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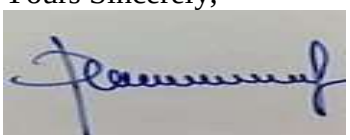

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The effect of fishing input, socioeconomic and relationship with government agent on fishermen income in Indonesia

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Article history:
Received
Received in revised form
Accepted
Available online

Keywords:
Fishing Input,
Socioeconomic and demographics,
Relationship with Government Agent,
Fishermen Income,

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Kasetsart Journal of Social Sciences 41 (2020) xxx–xxx

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The determinants of small-scale fishermen's income in Padang City, Indonesia

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Article Info

Article history:
Received 16 August 2018
Revised 8 February 2019
Accepted 10 February 2019
Available online

Keywords:
fishermen income,
fishing input,
small-scale fishermen

Abstract

Small-scale fisheries play an important role in supplyingfish protein for the community of Padang city. However, the incomes of fishermen are still far from expectation. This study investigates the effect of fishing input, socioeconomics, demography, and relationship with government agent on fishermen income in Padang. 150 fishermen responded to this study and returned the questionnaire. Using multiple regression analysis, we found that Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Education have a significant effect on fishermen income.Specifically, FP (t statistics 7.954) was registered as the highest contribution on fishermen income, while the GL (t statistics -2.798)was found to have lowest effect on fishermen income, yet direction effect is not expected.

Introduction

Many millions of people live along coastal zones and rely on the ocean and its resources for sustenance, livelihood, and culture continuity (Kittinger, 2013). The fishery and aquaculture sector is a source of income and livelihood for millions of people around the world (Adili & Antonia, 2017). It is hard to ignore the importance of fish for Indonesia. Around 95 percent of Indonesians who engaged in fishing activities are small-scale fisheries(Sudarmo, Baskoro, Wiryawan, Wiyono, & Monintja, 2015). Padang is a city located on the coast of West Sumatra Province, and has 11 sub-districts or *Kecamatan.*. The fishermen operating in territorial waters of Padang are small-scale fishermen. The number of fishermen in Padang has been increasing over the time. However, it decreased from 7,076 in 2016 to 7,066 in 2017. The fish production also increased from 20,612,8tons with a value of Rp. 435,16 billion (US $ 29,001,066.6 million)in 2016 to 20,814,9 tons with a value of Rp. 439,10 billion (US $ 29,267,333.3 million). Like in other areas in Indonesia, fishermen in Padang are also dominated by small-scale fishermen. Hendrik and Zulkarnain (2016) argue that fishing activities in the west coast waters of Sumatra use various types of fishing gear, such us trolling, hand line and purse seine. Most of the fishing activities are supported by fishing gear using a motor boat (Hendrik & Zulkarnain, 2016). The Padang city map as a study area isshown in Figure 1 below.

The study of determinants of fishermen income has been conducted by previous studies (Adili & Antonia, 2017; Al Jabri, Collins, Sun, Omezzine, & Belwal, 2013; Rahman, Haque, & Rahman, 2011). Adili and Antonia (2017) investigated the factors affecting fishermen income and concluded that the fishing gear, number of laborers, and fishing season are significant factors affecting fishermen income in Tanzania. However, the educational level and financial support do not influence fishermen income significantly. In addition, Al Jabri et al.(2013) studied the

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https://doi.org/10.34044/j.kjss.2020.41.3.xx
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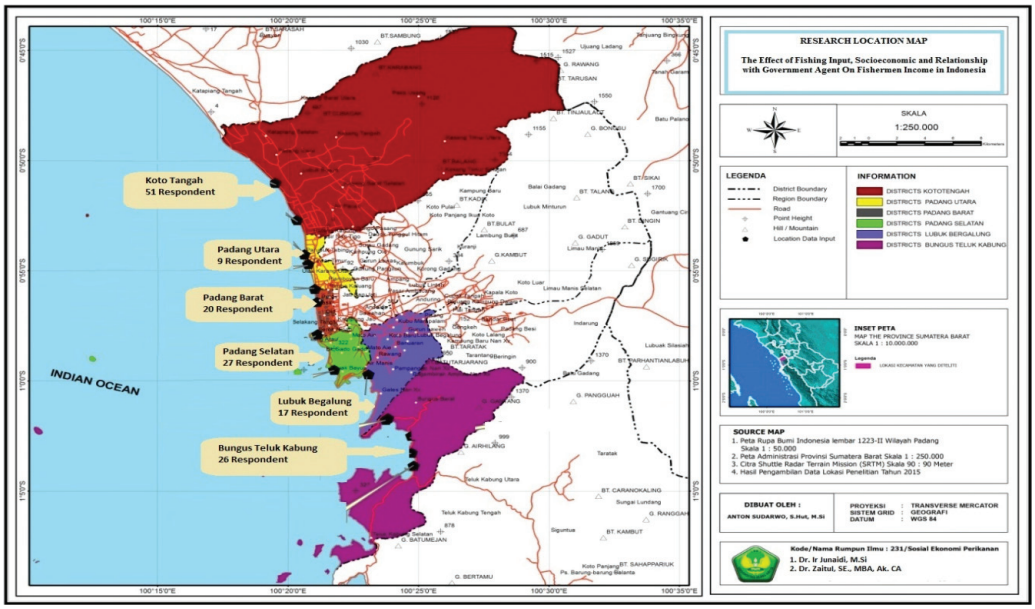

Figure 1 Study Area
Source: Padang City Spatial Plan in 2010

determinants of fishermen income in Oman and classified the determinants into three groups: fishing inputs and catch, socioeconomic and demographic, and extension and R&D. Al Jabri et al. (2013) concluded that engine power, boat length, fishing cost, fishing trip, difficulty in obtaining ice, average weekly catch, number of crew, and use of fiberglass boat are significant determinants of fishermen income. In addition, income sharing, board ownership, partnership in other boat and fishermen age have a significant relationship with fishermen income (Al Jabri et al., 2013). Further, exchange information and cooperation with MAF and being strongly involved with MAF also influence fishermen income significantly. Rahman et al.(2011) examine the effect of age, education, family members, family land holdings, pond size, experience of fishing farming, training on fish farming and access to information on fish farming on fishermen income among fishermen in Bangladesh. Family land holdings, pond size, training on fish farming, and access to information on fish farming are significant factors affecting fishermen income.

There is lack of studies investigating fishermen income using Indonesian fishermen data (Hendrik & Zulkarnain, 2016). Most studies using Indonesian data focus on other aspects, such as fishermen's poverty (Darwis, Elfindri, Syafrizal, & Mahdi, 2015), socioeconomic characteristics of small-scale fishermen (Sudarmo et al., 2015), and fishermen management system (Tan, 2014). Even though, Hendrik and Zulkarnain (2016) conducted a study on fishermen income, the study emphasized fuel price fluctuation. Therefore, there is the need of a more comprehensive study to investigate the determinants of fishermen income in Indonesia's setting. This study would probably enrich fisheries economic literature due to the uniqueness of Indonesia' fisheries environments compared to other countries. For instance, there is no fishing on Friday and women are not allowed to participate.

This study aims to investigate the effect of fishing input and catching, socioeconomics and demographics, and exchange of information and involvement with government agents on fishermen income. This paper is organized as follow: the first session is about background of the study. The second is theoretical aspects. Further, the third session discusses methodology. The fourth session is about results and discussion. The study isfinally closed by conclusion and recommendation.

Literature Review

Fishermen Income

Fishermen's income is an objective of fisheries management system (Cunningham, 1994). Fishing management is characterized by multiple and conflicting objectives, multiple stakeholders with divergent interests and high levels of uncertainty about dynamics of the resources being managed (Smith, Sainsbury, & Stevens, 1999). Cunningham (1994) argues that it is hard to understand the determinants of fisheries income in the situation within the standard fishery economics model. Panayotou (1980) stated that fishermen income depends on the opportunities income. Copes (1988) offered six reasons why opportunities income may be low in small-scale fisheries. These are: (i) the isolation of fishing communities, (ii) the existence of surplus labor due to productivities gains, (iii)capital asset fixity, (iv) lifestyle preferences, (v) high liner illusion, and (vi) perverse assistance. Al Jabri et al., (2013) classified determinants of fishermen income: fishing input and catch, socioeconomics and demographics, and relationship with government agents.

Fishermen Input

Al Jabri et al.(2013) state that there are three categories of factors affecting fishermen's income: input factor, socioeconomic and demography and fishermenextension and R&D. Fishermen's input refers to the all fisheries economic resources used for fishing activity. This includes engine power, boat length, fishing cost, fishing trips, etc.(Al Jabri et al., 2013). Engine power is the power of an engine to push the boat to get to the fishing ground quickly. The moreengine power , the more quickly a soat arrivesat the fishing ground. Usually, fishermen who have more engine power, catch more fish and finally get more income., Boat length isa measure ofcapacity for fish caught. Agreater length of boat, means fishermen have more space for stocking the fish. The artisanal fishermen failed to compete with the larger powered boats. Therefore, it may bring a lot of fish and finally more income. Gillnetlengthis length of net used by fishermen. The longer the net, the more opportunities to catch fish and more income will be earned by fishermen.

Fishing cost refers to the money spent by fishermen to do fishing activities. With more cost incurred, fishermen can go far from coastal areas and have an opportunity to catch more fish and finally earn more income.. Further, fishing trips are defined as the number of setting and hauling activities. The more trips that fishermen do, the more production and thus, the more income. The next factor is the number of fishing crew. The higher the number of fishing crew, the faster hauling is done. This factor will increase fishing production and finally result in more income. Finally, all input will produce the output in terms of fishing production. Fishing production refers to the quantity of fish.

Fishermen Socioeconomic and Demographic

Fishermen socioeconomic and demographic variables are significant factor affecting fishermen income, such as income sharing with crews, age and partnership in other boat (Al Jabri et al., 2013). Al Jabri et al.(2013) identified several factors from socioeconomic and demographic: income sharing with crews, boat ownership, partnership in other boat, fishermen age, literacy level of fishermen, relationship with crew, and alternative sources of income. Boat ownership refers to the fishermen having their own boat to be used in fishing operation. Due to boat ownership, the fishing income will be distributed more to owner of boat. Therefore, the fishermen will earn more income. Fishing experience is defined as long tenure of fishermen engaging in fishing activities. With more experience, fishermen know a lot about fishing activities. This experience will help them to catch more fish and finallythis will increase fishing production as well as fishermen income. Further, fishermen education is the level of education of fishermen. With level of education, they can plan, organize and control all aspects of fishing well. Most of the time, the higher the fishermen education, the higher the fishing production and therefore, increase of income. The relationship between fishing crew is defined as a family relationship. A fishing crew with good family relationship has more commitment to increase fishing production. Thus, fishermen income would increase. Other fishermen income refers to other income earned by other family members beside fishing income. Family members help to earn additional income and this condition will increase fishermen income. A family member is defined as the number of family burden in one family. The higher the number of family burden, the higher the fishermen income. This is because they show more motivation to increase their income. They know that they have to cover all costs incurred in the family.

Exchange of information and participation

The relationship with a government agent,the last factor, is information exchange and participation in government agent activity. Exchangeof information and cooperation with the government agent is useful for initiatives in order to get updated information regarding fishing matters. With updated information, fishermen are expected to experience an impact on fishermen income (Al Jabri et al., 2013).In concluson, fishermen income could be explained as havinga good relationship and open communication with extension services. In addition, discussion with government agent brings better knowledge of fishing areas, awareness of better tools and technology, information about financial schemes, and realising promising opportunities. These condition would create the opportunities to have more fishing production and finally fishermen income.

Methods

The object of this study is small-scale fishermen in Padang City. One hundred and fifty fishermen are included as sample of the study. Primary data used were gathered by doing a surveyduringFebruary, 2018. There are 15 independent variables and one dependent variable,which is fishermen incomemeasured by rupiah kilogram per week. The independent variables are grouped into 3 categories: inputs of fishing, socioeconomics and demographic, and relationship with government agent. Fishing input, and socioeconomics and demographics are ratio and ordinal variables.

Boat ownership (BO) is conceptualized as boats used in fishing activities that are neither owned by the fisherman itself nor owned by other parties.Fishermen education (FeD) is the level of formal education possessed by fishermen.Fishing experience (FE) is the duration of being a fisherman in units of years, while fishing crew (FC) is the crew of the boat involved in fishing activities whether they have family relationships or not.

In addition, the relationship with a government agent is 5-scaleitems.Thisstudyusesthemultipleregressionmodelusing the SPSS. The relationship with government agent was firstly tested for validity and reliability. Multicollinearity test is conducted to see whether there is anyrelationship among the independent variables. F statistic is applied to see the model fitness. The t statistic or significant value is used to see the effect of independent variables on dependent variable.

Results and discussion

One hundred and fifty small-scale fishermen responded in this study. Based on location, 26 fishermen or 17.33percent are from *BungusTaluakKabuang*area, and 17 fishermen or 11.33 percentare from *LubukBegaluang*. 27 fishermen or 18.00 percent are from *Padang Selatan* and 20 fishermen or 13.33 percent are from *Padang Barat* area. From area of *Padang Utara* and *Koto Tangah* are 9 and 51 fishermen respectively. The age of respondent is categorized as 18 to 30 years (20 fishermen or 13.33percent), 31 to 40 years (36 fishermen or 24.00percent), 41 to 50 years (36 fishermen or 40.00precent), and more than 50 years old are about 60 fishermen or 40.00 percent. Further, all fishermen are male and 141 (94percent) of 150 fishermen are married and the rest single. The detail of demographics data is shown in Table 1.

Variable of relationship with government agent is interval using 5-scale. Therefore, the validity and reliability test must be conducted before regression is run. The validity test is using the KMO and Bartlett test(Bartlett, 1950; Kaiser, 1970). The result shows that two variable represented the relationship with government agents: information exchange and participation in government agent. Exchange information consists of three items and all items are valid with KMO value of .654 (greater than .5) (Hair, William, Babin, & Anderson, 2014). Significant value of Bartlett test is .00 and less than .01. Loading factor is also greater than .5. In addition, test of reliability is using the Cronbach Alpha (Cronbach, 1951) and the value must be greater than .7. Theresult shows that the variable is reliable. The mean value of information exchange is 4.033 (higher). The second variable of relationship with government agent is involvement. The validity test also shows that the variable is valid because of KMO and Bartlett test is satisfied. Further, the reliability test also indicates that the variable is reliable due to the value of Cronbach Alpha greater than .7 (Nunnally, 1978). Finally, the mean value of participation in government agent is higher.

This study uses the multivariate analysis and the model must be free from the multicollinearity problem (Sekaran, 2003). Tolerance and VIF are applied to see whether there is a multicollinearity problem. The multicollinearity problem does not exist if the tolerance value is greater than 1 and VIF value must be less than 10(Gujarati, 1995). The result shows that there is no multicollinearity problem. Besides, this study also uses the Pearson correlation to support the conclusion that there is no multicollinearity problem (see Table 3 and 4). The next classical assumption is heteroscedasticity. The heteroscedasticity exists when unequal variance is present and it is one of the most classical assumptions (Hair et. al., 2014). This problem can be identified using White test (White, 1980). In addition, Wooldridge (2003) recommended that heteroscedasticity corrected regression can be used if heteroscedasticity is identified. The result shows that there is a heteroscedasticity problem (p- value .00007). Therefore, this study applies the heteroscedasticity corrected regression for the final result (see Table 5).

The regression result is demonstrated in table 5. The multivariate model is feasible because statistic is 36.337 with *p* value of .00. In addition, the ability of independent variables explains the dependent variables 82.39 percent and the rest is explained by other variables. The first independent variable is engine power (EP). The effect of engine power on the fishermen income is positively significant due to the *p* value of this variablebeing .0004, which is less than .05. Therefore, it indicates that the higher the engine power, the higher the fishermen income.

The second variable does not have a significant effect on fishermen income. Boat length (BL) has *p*_ value higher than .10 (.332). The possible explanation why boat length does not have a significant effect on fishermen income is that most boatsare not in good condition. In fact, some of them are old. Therefore, it is difficult for fishermen to go far from the seashore. In addition, the third variable (Gillnetlength) has lower*p* value (.006), which means that there is a significant effect of gillnetlength (GL) and fishermen income. However, the signal effect is negative which means the longer the gillnet length, the lower the fishermen income.It is difficult to explain why gillnet length has a negatively significant impact on fishermen income, but it may be related to the condition of the gillnet. The most of fishermen have torn and tangled gillnets.

Further, fishing cost (FC) has a positively significant impact on fishermen income. Fishermen who spend more money on fishing activity, earn more income. Fishing cost consists of direct cost and non-direct cost. However, fishing trips (FT) do not have a significant relationship with fishermen income. Fishing production (FP) has a positive relationship with fishermen income. *p*value of this variable is .0001, which ismuch less than 10 percent. This finding indicates that fishermen who can catch more fish will gain more income. There is a marketing skill of fishermen here and thus they can market their produce well. Finally, they gain more income. In contrast,boat crew do not have a significant effect on fishermen income due to higher *p*_ value of this variable (.343).

