine, gill nets fixed, floating chart, fishing rods, traps, tools for collecting seaweed, and other types of tools. Most of fishing gear owned by fishermen are fishing while few fisherman owned the tools for of collecting seaweed (Diskanlut, 2010).

Production is the physical result of fishing for a period of catching, which consists of several types of fish caught (results of respondents are flying fish, mackerel and tuna). The fish will be stored in a thermos of fish, because by using the flask will be maintain production quality compared with cork box.

Tabel 2. Average Income in One Catching Period in Tete B, AmpanaTete

No.	Type of Fish	Catching Result (kg)	Price (Rp)	Income (Rp)
1.	Layang (Flying)	125	5.000	625.000
2.	Kembung (Mackerel)	112	6.000	672.000
3.	Tongkol (Tuna)	126	5.000	630.000
		Total Income		1.927.000

Source : Primary Data After Analyze, 201.

Tabel 3. Analysis Income of Fisherman in Tete B Village, Kecamatan Ampana Tete

No.	Detail	Amount
1.	Receiving:	
	- Flying Fish	625.000,00
	- Mackerel	672.000,00
	- Tuna	630.000,00
2.	Receiving (Rp)	1.927.000,00
3.	Production Cost (Rp)	
	a. Permanent cost	
	- Reduction of rod	391,14
	- Reduction of box	565,01
	- Reduction of machine	11.503,76
	- Reduction of boat	1.574,65
	b. Variabel Cost	
	- Gasoline	567.550,00
	- Kerosene	135.135,00
	- Oil	25.000,00
	- Ice	78.240,00
	- Rope	22.162,00
	- hook	10.000,00
	- Cigarette	152.856,85
	- Consumption	139.121,62
4.	Total Cost (Rp)	1.144.100,03
5.	Income (2-4) Rp.	782.899,97

Source : Primary Data After Analyze, 2012.

Value income of fishermen strongly influenced by the price at the prevailing rate of fishing in the local area, and catches are obtained. Average income by type of fish in the catching period shown in Table 2.

Table 2 shows the average production during the period of catching fish is different based on the type of fish. Most species of fish caught is tuna 126 kg. In Average price of fish are vary, and the most expensive is mackerel at Rp 6.000/kg.

Business of fishing with fishing gear pancingulur is one of the activities to earn income. The amount of production costs incurred by these businesses include fishing frequency, and the number of factors used, such as the purchase of a hook, rope, fuel, oil or lubricants, ice cubes, kerosene, cigarettes and consumption, the cost of depreciation of tools and boats. Catching location which is farmakes fishermen must pay higher production cost. Fishing income respondents are shown in Table 3.

Table 3 shows the income received by fishermen from catching fish in one catch period Rp 782,899.97. Production inputs using by fisherman respondents, gasoline, lube/oil, ice, consumption, and smoking. The maximum income is obtained from the results of the fishing pancingulur which is a combination of the catches with resource inputs used. Coefficient production inputs to obtain maximum results shown in Table 4.

Tabel 4. Coefficient Production Input Respondent of Fishermen inTete B KecamatanAmpanaTete

No.	Detail (Rp)	Coefficient	Availibitlity of Input
1.	Income (Rp)	2.555,52	
2.	Problem of production input of fishermen pancingulur		
	1. Gasoline	0.31	5.325
	2. Lubricants oil	0.003	47
	3. Ice	0.22	4.230
	4. Consumption	383	6.970.000
	5. Cigarette	0.07	1.275

Tabel 6. The using of Production Input of Fisherman Respondent in Tete B Kecamatan Ampana Tete

No.	Production Input	Available	The using of Maximum Resource	Slack or Surplus	
1.	Gasoline	5.325	4.856,67	468,33	0,00
2.	Lubricant	47	47,00	0,00	851.840,00
3.	Ice	4.230	3.446,67	783,33	0,00
4.	Consumption	6.970.000	6.000.333,30	969.666,75	0,00
5.	Cigarette	1.275	1.096,67	178,33	0,00

Source : Primary Data After Analyze, 2012.

Table 5. Result of LINDO Maksimal Income of Fisherman Respondents in The Village Tete B Kecamatan Ampana Tete

No.	Detail	First	Maksimum
1.	Income (Rp)	34.338.501	40.036.480
2.	Production (kg)	13.437	15.667

Source : Primary Data After Analyze, 2012.

Table 4 shows the coefficients and the availability of inputs to obtain the maximum income from the fishermen fishing fishing pancingulur. To reach the maximum income coefficient obtained incomeis Rp 2555.52/kg, further the objective function as follows :

Objective Function : Maximize Z = 2555,52X
Constraints Function : Gasoline : $0.31X \leq 5325$
Lubricants/oil : $0.003X \leq 47$
Ice : $0.22X \leq 4230$
Consumption : $383X \leq 6.97$ million
Cigarettes : $0.07X \leq 1275$

Maximum income earned by fishermen fishing pancingulur is the results of the allocation of production inputs has used, in this case are gasoline, lubricants/ole, ice, consumption, and smoking. LINDO processed to achieve maximum income shown in Table 5.

Table 5 shows the increasing of income Rp 5.697.979,00, and the of increasing production 2.230 kg. This improvement is obtained if the fisherman pancingulur using the inputs as well as possible. When the maximum income happened, production inputs used has not been all used so there is still the rest of value. The using of production inputs shown in Table 6.

Table 6 shows the respondent of fisherman has not been able to optimize the using availability of production inputs. The using of production inputs respondent of fisherman in Tete B Ampana Tete are:

1. The fisherman did not use all gasoline production input or surplus 468.33 liters, from the amount of gas available 5.325 liters. In order to maximize the income the using for gas input should be 4.856,67 liters.
2. Production input of lubricants/oil is used up, which has the dual prices is Rp 851.840,00 This means that the use of production inputs lubricant/oil will increase the profit of Rp 851.840,00.
3. Input ice is not used up or surplus of 783 packs, from the amount available 4.230 ice packs. To maximize the income, the input should be used are 3.446 ice packs.
4. Input consumption is not used up or surplus Rp 969.666,75, from the amount available Rp 6.97 million. To maximize the income input should be used is Rp 6.000.333,30.
5. Input cigarette also surplus 178 packs, from the number of cigarette packs available are 1275. To maximize income, the input should be used are 1.096 cigarette packs.

CONCLUSION

The maximum value of income for one period of catching fish will be obtained by the fisherman fishing in Tete B, if the allocation of production inputs used

such as 4.856.67 liters of gasoline, lube/oil is 47 liters, pack of ice 3.446, consumption Rp 6.000.333,33 and a pack of cigarettes by 1.096. If fishermen have used of production inputs, the maximum income can be obtained is Rp 40.036.480,00/period of fishing.

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