Table 1
Demographic Data

No	Demography Data	Categories	Number	%
1	Location	Bungustaluakkabung	26	17.33
		Lubukbegaluang	17	11.33
		Padang selatan	27	18.00
		Padang barat	20	13.33
		Padang Utara	9	6.00
		Koto tangah	51	34.00
2	Age	18 sd 30	20	13.33
		31 sd 40	36	24.00
		41 sd 50	36	24.00
		> 50	60	40.00
3	Gender	Male	150	100.00
		Female	0	0.00
4	Married Status	Married	141	94.00
		Single	9	6.00

Table 2
Validity, Reliability and Means Value of Variables

Variable	#Item	#valid	KMO	Sig Barlett	Loading Factor	CA	Means
Exchange information	3	3	.654	.000	.753 to.903	.795	4.033
Involvement	3	3	.638	.000	.782 to .885	.746	4.058

Table 3
Result of Multicollinearity

Variable	Tolerance	VIF
Engine Power (EP)	.353	2.831
Boat Length (BL)	.433	2.312
Gill Net Length (GL)	.497	2.013
Fishing Cost (FC)	.567	1.763
Fishing Trip (FT)	.856	1.169
Fishing Production (FP)	.350	2.859
Boat Crew (BC)	.314	3.188
Boat Ownership (BO)	.448	2.231
Fishing Experience(FE)	.674	1.483
Fishermen Education (FeD)	.893	1.120
Relationship with Fishing Crew (RFC)	.774	1.292
Other Fishermen Income (OFI)	.733	1.364
Family Members (FM)	.751	1.332
Exchange Information (EI)	.553	1.808
Participation with Government Agent (PGA)	.662	1.510

Table 4
Correlation Matrix of Independent Variables

	EP	BL	GL	FC	FT	FP	BC	BO	FE	FeD	RCF	OFI	FM	EI	PGA
EP	1														
BL	.715**	1													
GL	.588**	.465**	1												
FC	.501**	.439**	.289**	1											
FT	.035	-.109	.074	-.120	1										
FP	.203*	.019	.526**	0.92	.371**	1									
BC	.182*	.091	.374**	.165*	.182*	.637**	1								
BO	.031	.054	-.085	.120	.029	.013	.097	1							
FE	-.059	-.146	-.164*	-.065	.024	-.159	-.118	.068	1						
FeD	-.022	-.017	.002	-.045	-.020	.039	.084	.020	-.194*	1					
RCF	-.129	-.053	-.081	-.196*	-.170*	-.203*	-.064	-.064	-.205*	.226**	1				
OFI	.122	.001	.238**	.044	.179*	.565**	.424**	.017	-.045	-.068	-.209*	1			
FM	.062	.002	.007	.124	.114	.108	.000	-.043	.384**	-.171*	-.192*	.87	1		
EI	.055	-.021	.196*	-.260*	.161*	.424**	.213**	-.045	-.180*	.006	.020	.192*	-.100	1	
PGA	.003	.070	-.028	-.223**	.029	-.090	-.135	-.092	-.108	.054	.131	-.065	.109	.402**	1

Note: ** Correlation is significant at the .01 level (2-tailed)
* Correlation is significant at the .05 level (2-tailed)

Table 5
Results of Multiple Regressions

Variables	Coef Reg	t stat	p value	Conclusion
constant	-985722	-2.400	.0178**	
Engine Power (EP)	**15645.300**	**3.665**	**.0004*** **	**Significant**
Boat Length (BL)	8934.920	.975	.332	Not-significant
Gill Net Length (GL)	**-132.822**	**-2.798**	**.0059*** **	**Significant**
Fishing Cost (FC)	**.192**	**4.635**	**.0001*** **	**Significant**
Fishing Trip (FT)	3694.910	.259	.796	Not-significant
Fishing Production (FP)	**4048.530**	**7.954**	**.0001*** **	**Significant**
Boat Crew (BC)	58788.200	.953	.343	Not-significant
Boat Ownership (BO)	**243549.000**	**4.343**	**.0001*** **	**Significant**
Fishing Experience(FE)	-1649.340	-1.337	.183	Not-significant
Fishermen Education (FeD)	**21180.600**	**3.653**	**0.0004*** **	**Significant**
Relationship with Fishing Crew (RFC)	-8079.260	-.334	.739	Not-significant
Other Fishermen Income (OFI)	.000	.000	1.000	Not-significant
Family Members (FM)	31896.190	1.396	.168	Not-significant
Exchange Information (EI)	48768.600	1.492	.138	Not-significant
Participation with Gov. Agent (PGA)	22275.700	1.576	.118	Not-significant
Fstat (F sig)		36.337		
R square		.8239		
Durbin Watson		1.893		

Note: *,**, and *** indicate significant at 10%, 5%, and 1%

Boat ownership (BO) has a positively significant relationship with fishermen income (p value of .036). Fishermen who own boatstendto increase their income. However, fishermen experience (FE) does not influence the fishermen income. In addition, fishermen education (FeD) has a positively significant relationship with fishermen income. The fishermen with higher education level tend togain more income. Other variables; Relationship with fishing crews (RFC), other fishermen income (OFI), family members (FM), exchange information (EI) and participation with government agent (PGA), do not have a significant effect on fishermen income.There are three group variables in this study; fishing input, socioeconomic and demography, and relationship with government agent. Significant variablesare engine power (EP), fishing cost (FC), fishing production (FP), boat ownership (BO), and fishermen education.

Engine power has a positive significant effect on fishermen income. This finding is aligned with findings of Al Jabri et al. (2013) who also found a positive effect of engine power on fishermen income. The significant variable is fishing cost and it is also supported by Al Jabri et al. (2013). Al Jabri et al.(2013) found a negative relationship with fishermen income . However, this study shows a positive relationship. Fishing production also has a positive relationship with fishermen income and implies that fishermen in Padang city are able to do marketing management. Therefore, it positively contributes to ishermen income. From socioeconomics and demographics, only boat ownership and education have a significant effect on fishermen income. Boat ownership has a positive relatioship with fishermen income but this finding is not supported by previous research (Al Jabri et al., 2013). In contrast to findings of Al Jabri et al. (2013), fishermen education has a positive relationship with fishermen income. Furthermore, the result of the study revealed R square .8239 meaning that the variances of fishermen income are explained by the 15 independent variables 82.39 percent.

Conclusion and Policy Recommendation

The study on fishing input, socioeconomics, demography, and relationship with government agent and their effect on fishermen income in Padang was carried out. Some conclusions that can be drawn are that fishing production (FP) registered as the highest contribution on fishermen income, followed by fishing costs (FC), boat owner (BO), engine power (EP), fishermen education (FeD), and gillnet length (GL) respectively.In addition, the variances of fishermen income are shown as 82.39 percent by the 15 independent variables.

Policy recommendation could be addressed to government agencies. In order to increase the income of fishermen in Padang in future, it is recommended to improve the aids of boat, engine, fishing training, as well as fishing operational costs.

Conflict of interest

The research does not have a conflict of interest.

Acknowledgments

The author expresses his gratitude for the financial assistance provided by Universitas Bung Hatta through the acceleration program of the professor with contract number 205.1-705.4.001.01.001, 3rd November 2017.

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Kasetsart Journal of Social Sciences

The effect of fishing input, socioeconomic and relationship with government agent on fishermen income in Indonesia

Dear Editor,

Thank you for your useful comments and suggestions on our manuscript. We have modified the manuscript accordingly, and detailed corrections are listed below point by point:

Reviewer 1

1. Need to conclude how to use the result applying to the policy on small scale fishery management
   √ We had added the policy on on small scale fishery management in manuscript.

2. Need to check grammar all the paper because the writing is quite low standard and not consistent
   √ We had revised and check grammar all the paper in manuscript.

3. The explanation is not clear in the abstract , literature review and implications
   √ We had added the explanation in the abstract

4. Need to check citation format.
   √ We had revised the citation format in manuscript.

Please see attached file -- KJSS_2018_447_Manuscript.

Reviewer 2

General comment:

What is the year of data used in this paper?

√ We had added the year of data used in manuscript.

The author should present data description and measurement of variables such as how fishing income (fishing production) is measured (e.g. RP (kilograms) per month or per annum), how number of crews per boat are calculated, what are included in measuring costs of fishing, how many education levels are in use.

√ We had added the data description and measurement of variables in manuscript.

Please verify the definition of boat ownership (BO), fishermen education (FeD), fishing experience (FE) and the relationship with fishing crew (RFC). Are those dummy variables or the number of boats possession or years of educational attainment/experiences?.

√ We had added the definition of boat ownership (BO), fishermen education (FeD), fishing experience (FE) and the relationship with fishing crew (RFC) in mauscript.

The author should provide the correlation matrix of independent variables.

√ We had added the correlation matrix of independent variables in mauscript.

The endogeneity problem can occur because the quantities of the catches (fishing production: FP) are simultaneously determined with the level of fishermen's income. Additionally, the author should provide the correlation matrix.

√ We had added the correlation matrix in mauscript.

It is crucial that the author should discuss and interpret the magnitude of coefficients. According to page 11, please check how to interpret categorical variables if boat ownership or fishermen's education are dummy variables.

The results reveal that some variables are insignificant such as boat length (BL), gillnet length (GL) and fishing costs. Therefore, the author should clarify and discuss significance and sign of these variables are not as expected.

Since your data is cross sectional, the author should concern about heteroskedasticity problem with a robustness check. In the presence of heteroskedasticity, the estimators of variances are biased, and then their standard errors are no longer valid for constructing confidence intervals and t statistics.

I strongly suggest the author to revise the conclusion since there are many typos and lack of policy implication. In addition, the author should specify policy recommendation and explain more details about the limitations.

√ We had revised the the conclusion and specify policy recommendation and explain more details about the limitations in conclusion.

Check the style of accurate citation and use capital letter at the beginning of sentences throughout the article.

√ We had checked the style of accurate citation and use capital letter at the beginning of sentences throughout the article in manuscript.

Specific comment:

1. Data employed in this paper does not represent fishing income of the whole country. Maybe, the title could be changed to "The Determinants of Small-scale Fishermen's Income in Padang city, Indonesia".

√ We had revised the title based on suggestion to "The Determinants of Small-scale Fishermen's Income in Padang city, Indonesia".

2. Page 1 L8, 'questioner' should be 'questionnaires'

√ We had revised page 1 L8 , 'questioner' to be 'questionnaires' in manuscript.

3. Check grammatical errors in line 17, 25.

4. Page 1 L18-19, 'Fisheries and aquaculture' should be 'Fishery and aquaculture sector is source…'

√ We had revised page 1 L18-19 , 'Fisheries and aquaculture' to be 'Fishery and aquaculture sector is source…' in manuscript.

5. Page 1 L20-21, these sentences should be modified. 'Around 95% of Indonesian engaged in fishing activities are small-scale fisheries'.

√ We had revised page 1 L20-21 to be 'Around 95% of Indonesian engaged in fishing activities are small-scale fisheries' in manuscript.

6. Page 2, L1, 'ton' should be 'tons'

√ We had revised page 2, L1, 'ton' to be 'tons'

7. Page 2, L2, I suggest to add US$ value of fish production in the bracket after local currency value and inform which years of data are mentioned.

√ We had added US$ value of fish production in the bracket after local currency value and inform the years of data in manuscript.

8. Page 2, L5, Replace 'including' with 'such as'.

√ We had revised page 2, L5, Replace 'including' with 'such as' in manuscript.

9. Check typo and grammatical errors in line 5, 14, 17 on page 2.

√ We had revised gramatical error in line 5, 14, 17 on page 2 in manuscript.

10. Through this paper, use 'socioeconomic and demographic' with noun such as characteristics or factors or variables.

√ We had revised and used ‘socioeconomic and demographic’ in manuscript.

11. Page 3, L15, Replace ‘social economics’ with ‘socioeconomic’.
    √ We had revised page 3, L15, Replace ‘social economics’ with ‘socioeconomic’ in manuscript.

12. Page 3, L20, Please clarify what is the uniqueness of Indonesia’s fisheries?.

    √ We had added the uniqueness of Indonesia’s fisheries in manuscript.

13. Page 4, L11, Replace ‘fisheries economics’ with ‘fishery economics’.

    √ We had revised page 4, L11, Replace ‘fisheries economics’ with ‘fishery economics’ in manuscript.

14. Check verb tense consistency and grammatical errors from line 9 to 26 on page 4.
    √ We had revised page 4, 9 to 26 in manuscript.

15. Page 5, L6, Replace ‘Gillnet Length’ with ‘Gillnet Length.

    √ We had revised page 5, L6, Replace ‘Gillnet Length’ with ‘Gillnet length in manuscript.

16. Page 7, L7, there are 15 independent variables according to table 4D on page 10.

17. Page 7, L13, typo in ‘Multicollinearity’.

    √ We had revised page 7, L13, Multicollinearity in manuscript.

18. Page 7, L20, add ‘%’ after ’11.33’.
    √ We had revised page 7, L20, with add ‘%’ after ’11.33’ in manuscript.

19. Page 9, L1, ‘.7’ should be ‘0.7’.
    √ We had revised page 9, L1, ‘.7’ to be ‘0.7’ in manuscript.

20. Page 9, L4, Table 4B ‘Ext information’ should be ‘Exchange information’.
    √ We had revised page 9, L4, Table 4B ‘Ext information’ to be ‘Exchange information’ in manuscript.

21. Page 10, L3,The R square means that the percentage of variance in the dependent variable can be explained by the independent variables in the model.

- Please see attached file -- Comment_14Dec18.

The manuscript has been resubmitted to your journal. We look forward to your positive response.

Sincerely,

Dr. Hendra Suherman
Department of Mechanical Engineering
Universitas Bung Hatta

The effect of fishing input, socioeconomic and relationship with governmentagent on fishermen income in Indonesia

Abstract

Teknologi, kenaikan harga bahan bakar, fluktuasi harga ikan akibat musim dan struktur keluarga merupakan fenomena nelayan di kota Padang.
This study investigates the effect of fishing input, socioeconomics and demography, and relationship with government agent on income of Padang's fishermen. Little to be known about fishermen income using Indonesia's data. 150 fishermen responded to this study and returned the questioner. Using multiple regression analysis, we found that (1). The effect on Engine Power on the Fishermen Income is positively significant due to the *p* value of this variable is 0.007 which is less than 0.01.

Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Education have a significant effect on the fishermen income.

Keywords:fishing input,fishermen income, relationship with government agent, socioeconomic and demographics

Introduction

Many millions of people living on along coastal zones and they rely on the ocean and its resources for sustenance, livelihood, and culture continuity (Kittinger, 2013). Fisheries and aquaculture sector is sources of income and livelihood for millions of people around the world (Adili & Antonia, 2017). It is hard to ignore the important of fish for Indonesia. 95% of Fishermen population is small-scale fishermen (Sudarmo, Baskoro, Wiryawan, Wiyono, & Monintja, 2015). Padang is a city where located at the coast water of west Sumatra. The fishermen operating in territorial of Padang are small-scale fishermen. Padang is one of cities in West Sumatra Province and has 11 sub-districts or *Kecamatan.* The number of fishermen in Padang has been increasing over the time. However, it was decreasing from 7,076 in 2016 to 7,066 in 2017. The fish production was increasing from

20,612,8 ton with value of Rp. 435,16 billion in 2016 to 20,814,9 ton with value of Rp. 439,10 billion. Like in other areas in Indonesia, Fishermen in Padang is also dominated by small-scale fishermen. Hendrik and Zulkarnain(2016) argue that Fishing activities in the west coast water of Sumatra using various type of fishing gear, including trolling, hand line and purse seine. Most of fishing activities are supported by fishing gear using a motor boat (Hendrik & Zulkarnain, 2016). The padang city map as a study area is demostrated in figure 1 below.

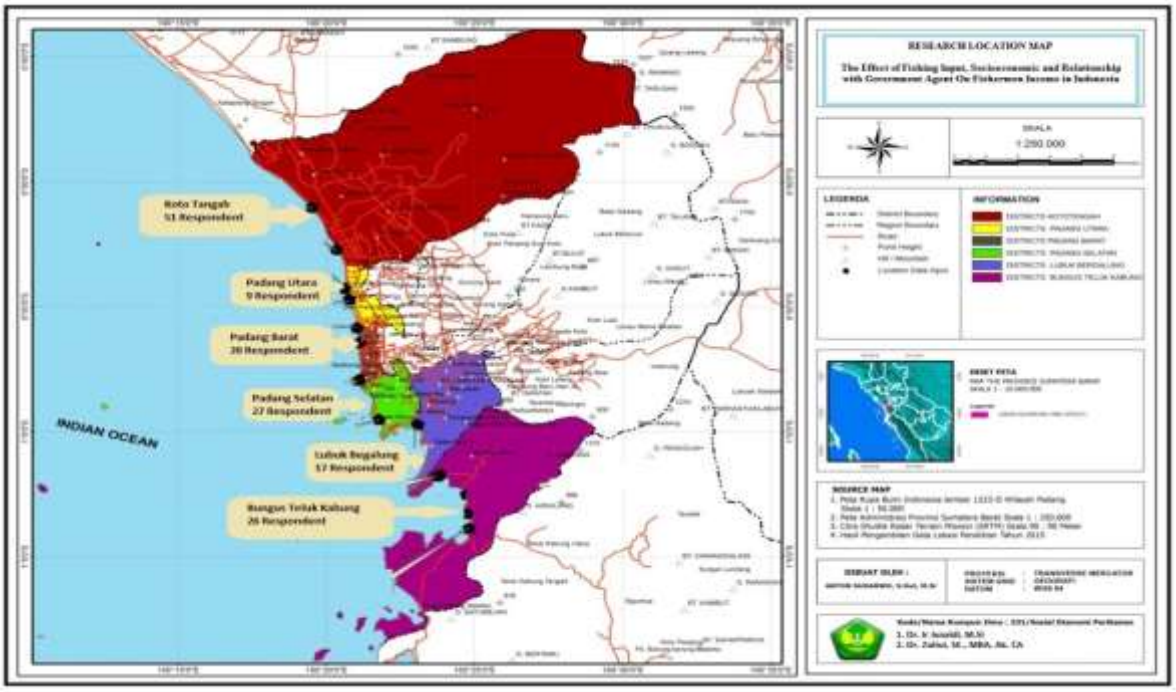

Figure 1. Study Area

The study of determinants of fishermen income has been conducted by previous studies (Adili & Antonia, 2017; Jabri, Collins, Sun, Omezzine, & Belwal, 2013; Rahman, Haque, & Rahman, 2011). Adili and Antonia (2017) investigate the factors affecting the fishermen income and conclude that the fishing gear, number of labor, fishing season are significant factors affecting the fishermen income in Tanzania. However, the educational level and financial support do not influence the fishermen income significantly. In addition, Jabri et al.(2013) study the determinants of the fishermen income in Oman and classified the determinants into three groups: fishing inputs and catch, Socioeconomic and demographic,

and extension and R&D. From fishing input and catch, Jabri et al. (2013) conclude that engine power, boat length, fishing cost, fishing trip, difficulty in obtaining ice, average weekly catch, number of crews, and use of fiberglass boat are significant determinants of fishermen income. in addition, income sharing, board ownership, partnership in other boat and fishermen age have a significant relationship with fishermen income (Jabri et al., 2013). Further, exchange information and cooperation with MAF and strongly involved with MAF also influence the fishermen income significantly. Rahman et al.(2011) examine the effect of age, education, family members, family land holdings, pond size, experience of fishing farming, training on fish farming and access to information on fish farming on the fishermen income among fishermen in Bangladesh. Family land holdings, pond size, training on fish farming, and access to information on fish farming are significant factors affecting the fishermen income.

There is lack of studies investigating the fishermen income using the Indonesia fishermen data (Hendrik & Zulkarnain, 2016). Most studies using Indonesia data are focusing on other aspect, such as fishermen's poverty (Darwis, Elfindri, Syafrizal, & Mahdi, 2015), social economics characteristics of small-scale fishermen (Sudarmo et al., 2015), and fishermen management system (Tan, 2014). Even though, Hendrik and Zulkarnain(2016) has conducted a study on fishermen income, the study was emphasizing on fuel price fluctuation. Therefore, there is desire need a study in more comprehensive to investigate the determinants of fishermen income in Indonesia's setting. This study would probably enrich fisheries economic literature due to the uniqueness of Indonesia' fisheries environments compared to other countries. Thus, this study aims to investigate the effect of fishing input and catching, socioeconomics and demographics, and exchange information and involvement with government agents on fishermen income. this paper is organized as follow: first session is about background of study, followed by theoretical aspects. Further,

the third session discuss about methodology. Fourth session is about result and discussion and it is, finally, closed by conclusion and recommendation.

Literature Review

Fishermen Income

Fishermen's income is an objective of fisheries management system (Cunningham, 1994). Fishing management is characterized by multiple and conflicting objectives, multiple stakeholders with divergent interests and high levels of uncertainty about dynamics of the resources being managed (Smith, Sainsbury, & Stevens, 1999). Cunningham(1994)argue that it is hard to understand the determinants of fisheries income in the situation within the standard fisheries economics model. Panayotou(1980) state that fishermen income depends on the opportunities income.Copes(1988) offered six reasons why opportunities income may be low in small-scale fisheries. These are: (i) the isolation of fishing communities, (ii) the existence of surplus labor due to productivities gains, (iii)capital asset fixity, (iv) lifestyle preferences, (v) high liner illusion, and (vi) perverse assistance. (Jabri et al., 2013) classified determinants of fishermen income: fishing input and catch, socioeconomics and demographics, and relationship with government agents.

Fishermen Input

Jabri et al.(2013) state that there are three categories of factors affecting the fishermen's income: input factor, socioeconomic and demography and fishermenextension and R&D. Fishermen's input refers to the all fisheries economic resources used for fishing activity. The including sources are engine power, Boat length, fishing cost, fishing trips, and etc(Jabri et al., 2013). An engine power is a power of engine to push the boat to go the fishing ground quickly. The more power of engine, more quickly arriving in the fishing ground. Usually, fishermen who has more power of engine, they may produce more fish and

finally more income. whereas, Boat length is length of Boat which is measure a room for fishes catched. More length of boat, fishermen could have more room for stocking the fish. In addition, length of boat make boat larger and relatively larger boats are able to derive substantial benefits from fishing (Islam, Ali, Zamhuri, & Kuperan, 2016). while the artisanal fishers failed to compete with the larger powered boats. Therefore, it may bring a lot of fish and finally more income. GillnetLength is long of net used by fishermen. The longer the net , the more opportunities to catch fish and more income will be earned by fishermen.

Fishing cost refers to the money expensed by fishermen to do fishing activities. More cost incurred, fishermen can go far from coastal and they have an opportunity to catch more fish and finally more income that they can earn. Further, fishing trips defined as the number of setting and hauling activities. More trips that fishermen do, more production and they would earn more income. the following factor is number of fishing crews. The higher the number of fishing crews, the faster hauling done. This factor will increase the fishing production and finally they earn more income. finally, all input will produce the output in term of fishing production. Fishing production refers to the number of fishing catch during fishing activities. It usually is measured by kilogram or monetary.

Fishermen Socioeconomic and Demographic

Fishermen socioeconomic and demographic variables are significant factor affecting the fishermen income, such as income sharing with crews, age and partnership in other boat (Jabri et al., 2013). Jabri et al.(2013) identified several factors from socioeconomic and demographic: income sharing with crews, boat ownership, partnership in other boat, fishermen age, literacy level of fishermen, relationship with crew, and alternative sources of income. Boat ownership refers to the fishermen has their own boat to be used in fishing operation. Due to boat ownership, the fishing income will be distributed more to owner of boat. Therefore, the fishermen income will earn more income. Fishing experience is defined

as long tenure of fishermen does the fishing activities. More experience of fishermen, they know everything about fishing activities. This experience will help them to produce more fishes and finally will increase the fishing production as well as fishermen income. Further, fishermen education is the level of education of fishermen. With level of education, they can plan, organize and control all aspect of fishing well. Most of time, the higher the fishermen education the higher the fishing production and therefore, increase the income. Relationship with fishing crew is defined as a family relationship with fishing crew. Fishing crew with family relationship is more commitment to increase fishing production. Thus, the fishermen income would be increasing. Other fishermen income refers to other income earned by other family members beside from fishing income. Family members help to earn the additional income and this condition will increase the fishermen income. Family member is defined as the number of family burden in one family. The higher the number of family burden, the higher the fishermen income. this is because they are more motivation to increase their income. They know that they have to cover all cost incurred in family.

Exchange information and participation

Relationship with government agent which measured by exchange information and participation. The last factors are exchange information and participation in government agent activity. Exchange information and cooperative with the government agent is useful initiatives in order to get update information regarding to fishing matters. With update information, fishermen are expected to have an impact on fishermen income. (Jabri et al., 2013) conclude that fishermen income could be explained by having good relationship and opern communication with extension services. In addition, discussion with government agent bring to have better knowledge of fishing areas, awarness of better tools and technology, information about financial schemes, and in realising some promising

opportunities. These condition would create the opportunities to have more fishing production and finally fishermen income.

Methods

The object of this study is small-scale fishermen in Padang City. One hundred and fifty fishermen are included as sample of the study. Primary data used and gathered by doing survey. There are 17 independent variables and one dependent variable, that is fishermen income. The independent variables are grouped into 3 categories: inputs of fishing, socioeconomics and demographic, and relationship with government agent. Fishing input, and socioeconomics and demographics are ratio and ordinal variables. In addition, the relationship with government agent is 5-scale items. This study uses the multiple regressionmodelusing the SPSS. Relationship with government agent firstly tested for validity and reliability. Multico linearity test is conducted to see whether anyrelationship among the independent variables. F statistic is applied to see the model fitness. The t statistic or significant value is used to see the effect of independent variables on dependent variable.

Results and discussion

One hundred and fifty small-scale fishermen are responded in this study. Based location, 26 fishermen or 17.33% are from *BungusTaluakKabuang* Area, and 17 fishermen or 11.33 are from *LubukBegaluang*. From *Padang Selatan* is 27 fishermen or 18.00% and 20 fishermen are from *Padang Barat* area or 13.33%. From area of *Padang Utara* and*Koto Tangah* are 9 and 51 fishermen respectively. Age of respondent is categorized as 18 to 30 years (20 fishermen or 13.33%), 31 to 40 years (36 fishermen or 24.00%), 41 to 50 years (36 fishermen or 40.00%), and greater than 50-year-old is about 60 fishermen or 40.00%.

further, all fishermen are male and 141 (94%) of 150 fishermen are married and the rest is single. The detail of demographics data is shown in table 4(A)

Table 4

Demographic Data

(A)

No	Demography Data	Categories	Number	%
1	Location	Bungus taluakkabung	26	17.33
		Lubuk begaluang	17	11.33
		Padang selatan	27	18.00
		Padang barat	20	13.33
		Padang Utara	9	6.00
		Koto tangah	51	34.00
2	Age	18 sd 30	20	13.33
		31 sd 40	36	24.00
		41 sd 50	36	24.00
		> 50	60	40.00
3	Gender	Male	150	100.00
		Female	0	0.00
4	Married Status	Married	141	94.00
		Single	9	6.00

Variable of relationship with government agent is interval using 5-scale. Therefore, the validity and reliability test must be conducted before regression is run. The validity test is using the KMO and Bartlett test (Bartlett, 1950; Kaiser, 1970). The result show that two variable represented the relationship with government agents: information exchange and participation in government agent. Exchange information consists of three items and all items are valid with KMO value of 0.654 (greater than 0.5)(Hair, William, Babin, & Anderson, 2014). Significant value of Bartlett test is 0.00 and lesser than 0.01. Loading factor is also greater than 0.5. in addition, test of reliability is using the Cronbach Alpha

(Cronbach, 1951) and the value must be greater than 0.7. The result shows that the variable is reliable. The means value of information exchange 4.033 (higher). Second variable of relationship with government agent is involvement. The validity test also shows that the variable is valid because of KMO and Bartlett test is satisfied. Further, the reliability test is also indicating that the variable is reliable due to the value of Cronbach Alpha greater than .7 (Nunnally, 1978). finally, the means value of participation in government agent is higher.

Table 4

Validity, Reliability and Means Value of Variables

(B)

Variable	#Item	#valid	KMO	Sig Barlett	Loading Factor	CA	Rata-rata
Ext information	3	3	0.654	0.00	0.753 to.903	0.795	4.033
Involvement	3	3	0.638	0.00	0.782 to .885	0.746	4.058

This study use the multivariate analysis and the model must be free from the multicollinearity problem (Sekaran, 2003). Tolerance and VIF are applied to see whether there is multicollinearity problem. The multicollinearity problem does not exist if the tolerance value must greater than 1 and VIF value must be lesser than 10 (Gujarati, 1995). The result show that there is no multicollinearity problem.

Table 4

Result of Multicollinearity

(C)

Variable	Tolerance	VIF
Engine Power (EP)	0.353	2.831
Boat Length (BL)	0.433	2.312
Gillnet Length (GL)	0.497	2.013
Fishing Cost (FC)	0.567	1.763
Fishing Trip (FT)	0.856	1.169
Fishing Production (FP)	0.350	2.859
Boat Crew (BC)	0.314	3.188
Boat Ownership (BO)	0.448	2.231
Fishing Experience(FE)	0.674	1.483
Fishermen Education (FeD)	0.893	1.120
Relationship with Fishing Crew (RFC)	0.774	1.292

Other Fishermen Income (OFI)	0.733	1.364
Family Members (FM)	0.751	1.332
Exchange Information (EI)	0.553	1.808
Participation in Government Agent (PGA)	0.662	1.510

The regression result is demonstrated in table 4(D). The multivariate model is feasible because of F statistic is 7.684 with *p* value of 0.00. In addition, the ability of independent variables explain the dependent variables is 46.2% and the rest is explained by other variables. The first independent variables are Engine Power (EP). The effect on Engine Power on the Fishermen Income is positively significant due to the *p* value of this variable is 0.007 which is less than 0.01. Therefore, it indicates that the higher the engine power, the higher the fishermen income.

Table 4

Result of Regression

(D)

Variables	Coef.Reg	t stat	*p* value	Conclusion
Constant	320141.19	0.560	0.576	
Engine Power (EP)	34988.60	2.748	0.007***	**Significant**
Boat Length (BL)	-35052.53	-1.433	0.154	Not-significant
Gillnet Length (GL)	-1.95	0.016	0.988	Not-significant
Fishing Cost (FC)	0.35	3.059	0.003***	**Significant**
Fishing Trip (FT)	43378.62	1.611	0.110	Not-significant
Fishing Production (FP)	367705.14	3.308	0.001***	**Significant**
Boat Crew (BC)	-9,29	-0.003	0.998	Not-significant
Boat Ownership (BO)	267169.69	2.115	0.036**	**Significant**
Fishing Experience(FE)	4400.31	-1.389	0.167	Not-significant
Fishermen Education (FeD)	21453.62	2.612	0.010***	**Significant**
Relationship with Fishing Crew (RFC)	-79604.19	-0.856	0.393	Not-significant
Other Fishermen Income (OFI)	0.05	0.477	0.634	Not-significant
Family Members (FM)	31666.30	1.415	0.159	Not-significant
Exchange Information (EI)	-16040.28	-0.392	0.696	Not-significant
Participation in Government Agent (PGA)	-45493.83	-1.274	0.205	Not-significant
Fstat (F sig)		7.684 (0.000)***		
R square		0.462		
Durbin Watson		1.972		

Note: *,**, and *** indicate significant at 10%, 5%, and 1%

Second and third variables do not have a significant effect on fishermen income. Boat length (BL) has *p* value that higher than 0.10 (0.154). In addition, GillnetLength (GL) also has higher *p* value (0.988) which means that there is no significant effect of GillnetLength (GL) and fishermen income. Further, Fishing Cost (FC) has a positively significant impact on fishermen income. Fishermen which spend more money on fishing activity, they would earn more income. Fishing cost consists of direct cost and non-direct cost. However, Fishing Trips (FT) do not have a significant relationship with fishermen income. Fishing Production (FP) has a positive relationship with Fishermen Income. *p* value of this variable is 0.001

which much less than 10%. This finding indicate that fishermen who can produce more fishes will gain more income. there is a marketing skill of fishermen here and thus can market their productions well. Finally, they gain more income. Contrast to Fishing Production (FP), Boat Crew do not have a significant effect on fishermen income due to higher *p* value of this variable (0.998).

Boat Ownership (BO) has a positively significant relationship with fishermen income (*p* value of 0.036). Fishermen who own Boat will increase their income. However, Fishermen experience (FE) does not influence the fishermen income. In addition, Fishermen Education (FeD) has a positively significant with fishermen income. The fishermen with higher education level will gain more income. Other variables; Relationship with Fishing Crews (RFC), Other Fishermen Income (OFI), Family Members (FM), Exchange Information (EI) and Participation in Government Agent (PGA), do not have a significant effect on fishermen income.There are three group variables in this study; fishing input, socioeconomic and demography, and relationship with government agent. Significant variabel are Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Educaiton.

The engine power has a positive significant reationship with the fishermen income. this finding is aligned with finding of (Jabri et al., 2013) who also found that a positive effect of the engine power on fishermen income. Second significant variable is fishing cost and it is also supported by (Jabri et al., 2013). However, (Jabri et al., 2013) found a negative relationship with the fishermen income and this study conclude a positive relationship. Fishing production also have a positive relationship with the fishermen income and imply that fishermen in Padang city is able to do marketing management. Therefore, it positively contribute to the fishermen income. from socioeconomics and demographics, only boat ownership and education have a significant effect on the fishermen income. Boat ownership

has a positive relatiohsip with the fierhemen income and this finding is not supported by previous research (Jabri et al., 2013). Contrast to finding of (Jabri et al., 2013), the fishermen education has a positive relationship with fishermen income.

Conclusion and Recommendation

Fishermen income has been becoming a hot topics among academics and pratitioners of fisheries economics. Fihermen income is outcome of fisheries management system and need to explore why some fishermen has a low income and others does not. Many study has been done but little information using in Indonesia's fishermen data. By using fishermen in Padang city, this study conclude that Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Educaiton have a significant effect on income of Padang's fishermen. These findings contribute to theory of fisheries economics. Practically, these findings could be used to formulate the fishermens' related policy. A number of imortant limitations need to be considered. First, this study use an fishermen who got financial aids form government agency. Second, the variabel used in this study focused on fishing input, sociaeconomics and demographics, and relatiohip with governement agents. Finally, this study use multiple regeression analysis. Further work needs to be done to establish the effect of other variabels from other management system, such as marketing and finance perspective, using different data and methods.

Conflict of interest

The research does not have a conflict of interest.

Acknowledgments

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Manuscript Details

Manuscript number	KJSS_2018_447_R1
Title	The Determinants of Small-scale Fishermen’s Income in Padang City, Indonesia
Article type	Research Paper

Abstract

Small-scale fisheries play an important role in supplyingfish protein for community of Padang city. However, the incomes of fishermen are still far from expectation. This study investigates the effect of fishing input, socioeconomics, demography, and relationship with government agent on fishermen income in Padang. 150 fishermen responded to this study and returned the questioner. Using multiple regression analysis, we found that Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Education have a significant effect on the fishermen income.Specifically, FP (t statistics 3.308) was registered as the highest contribution on fishermen income, while the BO (t statistics 2.115) found to have lowest effect on fishermen income.

Keywords	Fishing Input, Socioeconomic; demographics; Relationship with Government Agent; Fishermen Income
Corresponding Author	Hendra Suherman
Corresponding Author's Institution	Universitas Bung Hatta
Order of Authors	Junaidi Junaidi, Zaitul Zaitul, Hendra Suherman
Opposed reviewers	Raja Abdullah Nik Mustapha, Indah Susilowati, Muhammad Firdaus

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Dear Asst.Prof.Dr. Shiepsumon Rungsayatorn
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This manuscript describes original work and is not under consideration by any other journal. All authors approved the manuscript and this submission for your consideration for publication in Kasetsart Journal of Social Sciences. Please find the enclosed manuscript entitled "The effect of fishing input, socioeconomic and relationship with government agent on fishermen income in Indonesia" by Junaidi, Zaitul and Hendra Suherman. The manuscript has 15 pages 4 table(s) and 1 figure.

The manuscript is in(Choose one field)*

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[There is lack of studies investigating the fishermen income using the Indonesia fishermen data (Hendrik & Zulkarnain, 2016). Most studies using Indonesia data are focusing on other aspect, such as fishermen's poverty (Darwis, Elfindri, Syafrizal, & Mahdi, 2015), social economics characteristics of small-scale fishermen (Sudarmo et al., 2015), and fishermen management system (Tan, 2014). Even though, Hendrik and Zulkarnain(2016) has conducted a study on fishermen income, the study was emphasizing on fuel price fluctuation. Therefore, there is desire need a study in more comprehensive to investigate the determinantsof fishermen income in Indonesia's setting]

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I hope that the enclosed manuscript and reviewer suggestions fulfill the requirements for publication in Kasetsart Journal of Social Sciences. Thank you for receiving our manuscript and considering it for review. We appreciate your time and look forward to your response.

Yours Sincerely,

(Hendra Suherman)

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Kasetsart Journal of Social Sciences

The effect of fishing input, socioeconomic and relationship with government agent on fishermen income in Indonesia

Dear Editor,

Thank you for your useful comments and suggestions on our manuscript. We have modified the manuscript accordingly, and detailed corrections are listed below point by point:

Reviewer 1

1. Need to conclude how to use the result applying to the policy on small scale fishery management
   √ We had added the policy on on small scale fishery management in manuscript.

2. Need to check grammar all the paper because the writing is quite low standard and not consistent
   √ We had revised and check grammar all the paper in manuscript.

3. The explanation is not clear in the abstract , literature review and implications
   √ We had added the explanation in the abstract

4. Need to check citation format.
   √ We had revised the citation format in manuscript.

Please see attached file -- KJSS_2018_447_Manuscript.

Reviewer 2

General comment:

What is the year of data used in this paper?

√ We had added the year of data used in manuscript.

The author should present data description and measurement of variables such as how fishing income (fishing production) is measured (e.g. RP (kilograms) per month or per annum), how number of crews per boat are calculated, what are included in measuring costs of fishing, how many education levels are in use.

√ We had added the data description and measurement of variables in manuscript.

Please verify the definition of boat ownership (BO), fishermen education (FeD), fishing experience (FE) and the relationship with fishing crew (RFC). Are those dummy variables or the number of boats possession or years of educational attainment/experiences?.

√ We had added the definition of boat ownership (BO), fishermen education (FeD), fishing experience (FE) and the relationship with fishing crew (RFC) in mauscript.

The author should provide the correlation matrix of independent variables.

√ We had added the correlation matrix of independent variables in mauscript.

The endogeneity problem can occur because the quantities of the catches (fishing production: FP) are simultaneously determined with the level of fishermen's income. Additionally, the author should provide the correlation matrix.

√ We had added the correlation matrix in mauscript.

It is crucial that the author should discuss and interpret the magnitude of coefficients. According to page 11, please check how to interpret categorical variables if boat ownership or fishermen's education are dummy variables.

The results reveal that some variables are insignificant such as boat length (BL), gillnet length (GL) and fishing costs. Therefore, the author should clarify and discuss significance and sign of these variables are not as expected.

Since your data is cross sectional, the author should concern about heteroskedasticity problem with a robustness check. In the presence of heteroskedasticity, the estimators of variances are biased, and then their standard errors are no longer valid for constructing confidence intervals and t statistics.

I strongly suggest the author to revise the conclusion since there are many typos and lack of policy implication. In addition, the author should specify policy recommendation and explain more details about the limitations.

√ We had revised the the conclusion and specify policy recommendation and explain more details about the limitations in conclusion.

Check the style of accurate citation and use capital letter at the beginning of sentences throughout the article.

√ We had checked the style of accurate citation and use capital letter at the beginning of sentences throughout the article in manuscript.

Specific comment:

1. Data employed in this paper does not represent fishing income of the whole country. Maybe, the title could be changed to "The Determinants of Small-scale Fishermen's Income in Padang city, Indonesia".

√ We had revised the title based on suggestion to "The Determinants of Small-scale Fishermen's Income in Padang city, Indonesia".

2. Page 1 L8, 'questioner' should be 'questionnaires'

√ We had revised page 1 L8 , 'questioner' to be 'questionnaires' in manuscript.

3. Check grammatical errors in line 17, 25.

4. Page 1 L18-19, 'Fisheries and aquaculture' should be 'Fishery and aquaculture sector is source…'

√ We had revised page 1 L18-19 , 'Fisheries and aquaculture' to be 'Fishery and aquaculture sector is source…' in manuscript.

5. Page 1 L20-21, these sentences should be modified. 'Around 95% of Indonesian engaged in fishing activities are small-scale fisheries'.

√ We had revised page 1 L20-21 to be 'Around 95% of Indonesian engaged in fishing activities are small-scale fisheries' in manuscript.

6. Page 2, L1, 'ton' should be 'tons'

√ We had revised page 2, L1, 'ton' to be 'tons'

7. Page 2, L2, I suggest to add US$ value of fish production in the bracket after local currency value and inform which years of data are mentioned.

√ We had added US$ value of fish production in the bracket after local currency value and inform the years of data in manuscript.

8. Page 2, L5, Replace 'including' with 'such as'.

√ We had revised page 2, L5, Replace 'including' with 'such as' in manuscript.

9. Check typo and grammatical errors in line 5, 14, 17 on page 2.

√ We had revised gramatical error in line 5, 14, 17 on page 2 in manuscript.

10. Through this paper, use 'socioeconomic and demographic' with noun such as characteristics or factors or variables.

√ We had revised and used 'socioeconomic and demographic' in manuscript.

11. Page 3, L15, Replace ‘social economics’ with ‘socioeconomic’.
    √ We had revised page 3, L15, Replace ‘social economics’ with ‘socioeconomic’ in manuscript.

12. Page 3, L20, Please clarify what is the uniqueness of Indonesia’s fisheries?.

    √ We had added the uniqueness of Indonesia’s fisheries in manuscript.

13. Page 4, L11, Replace ‘fisheries economics’ with ‘fishery economics’.

    √ We had revised page 4, L11, Replace ‘fisheries economics’ with ‘fishery economics’ in manuscript.

14. Check verb tense consistency and grammatical errors from line 9 to 26 on page 4.
    √ We had revised page 4, 9 to 26 in manuscript.

15. Page 5, L6, Replace ‘Gillnet Length’ with ‘Gillnet Length.

    √ We had revised page 5, L6, Replace ‘Gillnet Length’ with ‘Gillnet length in manuscript.

16. Page 7, L7, there are 15 independent variables according to table 4D on page 10.

17. Page 7, L13, typo in ‘Multicollinearity’.

    √ We had revised page 7, L13, Multicollinearity in manuscript.

18. Page 7, L20, add ‘%’ after ’11.33’.
    √ We had revised page 7, L20, with add ‘%’ after ’11.33’ in manuscript.

19. Page 9, L1, ‘.7’ should be ‘0.7’.
    √ We had revised page 9, L1, ‘.7’ to be ‘0.7’ in manuscript.

20. Page 9, L4, Table 4B ‘Ext information’ should be ‘Exchange information’.
    √ We had revised page 9, L4, Table 4B ‘Ext information’ to be ‘Exchange information’ in manuscript.

21. Page 10, L3,The R square means that the percentage of variance in the dependent variable can be explained by the independent variables in the model.

- Please see attached file -- Comment_14Dec18.

The manuscript has been resubmitted to your journal. We look forward to your positive response.

Sincerely,

Dr. Hendra Suherman
Department of Mechanical Engineering
Universitas Bung Hatta

Kasetsart Journal of Social Sciences. year. Vol(No): xx–xx.
Kasetsart J. Soc. Sci. year. Vol(No): xx–xx.

The Determinants of Small-scale Fishermen's Income in Padang City, Indonesia

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Article history:
Received
Received in revised form
Accepted
Available online

Keywords:
Fishing Input,
Socioeconomic and demographics,
Relationship with Government Agent,
Fishermen Income,

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1

The Determinants of Small-scale Fishermen's Income in Padang City, Indonesia

Abstract

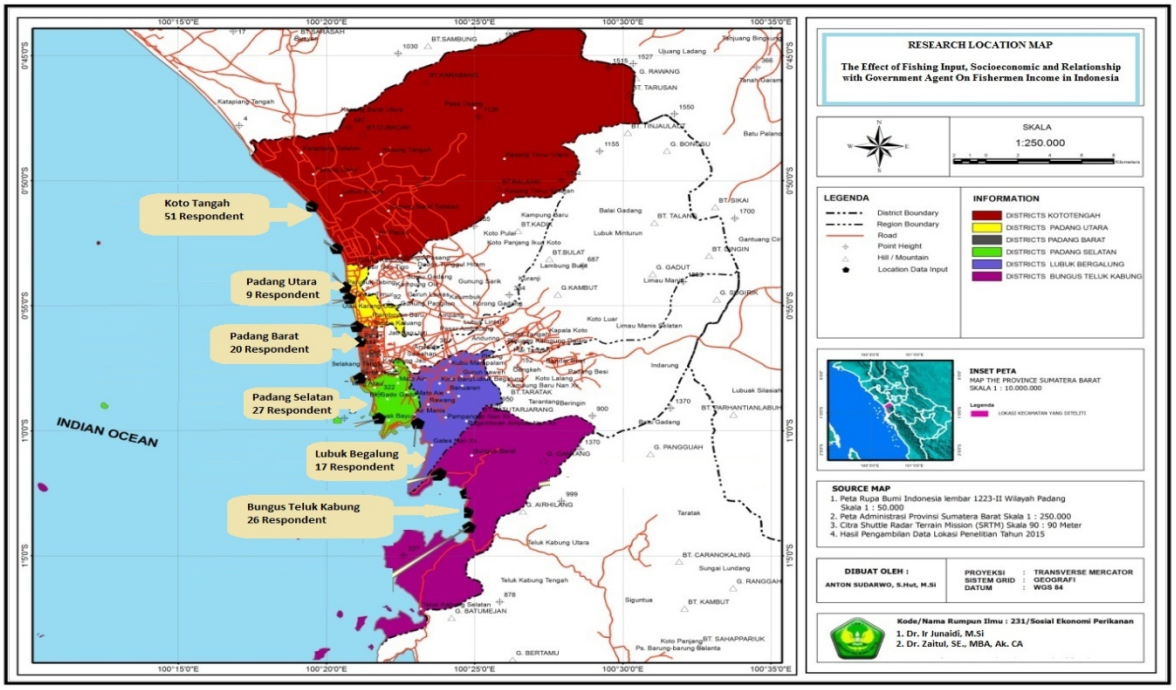
Small-scale fisheries play an important role in supplyingfish protein for community of Padang city. However, the incomes of fishermen are still far from expectation. This study investigates the effect of fishing input, socioeconomics, demography, and relationship with government agent on fishermen income in Padang. 150 fishermen responded to this study and returned the questioner. Using multiple regression analysis, we found that Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Education have a significant effect on the fishermen income.Specifically, FP (t statistics 3.308) was registered as the highest contribution on fishermen income, while the BO (t statistics 2.115) found to have lowest effect on fishermen income.

Keywords:fishing input,fishermen income, relationship with government agent, socioeconomic and demographics

Introduction

Many millions of people living on along coastal zones and they rely on the ocean and its resources for sustenance, livelihood, and culture continuity (Kittinger, 2013). Fishery and aquaculture sector is source of income and livelihood for millions of people around the world (Adili & Antonia, 2017). It is hard to ignore the important of fish for Indonesia.Around 95% of Indonesian engaged in fishing activities are small-scale Fisheries(Sudarmo, Baskoro, Wiryawan, Wiyono, and Monintja, 2015). Padang is a city where located at the coast water of west Sumatra. The fishermen operating in territorial of Padang are small-scale fishermen. Padang is one of cities in West Sumatra Province and has 11 sub-districts or *Kecamatan.* The number of fishermen in Padang has been increasing over the time. However, it was decreasing from 7,076 in 2016 to 7,066 in 2017. The fish production was increasing from 20,612,8tons with value of Rp. 435,16 billion(US $ 29,001,066.6 million).in 2016 to 20,814,9 tonswith value of Rp. 439,10 billion(US $ 29,267,333.3 million). Like in other areas in Indonesia, Fishermen in Padang is also dominated by small-scale fishermen. Hendrik and Zulkarnain(2016) argue that Fishing

activities in the west coast water of Sumatra using various type of fishing gear, such us trolling, hand line and purse seine. Most of fishing activities are supported by fishing gear using a motor boat (Hendrik & Zulkarnain, 2016). The padang city map as a study area is demostrated in Figure 1 below.



Source: Padang City Spatial Plan in 2010.
Figure 1. Study Area

The study of determinants of fishermen income has been conducted by previous studies (Adili & Antonia, 2017; Jabri, Collins, Sun, Omezzine, and Belwal, 2013; Rahman, Haque, and Rahman, 2011). Adili and Antonia(2017) investigate the factors affecting the fishermen income and conclude that the fishing gear, number of labor, fishing season are significant factors affecting the fishermen income in Tanzania. However, the educational level and financial support do not influence the fishermen income significantly. In addition, Jabri et al.(2013) studied the determinants of the fishermen income in Oman and classified the determinants into three groups: fishing inputs and catch, socioeconomic and demographic, and extension and R&D. Jabri et al.(2013) concluded that engine power, boat length, fishing cost, fishing trip, difficulty in obtaining ice, average weekly catch, number of

crews, and use of fiberglass boat are significant determinants of fishermen income. In addition, income sharing, board ownership, partnership in other boat and fishermen age have a significant relationship with fishermen income (Jabri et al., 2013). Further, exchange information and cooperation with MAF and strongly involved with MAF also influence the fishermen income significantly. Rahman et al.(2011) examine the effect of age, education, family members, family land holdings, pond size, experience of fishing farming, training on fish farming and access to information on fish farming on the fishermen income among fishermen in Bangladesh. Family land holdings, pond size, training on fish farming, and access to information on fish farming are significant factors affecting the fishermen income.

There is lack of studies investigating the fishermen income using the Indonesia fishermen data (Hendrik & Zulkarnain, 2016). Most studies using Indonesia data are focusing on other aspect, such as fishermen's poverty (Darwis, Elfindri, Syafrizal, and Mahdi, 2015), socioeconomic characteristics of small-scale fishermen (Sudarmo et al., 2015), and fishermen management system (Tan, 2014). Even though, Hendrik and Zulkarnain(2016) has conducted a study on fishermen income, the study is emphasizing on fuel price fluctuation. Therefore, there is desire need a study in more comprehensive to investigate the determinants of fishermen income in Indonesia's setting. This study would probably enrich fisheries economic literature due to the uniqueness of Indonesia' fisheries environments compared to other countries. For instance there is no fishing on Friday and women are not allowed to be fisher.

This study aims to investigate the effect of fishing input and catching, socioeconomics and demographics, and exchange information and involvement with government agents on fishermen income. This paper is organized as follow: first session is about background of study, followed by theoretical aspects. Further, the third session

discuss about methodology. Fourth session is about result and discussion and it is, finally, closed by conclusion and recommendation.

Literature Review

Fishermen Income

Fishermen's income is an objective of fisheries management system (Cunningham, 1994). Fishing management is characterized by multiple and conflicting objectives, multiple stakeholders with divergent interests and high levels of uncertainty about dynamics of the resources being managed,Smith, Sainsbury, and Stevens, (1999). Cunningham(1994)argues that it is hard to understand the determinants of fisheries income in the situation within the standard fishery economics model. Panayotou(1980) stated that fishermen income depends on the opportunities income. Copes(1988) offered six reasons why opportunities income may be low in small-scale fisheries. These are: (i) the isolation of fishing communities, (ii) the existence of surplus labor due to productivities gains, (iii)capital asset fixity, (iv) lifestyle preferences, (v) high liner illusion, and (vi) perverse assistance. Jabri et al., (2013)classified determinants of fishermen income: fishing input and catch, socioeconomics and demographics, and relationship with government agents.

Fishermen Input

Jabri et al.(2013) state that there are three categories of factors affecting the fishermen's income: input factor, socioeconomic and demography and fishermenextension and R&D. Fishermen's input refers to the all fisheries economic resources used for fishing activity. The including sources are engine power, boat length, fishing cost, fishing trips, and etc(Jabri et al., 2013). An engine power is a power of engine to push the boat to go the fishing ground quickly. The more power of engine, more quickly boat arrived in the fishing ground. Usually, fishermen who has more power of engine, they may produce more fish and

finally more income. Whereas, boat length is measure a capacity for fishes caught. More length of boat, fishermen could have more space for stocking the fish. to derive substantialrevenues,Islam, Ali, Zamhuri, and Kuperan, (2016). While the artisanal fishers failed to compete with the larger powered boats. Therefore, it may bring a lot of fish and finally more income. Gillnet length is long of net used by fishermen. The longer the net, the more opportunities to catch fish and more income will be earned by fishermen.

Fishing cost refers to the money expensed by fishermen to do fishing activities. More cost incurred, fishermen can go far from coastal and they have an opportunity to catch more fish and finally more income that they can earn. Further, fishing trips defined as the number of setting and hauling activities. More trips that fishermen do, more production and they would earn more income. The following factor is number of fishing crews. The higher the number of fishing crews, the faster hauling is done. This factor will increase the fishing production and finally they earn more income. Finally, all input will produce the output in term of fishing production. Fishing production refers to the quantity of fish.

Fishermen Socioeconomic and Demographic

Fishermen socioeconomic and demographic variables are significant factor affecting the fishermen income, such as income sharing with crews, age and partnership in other boat (Jabri et al., 2013). Jabri et al. (2013) identified several factors from socioeconomic and demographic: income sharing with crews, boat ownership, partnership in other boat, fishermen age, literacy level of fishermen, relationship with crew, and alternative sources of income. Boat ownership refers to the fishermen has their own boat to be used in fishing operation. Due to boat ownership, the fishing income will be distributed more to owner of boat. Therefore, the fishermen income will earn more income. Fishing experience is defined as long tenure of fishermen does the fishing activities. More experience of fishermen, they know everything about fishing activities. This experience will help them to produce more

fishes and finally will increase the fishing production as well as fishermen income. Further, fishermen education is the level of education of fishermen. With level of education, they can plan, organize and control all aspect of fishing well. Most of time, the higher the fishermen education the higher the fishing production and therefore, increase the income. Relationship with fishing crew is defined as a family relationship with fishing crew. Fishing crew with family relationship is more commitment to increase fishing production. Thus, the fishermen income would be increasing. Other fishermen income refers to other income earned by other family members beside from fishing income. Family members help to earn the additional income and this condition will increase the fishermen income. Family member is defined as the number of family burden in one family. The higher the number of family burden, the higher the fishermen income. This is because they are more motivation to increase their income. They know that they have to cover all cost incurred in family.

Exchange information and participation

Relationship with government agent, the last factors is information exchange and participation in government agent activity. Exchange of information and cooperative with the government agent is useful initiatives in order to get update information regarding to fishing matters. With update information, fishermen are expected to have an impact on fishermen income. (Jabri et al., 2013). In conclusion, fishermen income could be explained by having good relationship and opern communication with extension services. In addition, discussion with government agent bring to have better knowledge of fishing areas, awarness of better tools and technology, information about financial schemes, and in realising some promising opportunities. These condition would create the opportunities to have more fishing production and finally fishermen income.

Methods

The object of this study is small-scale fishermen in Padang City. One hundred and fifty fishermen are included as sample of the study. Primary data used and gathered by doing survey during February, 2018. There are 15 independent variables and one dependent variable that is fishermen income that measured by rupiah kilogram per week. The independent variables are grouped into 3 categories: inputs of fishing, socioeconomics and demographic, and relationship with government agent. Fishing input, and socioeconomics and demographics are ratio and ordinal variables.

Boat ownership (BO) is conceptualized as boats used in fishing activities that neither owned by the fisherman itself nor owned by other parties, fishermen education (FeD) is the level of formal education possessed by fishermen, fishing experience (FE) is the duration of being fisherman in units of years, while fishing crew (FC) is the crew of the boat involved in fishing activities whether they have family relationships or not.

In addition, the relationship with government agent is 5-scale items. This study uses the multiple regressionmodelusing the SPSS. Relationship with government agent firstly tested for validity and reliability. Multicollinearity test is conducted to see whether anyrelationship among the independent variables. F statistic is applied to see the model fitness. The t statistic or significant value is used to see the effect of independent variables on dependent variable.

Results and discussion

One hundred and fifty small-scale fishermen are responded in this study. Based location, 26 fishermen or 17.33% are from *Bungus Taluak Kabuang* Area, and 17 fishermen or 11.33 % are from *Lubuk Begaluang*. From *Padang Selatan* is 27 fishermen or 18.00% and 20 fishermen are from *Padang Barat* area or 13.33%. From area of *Padang Utara* and *Koto Tangah* are 9 and 51 fishermen respectively. Age of respondent is categorized as 18 to

30 years (20 fishermen or 13.33%), 31 to 40 years (36 fishermen or 24.00%), 41 to 50 years (36 fishermen or 40.00%), and greater than 50-year-old is about 60 fishermen or 40.00%. further, all fishermen are male and 141 (94%) of 150 fishermen are married and the rest is single. The detail of demographics data is shown in table 1.

Table 1

Demographic Data

No	Demography Data	Categories	Number	%
1	Location	Bungustaluakkabung	26	17.33
		Lubukbegaluang	17	11.33
		Padang selatan	27	18.00
		Padang barat	20	13.33
		Padang Utara	9	6.00
		Koto tangah	51	34.00
2	Age	18 sd 30	20	13.33
		31 sd 40	36	24.00
		41 sd 50	36	24.00
		> 50	60	40.00
3	Gender	Male	150	100.00
		Female	0	0.00
4	Married Status	Married	141	94.00
		Single	9	6.00

Variable of relationship with government agent is interval using 5-scale. Therefore, the validity and reliability test must be conducted before regression is run. The validity test is using the KMO and Bartlett test (Bartlett, 1950; Kaiser, 1970). The result show that two variable represented the relationship with government agents: information exchange and participation in government agent. Exchange information consists of three items and all items are valid with KMO value of .654 (greater than .5) (Hair, William, Babin, & Anderson, 2014). Significant value of Bartlett test is .00 and lesser than .01. Loading factor is also greater than .5. in addition, test of reliability is using the Cronbach Alpha (Cronbach, 1951)and the value must be greater than .7. Theresult shows that the variable is reliable. The

means value of information exchange 4.033 (higher). Second variable of relationship with government agent is involvement. The validity test also shows that the variable is valid because of KMO and Bartlett test is satisfied. Further, the reliability test is also indicating that the variable is reliable due to the value of Cronbach Alpha greater than .7 (Nunnally, 1978). Finally, the means value of participation in government agent is higher.

Table 2

Validity, Reliability and Means Value of Variables

Variable	#Item	#valid	KMO	Sig Barlett	Loading Factor	CA	Means
Exchange information	3	3	.654	.000	.753 to.903	.795	4.033
Involvement	3	3	.638	.000	.782 to .885	.746	4.058

This study uses the multivariate analysis and the model must be free from the multicollinearity problem (Sekaran, 2003). Tolerance and VIF are applied to see whether there is multicollinearity problem. The multicollinearity problem does not exist if the tolerance value must greater than 1 and VIF value must be lesser than 10 (Gujarati, 1995). The result shows that there is no multicollinearity problem.

Table 3

Result of Multicollinearity

Variable	Tolerance	VIF
Engine Power (EP)	.353	2.831
Boat Length (BL)	.433	2.312
Gillnet Length (GL)	.497	2.013
Fishing Cost (FC)	.567	1.763
Fishing Trip (FT)	.856	1.169
Fishing Production (FP)	.350	2.859
Boat Crew (BC)	.314	3.188
Boat Ownership (BO)	.448	2.231
Fishing Experience(FE)	.674	1.483
Fishermen Education (FeD)	.893	1.120
Relationship with Fishing Crew (RFC)	.774	1.292
Other Fishermen Income (OFI)	.733	1.364
Family Members (FM)	.751	1.332
Exchange Information (EI)	.553	1.808
Participation in Government Agent (PGA)	.662	1.510

The regression result is demonstrated in table 5. The multivariate model is feasible because of F statistic is 7.684 with *p* value of **.00**. In addition, the ability of independent variables explains the dependent variables 46.2% and the rest is explained by other variables. The first independent variables are Engine Power (EP). The effect on Engine Power on the Fishermen Income is positively significant due to the *p* value of this variable is**.007** which is less than .10. Therefore, it indicates that the higher the engine power, the higher the fishermen income.

Table 4

Correlation Matrix of Independent Variables

	EP	BL	GL	FC	FT	FP	BC	BO	FE	FeD	RCF	OFI	FM	EI	PGA
EP	1														
BL	.715**	1													
GL	.588**	.465**	1												
FC	.501**	.439**	.289**	1											
FT	.035	-.109	.074	-.120	1										
FP	.203*	.019	.526**	0.92	.371**	1									
BC	.182*	.091	.374**	.165*	.182*	.637**	1								
BO	.031	.054	-.085	.120	.029	.013	.097	1							
FE	-.059	-.146	-.164*	-.065	.024	-.159	-.118	.068	1						
FeD	-.022	-.017	.002	-.045	-.020	.039	.084	.020	-.194*	1					
RCF	-.129	-.053	-.081	-.196*	-.170*	-.203*	-.064	-.064	-.205*	.226**	1				
OFI	.122	.001	.238**	.044	.179*	.565**	.424**	.017	-.045	-.068	-.209*	1			
FM	.062	.002	.007	.124	.114	.108	.000	-.043	.384**	-.171*	-.192*	.87	1		
EI	.055	-.021	.196*	-.260*	.161*	.424**	.213**	-.045	-.180*	.006	.020	.192*	-.100	1	
PGA	.003	.070	-.028	-.223**	.029	-.090	-.135	-.092	-.108	.054	.131	-.065	.109	.402**	1

Note: ** Correlation is significant at the .01 level (2-tailed)
* Correlation is significant at the .05 level (2-tailed)

Table 5

Results of Multiple Regressions

Variables	Coef.Reg	t stat	***p* value**	Conclusion
Constant	320141.19	.560	.576	
Engine Power (EP)	**34988.60**	2.748	.007***	**Significant**
Boat Length (BL)	-35052.53	-1.433	.154	Not-significant
Gillnet Length (GL)	-1.95	.016	.988	Not-significant
Fishing Cost (FC)	**.35**	3.059	.003***	**Significant**
Fishing Trip (FT)	43378.62	1.611	.110	Not-significant
Fishing Production (FP)	**367705.14**	3.308	.001***	**Significant**
Boat Crew (BC)	-9,29	-.003	.998	Not-significant
Boat Ownership (BO)	**267169.69**	2.115	.036**	**Significant**
Fishing Experience(FE)	4400.31	-1.389	.167	Not-significant
Fishermen Education (FeD)	**21453.62**	2.612	.0010***	**Significant**
Relationship with Fishing Crew (RFC)	-79604.19	-.856	.393	Not-significant
Other Fishermen Income (OFI)	.05	.477	.634	Not-significant
Family Members (FM)	31666.30	1.415	.159	Not-significant
Exchange Information (EI)	-16040.28	-.392	.696	Not-significant
Participation in Government Agent (PGA)	-45493.83	-1.274	.205	Not-significant
Fstat (F sig)		7.684 (.000)***		
R square		.462		
Durbin Watson		1.972		

Note: *,**, and *** indicate significant at 10%, 5%, and 1%

Second and third variables do not have a significant effect on fishermen income. Boat length (BL) has *p*_ value that higher than .10 (.154). In addition, Gillnet length (GL) also has higher *p* value (**.988**) which means that there is no significant effect of Gillnet length (GL) and fishermen income. Further, Fishing Cost (FC) has a positively significant impact on fishermen income. Fishermen who spend more money on fishing activity, they would earn more income. Fishing cost consists of direct cost and non-direct cost. However, Fishing trips (FT) do not have a significant relationship with fishermen income. Fishing Production (FP) has a positive relationship with Fishermen Income. *p* value of this variable is **.001** which much less than 10%. This finding indicates that fishermen who can catch more fishes will

gain more income. There is a marketing skill of fishermen here and thus can market their productions well. Finally, they gain more income. In contrast, Boat Crew do not have a significant effect on fishermen income due to higher *p_* value of this variable (**.998**).

Boat Ownership (BO) has a positively significant relationship with fishermen income (*p* value of .036). Fishermen who own boat will increase their income. However, Fishermen experience (FE) does not influence the fishermen income. In addition, Fishermen Education (FeD) has a positively significant with fishermen income. The fishermen with higher education level will gain more income. Other variables; Relationship with Fishing Crews (RFC), Other Fishermen Income (OFI), Family Members (FM), Exchange Information (EI) and Participation in Government Agent (PGA), do not have a significant effect on fishermen income.There are three group variables in this study; fishing input, socioeconomic and demography, and relationship with government agent. Significant variabel are Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Educaiton.

The engine power has a positive significant reationship with the fishermen income. this finding is aligned with finding of (Jabri et al., 2013) who also found that a positive effect of the engine power on fishermen income. The significant variable is fishing cost and it is also supported by (Jabri et al., 2013). However, Jabri et al.(2013) found a negative relationship with the fishermen income and this study conclude a positive relationship. Fishing production also have a positive relationship with the fishermen income and imply that fishermen in Padang city is able to do marketing management. Therefore, it positively contribute to the fishermen income. from socioeconomics and demographics, only boat ownership and edacation have a significant effect on the fishermen income. Boat ownership has a positive relatiohsip with the fierhemen income and this finding is not supported by previous research (Jabri et al., 2013). Contrast to finding of **(Jabri et al., 2013),** the

fishermen education has a positive relationship with fishermen income. Furthermore, the result of study revealed that R square .462 meaning that the variances of fishermen income are explained by the 15 independent variables 46.2%.

Conclusion and Policy Recommendation

The study on fishing input, socioeconomics, demography, and relationship with government agent and their effect on fishermen income in Padang has been done. Some conclusions can be drawn that fishing production (FP) registered as the highest contribution on fishermen income, and then followed by fishing costs (FC), engine power (EP), fishermen education (FeD), and boat owner (BO) respectively.In addition, the variances of fishermen income are explained 46.2% by the 15 independent variables.

Policy recommendation is addressed to government agencies. In order to increase the income of fishermen in Padang future, it is recommended to enhance the aids of boat, engine, fishing training, as well as fishing operational costs.

Conflict of interest

The research does not have a conflict of interest.

Acknowledgments

The authors express his gratitude for the financial assistant provided by Universitas Bung Hatta through the acceleration program of the professor with contract number 205.1-705.4.001.01.001, 3rd November 2017.

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InternationalConference on Social Sciences and Humanities (pp. 196–208). Istanbul, Turkey.

Manuscript Details

Manuscript number	KJSS_2018_447_R1
Title	The Determinants of Small-scale Fishermen’s Income in Padang City, Indonesia
Article type	Research Paper

Abstract

Small-scale fisheries play an important role in supplyingfish protein for community of Padang city. However, the incomes of fishermen are still far from expectation. This study investigates the effect of fishing input, socioeconomics, demography, and relationship with government agent on fishermen income in Padang. 150 fishermen responded to this study and returned the questioner. Using multiple regression analysis, we found that Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Education have a significant effect on the fishermen income.Specifically, FP (t statistics 3.308) was registered as the highest contribution on fishermen income, while the BO (t statistics 2.115) found to have lowest effect on fishermen income.

Keywords	Fishing Input, Socioeconomic; demographics; Relationship with Government Agent; Fishermen Income
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[There is lack of studies investigating the fishermen income using the Indonesia fishermen data (Hendrik & Zulkarnain, 2016). Most studies using Indonesia data are focusing on other aspect, such as fishermen's poverty (Darwis, Elfindri, Syafrizal, & Mahdi, 2015), social economics characteristics of small-scale fishermen (Sudarmo et al., 2015), and fishermen management system (Tan, 2014). Even though, Hendrik and Zulkarnain(2016) has conducted a study on fishermen income, the study was emphasizing on fuel price fluctuation. Therefore, there is desire need a study in more comprehensive to investigate the determinantsof fishermen income in Indonesia's setting]

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Kasetsart Journal of Social Sciences

The effect of fishing input, socioeconomic and relationship with government agent on fishermen income in Indonesia

Dear Editor,

Thank you for your useful comments and suggestions on our manuscript. We have modified the manuscript accordingly, and detailed corrections are listed below point by point:

Reviewer 1

1. Need to conclude how to use the result applying to the policy on small scale fishery management
   √ We had added the policy on on small scale fishery management in manuscript.

2. Need to check grammar all the paper because the writing is quite low standard and not consistent
   √ We had revised and check grammar all the paper in manuscript.

3. The explanation is not clear in the abstract , literature review and implications
   √ We had added the explanation in the abstract

4. Need to check citation format.
   √ We had revised the citation format in manuscript.

Please see attached file -- KJSS_2018_447_Manuscript.

Reviewer 2

General comment:

What is the year of data used in this paper?

√ We had added the year of data used in manuscript.

The author should present data description and measurement of variables such as how fishing income (fishing production) is measured (e.g. RP (kilograms) per month or per annum), how number of crews per boat are calculated, what are included in measuring costs of fishing, how many education levels are in use.

√ We had added the data description and measurement of variables in manuscript.

Please verify the definition of boat ownership (BO), fishermen education (FeD), fishing experience (FE) and the relationship with fishing crew (RFC). Are those dummy variables or the number of boats possession or years of educational attainment/experiences?.

√ We had added the definition of boat ownership (BO), fishermen education (FeD), fishing experience (FE) and the relationship with fishing crew (RFC) in mauscript.

The author should provide the correlation matrix of independent variables.

√ We had added the correlation matrix of independent variables in mauscript.

The endogeneity problem can occur because the quantities of the catches (fishing production: FP) are simultaneously determined with the level of fishermen's income. Additionally, the author should provide the correlation matrix.

√ We had added the correlation matrix in mauscript.

It is crucial that the author should discuss and interpret the magnitude of coefficients. According to page 11, please check how to interpret categorical variables if boat ownership or fishermen's education are dummy variables.

The results reveal that some variables are insignificant such as boat length (BL), gillnet length (GL) and fishing costs. Therefore, the author should clarify and discuss significance and sign of these variables are not as expected.

Since your data is cross sectional, the author should concern about heteroskedasticity problem with a robustness check. In the presence of heteroskedasticity, the estimators of variances are biased, and then their standard errors are no longer valid for constructing confidence intervals and t statistics.

I strongly suggest the author to revise the conclusion since there are many typos and lack of policy implication. In addition, the author should specify policy recommendation and explain more details about the limitations.

√ We had revised the the conclusion and specify policy recommendation and explain more details about the limitations in conclusion.

Check the style of accurate citation and use capital letter at the beginning of sentences throughout the article.

√ We had checked the style of accurate citation and use capital letter at the beginning of sentences throughout the article in manuscript.

Specific comment:

1. Data employed in this paper does not represent fishing income of the whole country. Maybe, the title could be changed to "The Determinants of Small-scale Fishermen's Income in Padang city, Indonesia".

√ We had revised the title based on suggestion to "The Determinants of Small-scale Fishermen's Income in Padang city, Indonesia".

2. Page 1 L8, 'questioner' should be 'questionnaires'

√ We had revised page 1 L8 , 'questioner' to be 'questionnaires' in manuscript.

3. Check grammatical errors in line 17, 25.

4. Page 1 L18-19, 'Fisheries and aquaculture' should be 'Fishery and aquaculture sector is source…'

√ We had revised page 1 L18-19 , 'Fisheries and aquaculture' to be 'Fishery and aquaculture sector is source…' in manuscript.

5. Page 1 L20-21, these sentences should be modified. 'Around 95% of Indonesian engaged in fishing activities are small-scale fisheries'.

√ We had revised page 1 L20-21 to be 'Around 95% of Indonesian engaged in fishing activities are small-scale fisheries' in manuscript.

6. Page 2, L1, 'ton' should be 'tons'

√ We had revised page 2, L1, 'ton' to be 'tons'

7. Page 2, L2, I suggest to add US$ value of fish production in the bracket after local currency value and inform which years of data are mentioned.

√ We had added US$ value of fish production in the bracket after local currency value and inform the years of data in manuscript.

8. Page 2, L5, Replace 'including' with 'such as'.

√ We had revised page 2, L5, Replace 'including' with 'such as' in manuscript.

9. Check typo and grammatical errors in line 5, 14, 17 on page 2.

√ We had revised gramatical error in line 5, 14, 17 on page 2 in manuscript.

10. Through this paper, use 'socioeconomic and demographic' with noun such as characteristics or factors or variables.

√ We had revised and used 'socioeconomic and demographic' in manuscript.

11. Page 3, L15, Replace ‘social economics’ with ‘socioeconomic’.
    √ We had revised page 3, L15, Replace ‘social economics’ with ‘socioeconomic’ in manuscript.

12. Page 3, L20, Please clarify what is the uniqueness of Indonesia’s fisheries?.

    √ We had added the uniqueness of Indonesia’s fisheries in manuscript.

13. Page 4, L11, Replace ‘fisheries economics’ with ‘fishery economics’.

    √ We had revised page 4, L11, Replace ‘fisheries economics’ with ‘fishery economics’ in manuscript.

14. Check verb tense consistency and grammatical errors from line 9 to 26 on page 4.
    √ We had revised page 4, 9 to 26 in manuscript.

15. Page 5, L6, Replace ‘Gillnet Length’ with ‘Gillnet Length.

    √ We had revised page 5, L6, Replace ‘Gillnet Length’ with ‘Gillnet length in manuscript.

16. Page 7, L7, there are 15 independent variables according to table 4D on page 10.

17. Page 7, L13, typo in ‘Multicollinearity’.

    √ We had revised page 7, L13, Multicollinearity in manuscript.

18. Page 7, L20, add ‘%’ after ’11.33’.
    √ We had revised page 7, L20, with add ‘%’ after ’11.33’ in manuscript.

19. Page 9, L1, ‘.7’ should be ‘0.7’.
    √ We had revised page 9, L1, ‘.7’ to be ‘0.7’ in manuscript.

20. Page 9, L4, Table 4B ‘Ext information’ should be ‘Exchange information’.
    √ We had revised page 9, L4, Table 4B ‘Ext information’ to be ‘Exchange information’ in manuscript.

21. Page 10, L3,The R square means that the percentage of variance in the dependent variable can be explained by the independent variables in the model.

- Please see attached file -- Comment_14Dec18.

The manuscript has been resubmitted to your journal. We look forward to your positive response.

Sincerely,

Dr. Hendra Suherman
Department of Mechanical Engineering
Universitas Bung Hatta

Kasetsart Journal of Social Sciences. year. Vol(No): xx–xx.
Kasetsart J. Soc. Sci. year. Vol(No): xx–xx.

The Determinants of Small-scale Fishermen's Income in Padang City, Indonesia

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Article history:
Received
Received in revised form
Accepted
Available online

Keywords:
Fishing Input,
Socioeconomic and demographics,
Relationship with Government Agent,
Fishermen Income,

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The Determinants of Small-scale Fishermen's Income in Padang City, Indonesia

Abstract

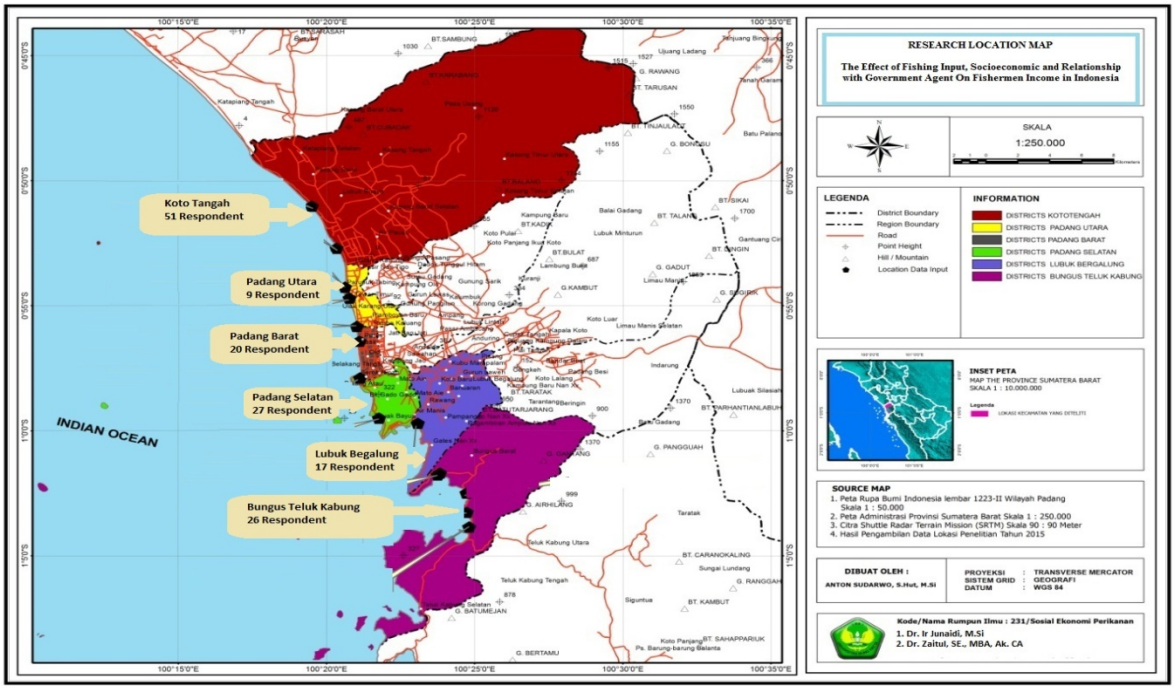
Small-scale fisheries play an important role in supplyingfish protein for community of Padang city. However, the incomes of fishermen are still far from expectation. This study investigates the effect of fishing input, socioeconomics, demography, and relationship with government agent on fishermen income in Padang. 150 fishermen responded to this study and returned the questioner. Using multiple regression analysis, we found that Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Education have a significant effect on the fishermen income.Specifically, FP (t statistics 3.308) was registered as the highest contribution on fishermen income, while the BO (t statistics 2.115) found to have lowest effect on fishermen income.

Keywords:fishing input,fishermen income, relationship with government agent, socioeconomic and demographics

Introduction

Many millions of people living on along coastal zones and they rely on the ocean and its resources for sustenance, livelihood, and culture continuity (Kittinger, 2013). Fishery and aquaculture sector is source of income and livelihood for millions of people around the world (Adili & Antonia, 2017). It is hard to ignore the important of fish for Indonesia.Around 95% of Indonesian engaged in fishing activities are small-scale Fisheries(Sudarmo, Baskoro, Wiryawan, Wiyono, and Monintja, 2015). Padang is a city where located at the coast water of west Sumatra. The fishermen operating in territorial of Padang are small-scale fishermen. Padang is one of cities in West Sumatra Province and has 11 sub-districts or *Kecamatan.* The number of fishermen in Padang has been increasing over the time. However, it was decreasing from 7,076 in 2016 to 7,066 in 2017. The fish production was increasing from 20,612,8tons with value of Rp. 435,16 billion(US $ 29,001,066.6 million).in 2016 to 20,814,9 tonswith value of Rp. 439,10 billion(US $ 29,267,333.3 million). Like in other areas in Indonesia, Fishermen in Padang is also dominated by small-scale fishermen. Hendrik and Zulkarnain(2016) argue that Fishing

activities in the west coast water of Sumatra using various type of fishing gear, such us trolling, hand line and purse seine. Most of fishing activities are supported by fishing gear using a motor boat (Hendrik & Zulkarnain, 2016). The padang city map as a study area is demostrated in Figure 1 below.



Source: Padang City Spatial Plan in 2010.
Figure 1. Study Area

The study of determinants of fishermen income has been conducted by previous studies (Adili & Antonia, 2017; Jabri, Collins, Sun, Omezzine, and Belwal, 2013; Rahman, Haque, and Rahman, 2011). Adili and Antonia(2017) investigate the factors affecting the fishermen income and conclude that the fishing gear, number of labor, fishing season are significant factors affecting the fishermen income in Tanzania. However, the educational level and financial support do not influence the fishermen income significantly. In addition, Jabri et al.(2013) studied the determinants of the fishermen income in Oman and classified the determinants into three groups: fishing inputs and catch, socioeconomic and demographic, and extension and R&D. Jabri et al.(2013) concluded that engine power, boat length, fishing cost, fishing trip, difficulty in obtaining ice, average weekly catch, number of

crews, and use of fiberglass boat are significant determinants of fishermen income. In addition, income sharing, board ownership, partnership in other boat and fishermen age have a significant relationship with fishermen income (Jabri et al., 2013). Further, exchange information and cooperation with MAF and strongly involved with MAF also influence the fishermen income significantly. Rahman et al.(2011) examine the effect of age, education, family members, family land holdings, pond size, experience of fishing farming, training on fish farming and access to information on fish farming on the fishermen income among fishermen in Bangladesh. Family land holdings, pond size, training on fish farming, and access to information on fish farming are significant factors affecting the fishermen income.

There is lack of studies investigating the fishermen income using the Indonesia fishermen data (Hendrik & Zulkarnain, 2016). Most studies using Indonesia data are focusing on other aspect, such as fishermen's poverty (Darwis, Elfindri, Syafrizal, and Mahdi, 2015), socioeconomic characteristics of small-scale fishermen (Sudarmo et al., 2015), and fishermen management system (Tan, 2014). Even though, Hendrik and Zulkarnain(2016) has conducted a study on fishermen income, the study is emphasizing on fuel price fluctuation. Therefore, there is desire need a study in more comprehensive to investigate the determinants of fishermen income in Indonesia's setting. This study would probably enrich fisheries economic literature due to the uniqueness of Indonesia' fisheries environments compared to other countries. For instance there is no fishing on Friday and women are not allowed to be fisher.

This study aims to investigate the effect of fishing input and catching, socioeconomics and demographics, and exchange information and involvement with government agents on fishermen income. This paper is organized as follow: first session is about background of study, followed by theoretical aspects. Further, the third session

discuss about methodology. Fourth session is about result and discussion and it is, finally, closed by conclusion and recommendation.

Literature Review

Fishermen Income

Fishermen's income is an objective of fisheries management system (Cunningham, 1994). Fishing management is characterized by multiple and conflicting objectives, multiple stakeholders with divergent interests and high levels of uncertainty about dynamics of the resources being managed,Smith, Sainsbury, and Stevens, (1999). Cunningham(1994)argues that it is hard to understand the determinants of fisheries income in the situation within the standard fishery economics model. Panayotou(1980) stated that fishermen income depends on the opportunities income. Copes(1988) offered six reasons why opportunities income may be low in small-scale fisheries. These are: (i) the isolation of fishing communities, (ii) the existence of surplus labor due to productivities gains, (iii)capital asset fixity, (iv) lifestyle preferences, (v) high liner illusion, and (vi) perverse assistance. Jabri et al., (2013)classified determinants of fishermen income: fishing input and catch, socioeconomics and demographics, and relationship with government agents.

Fishermen Input

Jabri et al.(2013) state that there are three categories of factors affecting the fishermen's income: input factor, socioeconomic and demography and fishermenextension and R&D. Fishermen's input refers to the all fisheries economic resources used for fishing activity. The including sources are engine power, boat length, fishing cost, fishing trips, and etc(Jabri et al., 2013). An engine power is a power of engine to push the boat to go the fishing ground quickly. The more power of engine, more quickly boat arrived in the fishing ground. Usually, fishermen who has more power of engine, they may produce more fish and

finally more income. Whereas, boat length is measure a capacity for fishes caught. More length of boat, fishermen could have more space for stocking the fish. to derive substantialrevenues,Islam, Ali, Zamhuri, and Kuperan, (2016). While the artisanal fishers failed to compete with the larger powered boats. Therefore, it may bring a lot of fish and finally more income. Gillnet length is long of net used by fishermen. The longer the net, the more opportunities to catch fish and more income will be earned by fishermen.

Fishing cost refers to the money expensed by fishermen to do fishing activities. More cost incurred, fishermen can go far from coastal and they have an opportunity to catch more fish and finally more income that they can earn. Further, fishing trips defined as the number of setting and hauling activities. More trips that fishermen do, more production and they would earn more income. The following factor is number of fishing crews. The higher the number of fishing crews, the faster hauling is done. This factor will increase the fishing production and finally they earn more income. Finally, all input will produce the output in term of fishing production. Fishing production refers to the quantity of fish.

Fishermen Socioeconomic and Demographic

Fishermen socioeconomic and demographic variables are significant factor affecting the fishermen income, such as income sharing with crews, age and partnership in other boat (Jabri et al., 2013). Jabri et al. (2013) identified several factors from socioeconomic and demographic: income sharing with crews, boat ownership, partnership in other boat, fishermen age, literacy level of fishermen, relationship with crew, and alternative sources of income. Boat ownership refers to the fishermen has their own boat to be used in fishing operation. Due to boat ownership, the fishing income will be distributed more to owner of boat. Therefore, the fishermen income will earn more income. Fishing experience is defined as long tenure of fishermen does the fishing activities. More experience of fishermen, they know everything about fishing activities. This experience will help them to produce more

fishes and finally will increase the fishing production as well as fishermen income. Further, fishermen education is the level of education of fishermen. With level of education, they can plan, organize and control all aspect of fishing well. Most of time, the higher the fishermen education the higher the fishing production and therefore, increase the income. Relationship with fishing crew is defined as a family relationship with fishing crew. Fishing crew with family relationship is more commitment to increase fishing production. Thus, the fishermen income would be increasing. Other fishermen income refers to other income earned by other family members beside from fishing income. Family members help to earn the additional income and this condition will increase the fishermen income. Family member is defined as the number of family burden in one family. The higher the number of family burden, the higher the fishermen income. This is because they are more motivation to increase their income. They know that they have to cover all cost incurred in family.

Exchange information and participation

Relationship with government agent, the last factors is information exchange and participation in government agent activity. Exchange of information and cooperative with the government agent is useful initiatives in order to get update information regarding to fishing matters. With update information, fishermen are expected to have an impact on fishermen income. (Jabri et al., 2013). In conclusion, fishermen income could be explained by having good relationship and opern communication with extension services. In addition, discussion with government agent bring to have better knowledge of fishing areas, awarness of better tools and technology, information about financial schemes, and in realising some promising opportunities. These condition would create the opportunities to have more fishing production and finally fishermen income.

Methods

The object of this study is small-scale fishermen in Padang City. One hundred and fifty fishermen are included as sample of the study. Primary data used and gathered by doing survey during February, 2018. There are 15 independent variables and one dependent variable that is fishermen income that measured by rupiah kilogram per week. The independent variables are grouped into 3 categories: inputs of fishing, socioeconomics and demographic, and relationship with government agent. Fishing input, and socioeconomics and demographics are ratio and ordinal variables.

Boat ownership (BO) is conceptualized as boats used in fishing activities that neither owned by the fisherman itself nor owned by other parties, fishermen education (FeD) is the level of formal education possessed by fishermen, fishing experience (FE) is the duration of being fisherman in units of years, while fishing crew (FC) is the crew of the boat involved in fishing activities whether they have family relationships or not.

In addition, the relationship with government agent is 5-scale items. This study uses the multiple regressionmodelusing the SPSS. Relationship with government agent firstly tested for validity and reliability. Multicollinearity test is conducted to see whether anyrelationship among the independent variables. F statistic is applied to see the model fitness. The t statistic or significant value is used to see the effect of independent variables on dependent variable.

Results and discussion

One hundred and fifty small-scale fishermen are responded in this study. Based location, 26 fishermen or 17.33% are from *Bungus Taluak Kabuang* Area, and 17 fishermen or 11.33 % are from *Lubuk Begaluang*. From *Padang Selatan* is 27 fishermen or 18.00% and 20 fishermen are from *Padang Barat* area or 13.33%. From area of *Padang Utara* and *Koto Tangah* are 9 and 51 fishermen respectively. Age of respondent is categorized as 18 to

30 years (20 fishermen or 13.33%), 31 to 40 years (36 fishermen or 24.00%), 41 to 50 years (36 fishermen or 40.00%), and greater than 50-year-old is about 60 fishermen or 40.00%. further, all fishermen are male and 141 (94%) of 150 fishermen are married and the rest is single. The detail of demographics data is shown in table 1.

Table 1

Demographic Data

No	Demography Data	Categories	Number	%
1	Location	Bungustaluakkabung	26	17.33
		Lubukbegaluang	17	11.33
		Padang selatan	27	18.00
		Padang barat	20	13.33
		Padang Utara	9	6.00
		Koto tangah	51	34.00
2	Age	18 sd 30	20	13.33
		31 sd 40	36	24.00
		41 sd 50	36	24.00
		> 50	60	40.00
3	Gender	Male	150	100.00
		Female	0	0.00
4	Married Status	Married	141	94.00
		Single	9	6.00

Variable of relationship with government agent is interval using 5-scale. Therefore, the validity and reliability test must be conducted before regression is run. The validity test is using the KMO and Bartlett test (Bartlett, 1950; Kaiser, 1970). The result show that two variable represented the relationship with government agents: information exchange and participation in government agent. Exchange information consists of three items and all items are valid with KMO value of .654 (greater than .5) (Hair, William, Babin, & Anderson, 2014). Significant value of Bartlett test is .00 and lesser than .01. Loading factor is also greater than .5. in addition, test of reliability is using the Cronbach Alpha (Cronbach, 1951)and the value must be greater than .7. Theresult shows that the variable is reliable. The

means value of information exchange 4.033 (higher). Second variable of relationship with government agent is involvement. The validity test also shows that the variable is valid because of KMO and Bartlett test is satisfied. Further, the reliability test is also indicating that the variable is reliable due to the value of Cronbach Alpha greater than .7 (Nunnally, 1978). Finally, the means value of participation in government agent is higher.

Table 2

Validity, Reliability and Means Value of Variables

Variable	#Item	#valid	KMO	Sig Barlett	Loading Factor	CA	Means
Exchange information	3	3	.654	.000	.753 to.903	.795	4.033
Involvement	3	3	.638	.000	.782 to .885	.746	4.058

This study uses the multivariate analysis and the model must be free from the multicollinearity problem (Sekaran, 2003). Tolerance and VIF are applied to see whether there is multicollinearity problem. The multicollinearity problem does not exist if the tolerance value must greater than 1 and VIF value must be lesser than 10 (Gujarati, 1995). The result shows that there is no multicollinearity problem.

Table 3

Result of Multicollinearity

Variable	Tolerance	VIF
Engine Power (EP)	.353	2.831
Boat Length (BL)	.433	2.312
Gillnet Length (GL)	.497	2.013
Fishing Cost (FC)	.567	1.763
Fishing Trip (FT)	.856	1.169
Fishing Production (FP)	.350	2.859
Boat Crew (BC)	.314	3.188
Boat Ownership (BO)	.448	2.231
Fishing Experience(FE)	.674	1.483
Fishermen Education (FeD)	.893	1.120
Relationship with Fishing Crew (RFC)	.774	1.292
Other Fishermen Income (OFI)	.733	1.364
Family Members (FM)	.751	1.332
Exchange Information (EI)	.553	1.808
Participation in Government Agent (PGA)	.662	1.510

The regression result is demonstrated in table 5. The multivariate model is feasible because of F statistic is 7.684 with *p* value of **.00**. In addition, the ability of independent variables explains the dependent variables 46.2% and the rest is explained by other variables. The first independent variables are Engine Power (EP). The effect on Engine Power on the Fishermen Income is positively significant due to the *p* value of this variable is**.007** which is less than .10. Therefore, it indicates that the higher the engine power, the higher the fishermen income.

Table 4

Correlation Matrix of Independent Variables

	EP	BL	GL	FC	FT	FP	BC	BO	FE	FeD	RCF	OFI	FM	EI	PGA
EP	1														
BL	.715**	1													
GL	.588**	.465**	1												
FC	.501**	.439**	.289**	1											
FT	.035	-.109	.074	-.120	1										
FP	.203*	.019	.526**	0.92	.371**	1									
BC	.182*	.091	.374**	.165*	.182*	.637**	1								
BO	.031	.054	-.085	.120	.029	.013	.097	1							
FE	-.059	-.146	-.164*	-.065	.024	-.159	-.118	.068	1						
FeD	-.022	-.017	.002	-.045	-.020	.039	.084	.020	-.194*	1					
RCF	-.129	-.053	-.081	-.196*	-.170*	-.203*	-.064	-.064	-.205*	.226**	1				
OFI	.122	.001	.238**	.044	.179*	.565**	.424**	.017	-.045	-.068	-.209*	1			
FM	.062	.002	.007	.124	.114	.108	.000	-.043	.384**	-.171*	-.192*	.87	1		
EI	.055	-.021	.196*	-.260*	.161*	.424**	.213**	-.045	-.180*	.006	.020	.192*	-.100	1	
PGA	.003	.070	-.028	-.223**	.029	-.090	-.135	-.092	-.108	.054	.131	-.065	.109	.402**	1

Note: ** Correlation is significant at the .01 level (2-tailed)
* Correlation is significant at the .05 level (2-tailed)

Table 5

Results of Multiple Regressions

Variables	Coef.Reg	t stat	***p* value**	Conclusion
Constant	320141.19	.560	.576	
Engine Power (EP)	**34988.60**	2.748	.007***	**Significant**
Boat Length (BL)	-35052.53	-1.433	.154	Not-significant
Gillnet Length (GL)	-1.95	.016	.988	Not-significant
Fishing Cost (FC)	**.35**	3.059	.003***	**Significant**
Fishing Trip (FT)	43378.62	1.611	.110	Not-significant
Fishing Production (FP)	**367705.14**	3.308	.001***	**Significant**
Boat Crew (BC)	-9,29	-.003	.998	Not-significant
Boat Ownership (BO)	**267169.69**	2.115	.036**	**Significant**
Fishing Experience(FE)	4400.31	-1.389	.167	Not-significant
Fishermen Education (FeD)	**21453.62**	2.612	.0010***	**Significant**
Relationship with Fishing Crew (RFC)	-79604.19	-.856	.393	Not-significant
Other Fishermen Income (OFI)	.05	.477	.634	Not-significant
Family Members (FM)	31666.30	1.415	.159	Not-significant
Exchange Information (EI)	-16040.28	-.392	.696	Not-significant
Participation in Government Agent (PGA)	-45493.83	-1.274	.205	Not-significant
Fstat (F sig)		7.684 (.000)***		
R square		.462		
Durbin Watson		1.972		

Note: *,**, and *** indicate significant at 10%, 5%, and 1%

Second and third variables do not have a significant effect on fishermen income. Boat length (BL) has *p*_ value that higher than .10 (.154). In addition, Gillnet length (GL) also has higher *p* value (**.988**) which means that there is no significant effect of Gillnet length (GL) and fishermen income. Further, Fishing Cost (FC) has a positively significant impact on fishermen income. Fishermen who spend more money on fishing activity, they would earn more income. Fishing cost consists of direct cost and non-direct cost. However, Fishing trips (FT) do not have a significant relationship with fishermen income. Fishing Production (FP) has a positive relationship with Fishermen Income. *p* value of this variable is **.001** which much less than 10%. This finding indicates that fishermen who can catch more fishes will

gain more income. There is a marketing skill of fishermen here and thus can market their productions well. Finally, they gain more income. In contrast, Boat Crew do not have a significant effect on fishermen income due to higher *p_* value of this variable (**.998**).

Boat Ownership (BO) has a positively significant relationship with fishermen income (*p* value of .036). Fishermen who own boat will increase their income. However, Fishermen experience (FE) does not influence the fishermen income. In addition, Fishermen Education (FeD) has a positively significant with fishermen income. The fishermen with higher education level will gain more income. Other variables; Relationship with Fishing Crews (RFC), Other Fishermen Income (OFI), Family Members (FM), Exchange Information (EI) and Participation in Government Agent (PGA), do not have a significant effect on fishermen income.There are three group variables in this study; fishing input, socioeconomic and demography, and relationship with government agent. Significant variabel are Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Educaiton.

The engine power has a positive significant reationship with the fishermen income. this finding is aligned with finding of (Jabri et al., 2013) who also found that a positive effect of the engine power on fishermen income. The significant variable is fishing cost and it is also supported by (Jabri et al., 2013). However, Jabri et al.(2013) found a negative relationship with the fishermen income and this study conclude a positive relationship. Fishing production also have a positive relationship with the fishermen income and imply that fishermen in Padang city is able to do marketing management. Therefore, it positively contribute to the fishermen income. from socioeconomics and demographics, only boat ownership and edacation have a significant effect on the fishermen income. Boat ownership has a positive relatiohsip with the fierhemen income and this finding is not supported by previous research (Jabri et al., 2013). Contrast to finding of **(Jabri et al., 2013),** the

fishermen education has a positive relationship with fishermen income. Furthermore, the result of study revealed that R square .462 meaning that the variances of fishermen income are explained by the 15 independent variables 46.2%.

Conclusion and Policy Recommendation

The study on fishing input, socioeconomics, demography, and relationship with government agent and their effect on fishermen income in Padang has been done. Some conclusions can be drawn that fishing production (FP) registered as the highest contribution on fishermen income, and then followed by fishing costs (FC), engine power (EP), fishermen education (FeD), and boat owner (BO) respectively.In addition, the variances of fishermen income are explained 46.2% by the 15 independent variables.

Policy recommendation is addressed to government agencies. In order to increase the income of fishermen in Padang future, it is recommended to enhance the aids of boat, engine, fishing training, as well as fishing operational costs.

Conflict of interest

The research does not have a conflict of interest.

Acknowledgments

The authors express his gratitude for the financial assistant provided by Universitas Bung Hatta through the acceleration program of the professor with contract number 205.1-705.4.001.01.001, 3rd November 2017.

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Manuscript Details

Manuscript number	KJSS_2018_447_R1
Title	The Determinants of Small-scale Fishermen’s Income in Padang City, Indonesia
Article type	Research Paper

Abstract

Small-scale fisheries play an important role in supplyingfish protein for community of Padang city. However, the incomes of fishermen are still far from expectation. This study investigates the effect of fishing input, socioeconomics, demography, and relationship with government agent on fishermen income in Padang. 150 fishermen responded to this study and returned the questioner. Using multiple regression analysis, we found that Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Education have a significant effect on the fishermen income.Specifically, FP (t statistics 3.308) was registered as the highest contribution on fishermen income, while the BO (t statistics 2.115) found to have lowest effect on fishermen income.

Keywords	Fishing Input, Socioeconomic; demographics; Relationship with Government Agent; Fishermen Income
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[a]Fisheries Faculty and Marine Science, Universitas Bung Hatta, Indonesia
[b]Faculty of Economic, Universitas Bung Hatta, Indonesia
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Dear Asst.Prof.Dr. Shiepsumon Rungsayatorn
Editor-in-chief
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This manuscript describes original work and is not under consideration by any other journal. All authors approved the manuscript and this submission for your consideration for publication in Kasetsart Journal of Social Sciences. Please find the enclosed manuscript entitled "The effect of fishing input, socioeconomic and relationship with government agent on fishermen income in Indonesia" by Junaidi, Zaitul and Hendra Suherman. The manuscript has 15 pages 4 table(s) and 1 figure.

The manuscript is in(Choose one field)*

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[There is lack of studies investigating the fishermen income using the Indonesia fishermen data (Hendrik & Zulkarnain, 2016). Most studies using Indonesia data are focusing on other aspect, such as fishermen's poverty (Darwis, Elfindri, Syafrizal, & Mahdi, 2015), social economics characteristics of small-scale fishermen (Sudarmo et al., 2015), and fishermen management system (Tan, 2014). Even though, Hendrik and Zulkarnain(2016) has conducted a study on fishermen income, the study was emphasizing on fuel price fluctuation. Therefore, there is desire need a study in more comprehensive to investigate the determinantsof fishermen income in Indonesia's setting]

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(Should be the same person as specified in the manuscript)

Name: Hendra Suherman
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I hope that the enclosed manuscript and reviewer suggestions fulfill the requirements for publication in Kasetsart Journal of Social Sciences. Thank you for receiving our manuscript and considering it for review. We appreciate your time and look forward to your response.

Yours Sincerely,

(Hendra Suherman)

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Kasetsart Journal of Social Sciences

The Determinants of Small-scale Fishermen's Income in Padang city, Indonesia

Dear Editor,

Thank you for your useful comments and suggestions on our manuscript. We have modified the manuscript accordingly, and detailed corrections are listed below point by point:

Reviewer 1

1. Need to conclude how to use the result applying to the policy on small scale fishery management
   √ We had added the policy on on small scale fishery management in manuscript.

2. Need to check grammar all the paper because the writing is quite low standard and not consistent
   √ We had revised and check grammar all the paper in manuscript.

3. The explanation is not clear in the abstract , literature review and implications
   √ We had added the explanation in the abstract

4. Need to check citation format.
   √ We had revised the citation format in manuscript.

Please see attached file -- KJSS_2018_447_Manuscript.

Reviewer 2

General comment:

What is the year of data used in this paper?

√ We had added the year of data used in manuscript.

The author should present data description and measurement of variables such as how fishing income (fishing production) is measured (e.g. RP (kilograms) per month or per annum), how number of crews per boat are calculated, what are included in measuring costs of fishing, how many education levels are in use.

√ We had added the data description and measurement of variables in manuscript.

Please verify the definition of boat ownership (BO), fishermen education (FeD), fishing experience (FE) and the relationship with fishing crew (RFC). Are those dummy variables or the number of boats possession or years of educational attainment/experiences?.

√ We had added the definition of boat ownership (BO), fishermen education (FeD), fishing experience (FE) and the relationship with fishing crew (RFC) in manuscript.

Boat ownership is dummy variable
Fishermen education is not dummy variable
Fishermen experience is not dummy variable
Relationship with fishing crew is dummy variable

The author should provide the correlation matrix of independent variables.

√ We had added the correlation matrix of independent variables in mauscript.

The endogeneity problem can occur because the quantities of the catches (fishing production: FP) are simultaneously determined with the level of fishermen's income. Additionally, the author should provide the correlation matrix.

√ We had added the correlation matrix in mauscript.

It is crucial that the author should discuss and interpret the magnitude of coefficients. According to page 11, please check how to interpret categorical variables if boat ownership or fishermen's education are dummy variables.

√ Positive effect of boat ownership on fishermen income means that "fishermen who own the boat tends to increase their income". In addition, fishermen's education has a positively significant with fishermen income, it means that "fishermen with higher education level tend to gain more income".

We had added in manuscript (p.12)

The results reveal that some variables are insignificant such as boat length (BL), gillnet length (GL) and fishing costs. Therefore, the author should clarify and discuss significance and sign of these variables are not as expected.

√The possible explanation why boat length does not have a significant effect on fishermen income is the most of boat is not in good condition. In fact, some of them is old. Therefore, it is difficult for fishermen to go far away from seashore.

Gillnet Length (GL) is significant but negative effect on fishermen income (using Heteroscedasticity corrected regression). The explanation is "It is difficult to explain why gillnet length have a negatively significant impact on fishermen income, but it may be related to condition of gillnet. The most of fishermen has torn and tangled gillnet".

Meanwhile, fishing cost is significant.

We had added in manuscript (p. 11)

Since your data is cross sectional, the author should concern about heteroskedasticity problem with a robustness check. In the presence of heteroskedasticity, the estimators of variances are biased, and then their standard errors are no longer valid for constructing confidence intervals and t statistics.

√We have done the heteroskedasticity test by using the white test (white, 1980). Based on the test, there is a heteroskedasticity problem and therefore, it regresses again by applying heteroskedasticity corrected regression (available in GRETL software). In manuscript, we replace regression result (in Table 5) by result from heteroskedasticity corrected regression, marked by blue color).

We has added in manuscript (p. 9)

I strongly suggest the author to revise the conclusion since there are many typos and lack of policy implication. In addition, the author should specify policy recommendation and explain more details about the limitations.

√ We had revised the the conclusion and specify policy recommendation and explain more details about the limitations in conclusion.

Check the style of accurate citation and use capital letter at the beginning of sentences throughout the article.

√ We had checked the style of accurate citation and use capital letter at the beginning of sentences throughout the article in manuscript.

Specific comment:

1. Data employed in this paper does not represent fishing income of the whole country. Maybe, the title could be changed to "The Determinants of Small-scale Fishermen's Income in Padang city, Indonesia".

   √ We had revised the title based on suggestion to "The Determinants of Small-scale Fishermen's Income in Padang city, Indonesia".

2. Page 1 L8, 'questioner' should be 'questionnaires'

   √ We had revised page 1 L8 , 'questioner' to be 'questionnaires' in manuscript.

3. Check grammatical errors in line 17, 25.
√we had revised the grammatical error in line 17, and 25

4. Page 1 L18-19, 'Fisheries and aquaculture' should be 'Fishery and aquaculture sector is source…'
√ We had revised page 1 L18-19 , 'Fisheries and aquaculture' to be 'Fishery and aquaculture sector is source…' in manuscript.

5. Page 1 L20-21, these sentences should be modified. 'Around 95% of Indonesian engaged in fishing activities are small-scale fisheries'.
√ We had revised page 1 L20-21 to be 'Around 95% of Indonesian engaged in fishing activities are small-scale fisheries' in manuscript.

6. Page 2, L1, 'ton' should be 'tons'
√ We had revised page 2, L1, 'ton' to be 'tons'

7. Page 2, L2, I suggest to add US$ value of fish production in the bracket after local currency value and inform which years of data are mentioned.
√ We had added US$ value of fish production in the bracket after local currency value and inform the years of data in manuscript.

8. Page 2, L5, Replace 'including' with 'such as'.
√ We had revised page 2, L5, Replace 'including' with 'such as' in manuscript.

9. Check typo and grammatical errors in line 5, 14, 17 on page 2.
√ We had revised gramatical error in line 5, 14, 17 on page 2 in manuscript.

10. Through this paper, use 'socioeconomic and demographic' with noun such as characteristics or factors or variables.

√ We had revised and used 'socioeconomic and demographic' in manuscript.

11. Page 3, L15, Replace 'social economics' with 'socioeconomic'.
√ We had revised page 3, L15, Replace 'social economics' with 'socioeconomic' in manuscript.

12. Page 3, L20, Please clarify what is the uniqueness of Indonesia's fisheries?.

√ We had added the uniqueness of Indonesia's fisheries in manuscript.

13. Page 4, L11, Replace 'fisheries economics' with 'fishery economics'.

√ We had revised page 4, L11, Replace 'fisheries economics' with 'fishery economics' in manuscript.

14. Check verb tense consistency and grammatical errors from line 9 to 26 on page 4.
    √ We had revised page 4, 9 to 26 in manuscript.

15. Page 5, L6, Replace ‘Gillnet Length’ with ‘Gillnet Length.

    √ We had revised page 5, L6, Replace ‘Gillnet Length’ with ‘Gillnet length in manuscript.

16. Page 7, L7, there are 15 independent variables according to table 4D on page 10.
    √We had revised the table 4D to Table 5 in page 11

17. Page 7, L13, typo in ‘Multicollinearity’.

    √ We had revised page 7, L13, Multicollinearity in manuscript.

18. Page 7, L20, add ‘%’ after ’11.33’.
    √ We had revised page 7, L20, with add ‘%’ after ’11.33’ in manuscript.

19. Page 9, L1, ‘.7’ should be ‘0.7’.
    √ We had revised page 9, L1, ‘.7’ to be ‘0.7’ in manuscript.

20. Page 9, L4, Table 4B ‘Ext information’ should be ‘Exchange information’.
    √ We had revised page 9, L4, Table 4B ‘Ext information’ to be ‘Exchange information’ in manuscript.

21. Page 10, L3, The R square means that the percentage of variance in the dependent variable can be explained by the independent variables in the model.
    √We had add in page 11

- Please see attached file -- Comment_14Dec18.

The manuscript has been resubmitted to your journal. We look forward to your positive response.

Sincerely,

Dr. Hendra Suherman
Department of Mechanical Engineering
Universitas Bung Hatta

Kasetsart Journal of Social Sciences. year. Vol(No): xx–xx.
Kasetsart J. Soc. Sci. year. Vol(No): xx–xx.

The Determinants of Small-scale Fishermen's Income in Padang City, Indonesia

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Article history:
Received
Received in revised form
Accepted
Available online

Keywords:
Fishing Input,
Socioeconomic and demographics,
Relationship with Government Agent,
Fishermen Income,

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1

The determinants of small-scale fishermen's income in Padang City, Indonesia

Abstract

Small-scale fisheries play an important role in supplyingfish protein for the community of Padang city. However, the incomes of fishermen are still far from expectation. This study investigates the effect of fishing input, socioeconomics, demography, and relationship with government agent on fishermen income in Padang. 150 fishermen responded to this study and returned the questionnaire. Using multiple regression analysis, we found that Engine Power (EP), Fishing Cost (FC), Fishing Production (FP), Boat Ownership (BO), and Fishermen Education have a significant effect on fishermen income.Specifically, FP (t statistics 7.954) was registered as the highest contribution on fishermen income, while the GL (t statistics -2.798)was found to have lowest effect on fishermen income, yet direction effect is not expected.

*Keywords:*fishermen income, fishing input,small-scale fishermen

Introduction

Many millions of people live along coastal zones and rely on the ocean and its resources for sustenance, livelihood, and culture continuity (Kittinger, 2013). The fishery and aquaculture sector is a source of income and livelihood for millions of people around the world (Adili & Antonia, 2017). It is hard to ignore the importance of fish for Indonesia.Around 95 percent of Indonesians who engaged in fishing activities are small-scale fisheries(Sudarmo, Baskoro, Wiryawan, Wiyono, & Monintja, 2015). Padang is a city located on the coast of West Sumatra Province, and has 11 sub-districts or*Kecamatan.*. The fishermen operating in territorial waters of Padang are small-scale fishermen. The number

of fishermen in Padang has been increasing over the time. However, it decreased from 7,076 in 2016 to 7,066 in 2017. The fish production also increased from 20,612,8tons with a value of Rp. 435,16 billion(US $ 29,001,066.6 million)in 2016 to 20,814,9 tonswith a value of Rp. 439,10 billion(US $ 29,267,333.3 million). Like in other areas in Indonesia, fishermen in Padang are also dominated by small-scale fishermen. Hendrik and Zulkarnain(2016) argue that fishing activities in the west coast waters of Sumatra use various types of fishing gear, such us trolling, hand line and purse seine. Most of the fishing activities are supported by fishing gear using a motor boat (Hendrik & Zulkarnain, 2016). The Padang city map as a study area isshown in Figure 1 below.

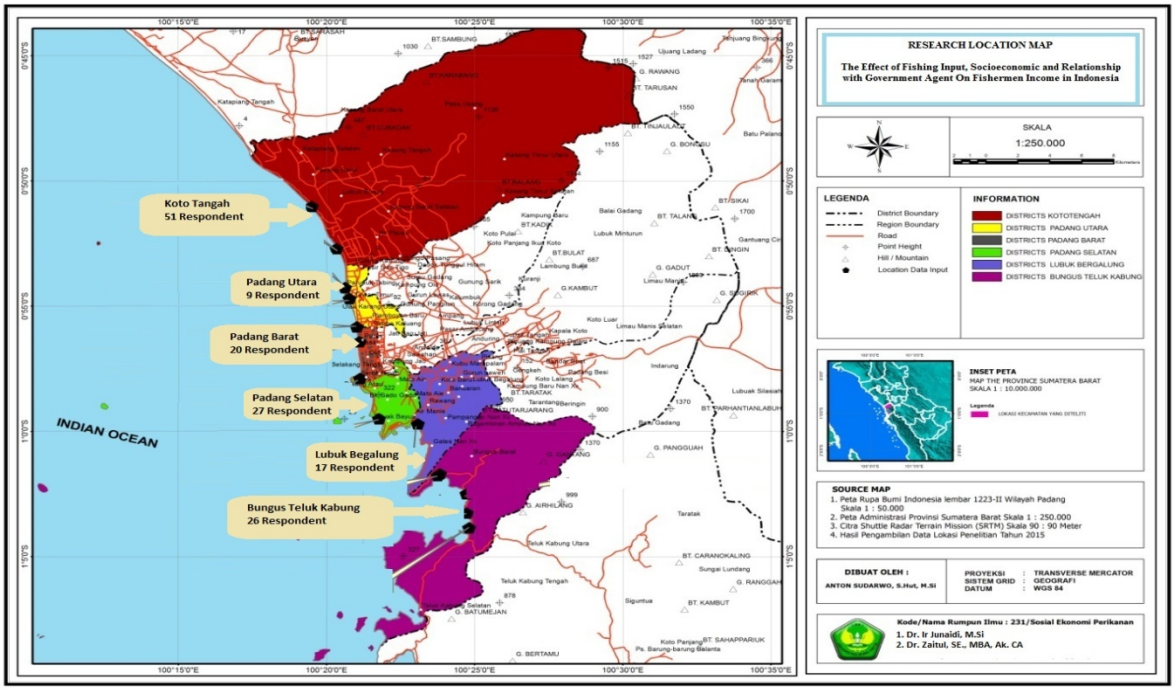

Figure 1 Study Area

Source: Padang City Spatial Plan in 2010

The study of determinants of fishermen income has been conducted by previous studies (Adili & Antonia, 2017; Al Jabri, Collins, Sun, Omezzine, & Belwal, 2013; Rahman,

Haque, & Rahman, 2011). Adili and Antonia(2017) investigated the factors affecting fishermen income and concluded that the fishing gear, number of laborers, and fishing season are significant factors affecting fishermen income in Tanzania. However, the educational level and financial support do not influence fishermen income significantly. In addition, Al Jabri et al.(2013) studied the determinants of fishermen income in Oman and classified the determinants into three groups: fishing inputs and catch, socioeconomic and demographic, and extension and R&D. Al Jabri et al.(2013) concluded that engine power, boat length, fishing cost, fishing trip, difficulty in obtaining ice, average weekly catch, number of crew, and use of fiberglass boat are significant determinants of fishermen income. In addition, income sharing, board ownership, partnership in other boat and fishermen age have a significant relationship with fishermen income (Al Jabri et al., 2013). Further, exchange information and cooperation with MAF and being strongly involved with MAF also influence fishermen income significantly. Rahman et al.(2011) examine the effect of age, education, family members, family land holdings, pond size, experience of fishing farming, training on fish farming and access to information on fish farming on fishermen income among fishermen in Bangladesh. Family land holdings, pond size, training on fish farming, and access to information on fish farming are significant factors affecting fishermen income.

There is lack of studies investigating fishermen income using Indonesian fishermen data (Hendrik & Zulkarnain, 2016). Most studies using Indonesian data focus on other aspects, such as fishermen's poverty (Darwis, Elfindri, Syafrizal, & Mahdi, 2015), socioeconomic characteristics of small-scale fishermen (Sudarmo et al., 2015), and fishermen management system (Tan, 2014). Even though, Hendrik and Zulkarnain(2016) conducted a study on fishermen income, the study emphasized fuel price fluctuation. Therefore, there is the need of a more comprehensive study to investigate the determinants

of fishermen income in Indonesia's setting. This study would probably enrich fisheries economic literature due to the uniqueness of Indonesia' fisheries environments compared to other countries. For instance, there is no fishing on Friday and women are not allowed to participate.

This study aims to investigate the effect of fishing input and catching, socioeconomics and demographics, and exchange of information and involvement with government agents on fishermen income. This paper is organized as follow: the first session is about background of the study. The second is theoretical aspects. Further, the third session discusses methodology. The fourth session is about results and discussion. The study isfinally closed by conclusion and recommendation.

Literature Review

Fishermen Income

Fishermen's income is an objective of fisheries management system (Cunningham, 1994). Fishing management is characterized by multiple and conflicting objectives, multiple stakeholders with divergent interests and high levels of uncertainty about dynamics of the resources being managed(Smith, Sainsbury, & Stevens, 1999). Cunningham(1994)argues that it is hard to understand the determinants of fisheries income in the situation within the standard fishery economics model. Panayotou(1980) stated that fishermen income depends on the opportunities income. Copes(1988) offered six reasons why opportunities income may be low in small-scale fisheries. These are: (i) the isolation of fishing communities, (ii) the existence of surplus labor due to productivities gains, (iii)capital asset fixity, (iv) lifestyle preferences, (v) high liner illusion, and (vi) perverse assistance. Al Jabri et al., (2013)classified determinants of fishermen income: fishing input and catch, socioeconomics and demographics, and relationship with government agents.

Fishermen Input

Al Jabri et al.(2013) state that there are three categories of factors affecting fishermen's income: input factor, socioeconomic and demography and fishermenextension and R&D. Fishermen's input refers to the all fisheries economic resources used for fishing activity. This includes engine power, boat length, fishing cost, fishing trips, etc.(Al Jabri et al., 2013). Engine power is the power of an engine to push the boat to get to the fishing ground quickly. The moreengine power , the more quickly a soat arrivesat the fishing ground. Usually, fishermen who have more engine power, catch more fish and finally get more income., Boat length isa measure ofcapacity for fish caught. Agreater length of boat, means fishermen have more space for stocking the fish. The artisanal fishermen failed to compete with the larger powered boats. Therefore, it may bring a lot of fish and finally more income. Gillnetlengthis length of net used by fishermen. The longer the net, the more opportunities to catch fish and more income will be earned by fishermen.

Fishing cost refers to the money spent by fishermen to do fishing activities. With more cost incurred, fishermen can go far from coastal areas and have an opportunity to catch more fish and finally earn more income.. Further, fishing trips are defined as the number of setting and hauling activities. The more trips that fishermen do, the more production and thus, the more income. The next factor is the number of fishing crew. The higher the number of fishing crew, the faster hauling is done. This factor will increase fishing production and finally result in more income. Finally, all input will produce the output in terms of fishing production. Fishing production refers to the quantity of fish.

Fishermen Socioeconomic and Demographic

Fishermen socioeconomic and demographic variables are significant factor affecting fishermen income, such as income sharing with crews, age and partnership in other boat (Al Jabri et al., 2013). Al Jabri et al.(2013) identified several factors from socioeconomic and demographic: income sharing with crews, boat ownership, partnership in other boat, fishermen age, literacy level of fishermen, relationship with crew, and alternative sources of income. Boat ownership refers to the fishermen having their own boat to be used in fishing operation. Due to boat ownership, the fishing income will be distributed more to owner of boat. Therefore, the fishermen will earn more income. Fishing experience is defined as long tenure of fishermen engaging in fishing activities. With more experience, fishermen know a lot about fishing activities. This experience will help them to catch more fish and finallythis will increase fishing production as well as fishermen income. Further, fishermen education is the level of education of fishermen. With level of education, they can plan, organize and control all aspects of fishing well. Most of the time, the higher the fishermen education, the higher the fishing production and therefore, increase of income. The relationship between fishing crew is defined as a family relationship. A fishing crew with good family relationship has more commitment to increase fishing production. Thus, fishermen income would increase. Other fishermen income refers to other income earned by other family members beside fishing income. Family members help to earn additional income and this condition will increase fishermen income. A family member is defined as the number of family burden in one family. The higher the number of family burden, the higher the fishermen income. This is because they show more motivation to increase their income. They know that they have to cover all costs incurred in the family.

Exchange of information and participation

The relationship with a government agent,the last factor, is information exchange and participation in government agent activity. Exchangeof information and cooperation with the government agent is useful for initiatives in order to get updated information regarding fishing matters. With updated information, fishermen are expected to experience an impact on fishermen income (Al Jabri et al., 2013).In concluson, fishermen income could be explained as havinga good relationship and open communication with extension services. In addition, discussion with government agent brings better knowledge of fishing areas, awareness of better tools and technology, information about financial schemes, and realising promising opportunities. These condition would create the opportunities to have more fishing production and finally fishermen income.

Methods

The object of this study is small-scale fishermen in Padang City. One hundred and fifty fishermen are included as sample of the study. Primary data used were gathered by doing a surveyduringFebruary, 2018. There are 15 independent variables and one dependent variable,which is fishermen incomemeasured by rupiah kilogram per week. The independent variables are grouped into 3 categories: inputs of fishing, socioeconomics and demographic, and relationship with government agent. Fishing input, and socioeconomics and demographics are ratio and ordinal variables.

Boat ownership (BO) is conceptualized as boats used in fishing activities that are neither owned by the fisherman itself nor owned by other parties.Fishermen education (FeD) is the level of formal education possessed by fishermen.Fishing experience (FE) is the duration of being a fisherman in units of years, while fishing crew (FC) is the crew of the boat involved in fishing activities whether they have family relationships or not.

In addition, the relationship with a government agent is 5-scale items. This study uses the multiple regressionmodelusing the SPSS. The relationship with government agent was firstly tested for validity and reliability. Multicollinearity test is conducted to see whether there is anyrelationship among the independent variables. F statistic is applied to see the model fitness. The t statistic or significant value is used to see the effect of independent variables on dependent variable.

Results and discussion

One hundred and fifty small-scale fishermen responded in this study. Based on location, 26 fishermen or 17.33percent are from *BungusTaluakKabuang*area, and 17 fishermen or 11.33 percentare from *LubukBegaluang*. 27 fishermen or 18.00 percent are from *Padang Selatan* and 20 fishermen or 13.33 percent are from *Padang Barat* area. From area of *Padang Utara* and*Koto Tangah* are 9 and 51 fishermen respectively. The age of respondent is categorized as 18 to 30 years (20 fishermen or 13.33percent), 31 to 40 years (36 fishermen or 24.00percent), 41 to 50 years (36 fishermen or 40.00precent), and more than 50years old are about 60 fishermen or 40.00 percent. Further, all fishermen are male and 141 (94percent) of 150 fishermen are married and the rest single. The detail of demographics data is shown in Table 1.

Table 1

Demographic Data

No	Demography Data	Categories	Number	%
1	Location	Bungustaluakkabung	26	17.33
		Lubukbegaluang	17	11.33
		Padang selatan	27	18.00
		Padang barat	20	13.33

		Padang Utara	9	6.00
		Koto tangah	51	34.00
2	Age	18 sd 30	20	13.33
		31 sd 40	36	24.00
		41 sd 50	36	24.00
		> 50	60	40.00
3	Gender	Male	150	100.00
		Female	0	0.00
4	Married Status	Married	141	94.00
		Single	9	6.00

Variable of relationship with government agent is interval using 5-scale. Therefore, the validity and reliability test must be conducted before regression is run. The validity test is using the KMO and Bartlett test(Bartlett, 1950; Kaiser, 1970). The result shows that two variable represented the relationship with government agents: information exchange and participation in government agent. Exchange information consists of three items and all items are valid with KMO value of .654 (greater than .5)(Hair, William, Babin, & Anderson, 2014). Significant value of Bartlett test is .00 and less than .01. Loading factor is also greater than .5. In addition, test of reliability is using the Cronbach Alpha (Cronbach, 1951)and the value must be greater than .7. Theresult shows that the variable is reliable. The mean value of information exchange is 4.033 (higher). The second variable of relationship with government agent is involvement. The validity test also shows that the variable is valid because of KMO and Bartlett test is satisfied. Further, the reliability test also indicates that the variable is reliable due to the value of Cronbach Alpha greater than .7(Nunnally, 1978). Finally, the mean value of participation in government agent is higher.

Table 2

Validity, Reliability and Means Value of Variables

Variable	#Item	#valid	KMO	Sig Barlett	Loading Factor	CA	Means
Exchange information	3	3	.654	.000	.753 to.903	.795	4.033
Involvement	3	3	.638	.000	.782 to .885	.746	4.058

This study uses the multivariate analysis and the model must be free from the multicollinearity problem(Sekaran, 2003). Tolerance and VIF are applied to see whether there is a multicollinearity problem. The multicollinearity problem does not exist if the tolerance value is greater than 1 and VIF value must be less than 10(Gujarati, 1995). The result shows that there is no multicollinearity problem. Besides, this study also uses the Pearson correlation to support the conclusion that there is no multicollinearity problem (see Table 3 and 4). The next classical assumption is heteroscedasticity. The heteroscedasticity exists when unequal variance is present and it is one of the most classical assumptions (Hair et. al., 2014). This problem can be identified using White test (White, 1980). In addition, Wooldridge (2003) recommended that heteroscedasticity corrected regression can be used if heteroscedasticity is identified. The result shows that there is a heteroscedasticity problem (p- value .00007). Therefore, this study applies the heteroscedasticity corrected regression for the final result (see Table 5).

Table 3

Result of Multicollinearity

Variable	Tolerance	VIF
Engine Power (EP)	.353	2.831
Boat Length (BL)	.433	2.312
Gill Net Length (GL)	.497	2.013
Fishing Cost (FC)	.567	1.763
Fishing Trip (FT)	.856	1.169
Fishing Production (FP)	.350	2.859
Boat Crew (BC)	.314	3.188

Boat Ownership (BO)	.448	2.231
Fishing Experience(FE)	.674	1.483
Fishermen Education (FeD)	.893	1.120
Relationship with Fishing Crew (RFC)	.774	1.292
Other Fishermen Income (OFI)	.733	1.364
Family Members (FM)	.751	1.332
Exchange Information (EI)	.553	1.808
Participation with Government Agent (PGA)	.662	1.510

Table 4

Correlation Matrix of Independent Variables

	EP	BL	GL	FC	FT	FP	BC	BO	FE	FeD	RCF	OFI	FM	EI	PGA
EP	1														
BL	.715**	1													
GL	.588**	.465**	1												
FC	.501**	.439**	.289**	1											
FT	.035	-.109	.074	-.120	1										
FP	.203*	.019	.526**	0.92	.371**	1									
BC	.182*	.091	.374**	.165*	.182*	.637**	1								
BO	.031	.054	-.085	.120	.029	.013	.097	1							
FE	-.059	-.146	-.164*	-.065	.024	-.159	-.118	.068	1						
FeD	-.022	-.017	.002	-.045	-.020	.039	.084	.020	-.194*	1					
RCF	-.129	-.053	-.081	-.196*	-.170*	-.203*	-.064	-.064	-.205*	.226**	1				
OFI	.122	.001	.238**	.044	.179*	.565**	.424**	.017	-.045	-.068	-.209*	1			
FM	.062	.002	.007	.124	.114	.108	.000	-.043	.384**	-.171*	-.192*	.87	1		
EI	.055	-.021	.196*	-.260*	.161*	.424**	.213**	-.045	-.180*	.006	.020	.192*	-.100	1	
PGA	.003	.070	-.028	-.223**	.029	-.090	-.135	-.092	-.108	.054	.131	-.065	.109	.402**	1

Note: ** Correlation is significant at the .01 level (2-tailed)

* Correlation is significant at the .05 level (2-tailed)

The regression result is demonstrated in table 5. The multivariate model is feasible because statistic is 36.337 with *p* value of .00. In addition, the ability of independent variables explains the dependent variables 82.39 percent and the rest is explained by other variables. The first independent variable is engine power (EP). The effect of engine power on the fishermen income is positively significant due to the *p* value of this variablebeing .0004, which is less than .05. Therefore, it indicates that the higher the engine power, the higher the fishermen income.

Table 5

Results of Multiple Regressions

Variables	Coef Reg	t stat	p value	Conclusion
constant	-985722	-2.400	.0178**	
Engine Power (EP)	**15645.300**	**3.665**	**.0004*** **	**Significant**
Boat Length (BL)	8934.920	.975	.332	Not-significant
Gill Net Length (GL)	**-132.822**	**-2.798**	**.0059*** **	**Significant**
Fishing Cost (FC)	**.192**	**4.635**	**.0001*** **	**Significant**
Fishing Trip (FT)	3694.910	.259	.796	Not-significant
Fishing Production (FP)	**4048.530**	**7.954**	**.0001*** **	**Significant**
Boat Crew (BC)	58788.200	.953	.343	Not-significant
Boat Ownership (BO)	**243549.000**	**4.343**	**.0001*** **	**Significant**
Fishing Experience(FE)	-1649.340	-1.337	.183	Not-significant
Fishermen Education (FeD)	**21180.600**	**3.653**	**0.0004*** **	**Significant**
Relationship with Fishing Crew (RFC)	-8079.260	-.334	.739	Not-significant
Other Fishermen Income (OFI)	.000	.000	1.000	Not-significant
Family Members (FM)	31896.190	1.396	.168	Not-significant
Exchange Information (EI)	48768.600	1.492	.138	Not-significant
Participation with Gov. Agent (PGA)	22275.700	1.576	.118	Not-significant
Fstat (F sig)			36.337	
R square			.8239	
Durbin Watson			1.893	

Note: *,**, and *** indicate significant at 10%, 5%, and 1%

The second variable does not have a significant effect on fishermen income. Boat length (BL) has *p*_ value higher than .10 (.332). The possible explanation why boat length does not

have a significant effect on fishermen income is that most boatsare not in good condition. In fact, some of them are old. Therefore, it is difficult for fishermen to go far from the seashore. In addition, the third variable (Gillnetlength) has lower*p* value (.006), which means that there is a significant effect of gillnetlength (GL) and fishermen income. However, the signal effect is negative which means the longer the gillnet length, the lower the fishermen income.It is difficult to explain why gillnet length has a negatively significant impact on fishermen income, but it may be related to the condition of the gillnet. The most of fishermen have torn and tangled gillnets.

Further, fishing cost (FC) has a positively significant impact on fishermen income. Fishermen who spend more money on fishing activity, earn more income. Fishing cost consists of direct cost and non-direct cost. However, fishing trips (FT) do not have a significant relationship with fishermen income. Fishing production (FP) has a positive relationship with fishermen income. *p*value of this variable is .0001, which ismuch less than 10 percent. This finding indicates that fishermen who can catch more fish will gain more income. There is a marketing skill of fishermen here and thus they can market their produce well. Finally, they gain more income. In contrast,boat crew do not have a significant effect on fishermen income due to higher *p*_ value of this variable (.343).

Boat ownership (BO) has a positively significant relationship with fishermen income (*p* value of .036). Fishermen who own boatstendto increase their income. However, fishermen experience (FE) does not influence the fishermen income. In addition, fishermen education (FeD) has a positively significant relationship with fishermen income. The fishermen with higher education level tend togain more income. Other variables; Relationship with fishing crews (RFC), other fishermen income (OFI), family members (FM), exchange information (EI) and participation with government agent (PGA), do not

have a significant effect on fishermen income.There are three group variables in this study; fishing input, socioeconomic and demography, and relationship with government agent. Significant variablesare engine power (EP), fishing cost (FC), fishing production (FP), boat ownership (BO), and fishermen education.

Engine power has a positive significant effect on fishermen income. This finding is aligned with findings of Al Jabri et al. (2013) who also found a positive effect of engine power on fishermen income. The significant variable is fishing cost and it is also supported by Al Jabri et al. (2013). Al Jabri et al.(2013) found a negative relationship with fishermen income . However, this study shows a positive relationship. Fishing production also has a positive relationship with fishermen income and implies that fishermen in Padang city are able to do marketing management. Therefore, it positively contributes to ishermen income. From socioeconomics and demographics, only boat ownership and education have a significant effect on fishermen income. Boat ownership has a positive relatioship with fishermen income but this finding is not supported by previous research (Al Jabri et al., 2013). In contrast to findings of Al Jabri et al. (2013), fishermen education has a positive relationship with fishermen income. Furthermore, the result of the study revealed R square .8239 meaning that the variances of fishermen income are explained by the 15 independent variables 82.39 percent.

Conclusion and Policy Recommendation

The study on fishing input, socioeconomics, demography, and relationship with government agent and their effect on fishermen income in Padang was carried out. Some conclusions that can be drawn are that fishing production (FP) registered as the highest contribution on fishermen income, followed by fishing costs (FC), boat owner (BO), engine

power (EP), fishermen education (FeD), and gillnet length (GL) respectively.In addition, the variances of fishermen income are shown as 82.39 percent by the 15 independent variables.

Policy recommendation could be addressed to government agencies. In order to increase the income of fishermen in Padang in future, it is recommended to improve the aids of boat, engine, fishing training, as well as fishing operational costs.

Conflict of interest

The research does not have a conflict of interest.

Acknowledgments

The author expresses his gratitude for the financial assistance provided by Universitas Bung Hatta through the acceleration program of the professor with contract number 205.1-705.4.001.01.001, 3rd November 2017.

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