



Adaptation strategy of Bitung fishermen to the impact of fisheries Moratorium policy in Indonesia

Florence V. Longdong, Eddy Mantjoro, Rene C. Kepel, Johnny Budiman

Faculty of Fisheries and Marine Science, Sam Ratulangi University, Jl. Kampus Bahu, Manado-95115, North Sulawesi, Indonesia. Corresponding author: F. V. Longdong, florencevera88@unsrat.ac

Abstract. This present study is to model the path of the relationship between the characteristics of fishermen families, social capital, institutions, entrepreneurial orientation, and family solidarity, and sustainable livelihoods of Bitung City fishermen; to analyze the significance of direct and indirect effects on the sustainable livelihoods of Bitung City fishermen; and to determine the contribution of factors that significantly influence the fishermen's sustainable livelihood. The research data were obtained through a survey method to fishermen in the city of Bitung. The research sample of 150 respondents was taken by purposive sampling. The research model used Structural Equation Modeling (SEM) and data analysis utilized the Partial Least Squares (PLS) method. The results showed that the characteristics of fishing families did not have a significant direct effect on sustainable livelihoods, entrepreneurial orientation, and family solidarity; fishermen's social capital has a real, direct positive effect on sustainable livelihoods, and has no significant direct effect on entrepreneurial orientation, and family solidarity. The institution has a significant direct effect on entrepreneurial orientation, and family solidarity, but not significant effect on the sustainable livelihood. It has indirectly positive effect on sustainable livelihoods with the mediator variables of entrepreneurial orientation and family solidarity.

Key Words: characteristics of fishing families, social capital, institutions, entrepreneurial orientation, family solidarity, sustainable livelihoods, fishermen adaptation.

Introduction. National development of Indonesia in the government period of 2014-2019 was escorted with Nawacita program, in which one of the superior programs has focused the marine and fisheries resources. In the government period of 2005-2014, mean economic growth of Indonesia was in the range of 5.0-5.5%, including marine and fisheries sector, that gives significant contribution. Nevertheless, in the end of his government, the fisheries field was disturbed with publications on high economic loss from the outbreak of illegal fishing and transshipment activities. There are many data concerning the national economic loss estimation from illegal fishing. According to Indonesian government, losses due to Illegal and Unreported (IUU) fishing by foreign vessels in Indonesian waters cost the country IDR 240 trillion (US\$20 billion) a year. The presence of this large illegal fishing presence has also facilitated other abuses, such as wildlife trafficking, drug smuggling, and exploitation of forced labor on fishing boats (CEA 2016).

Therefore, in the government era of 2014-2019, there is strong expectation to give sufficient government's attention and control on the issues in marine and fisheries sector. It, in fact, gets serious and firm response of the Minister of Marine Affairs and Fisheries through the issuance of the Minister's decree numbered 56/PERMEN-KP/2014 concerning temporary termination (Moratorium) of fisheries entrepreneurship permit in the fisheries management territory of Indonesian Republic, the Minister's decree numbered 57/PERMEN-KP/2014 concerning the second amendment of the Minister's decree of Marine Affairs and Fisheries numbered 30/Men/2012 concerning the fishing permit of fisheries activities in the fisheries management territory of Indonesian Republic, the Minister's decree numbered 58/PERMEN-KP/2014 concerning the discipline

of the civil employee in the Ministry of Marine Affairs and Fisheries in relation with the temporary termination (Moratorium) policy implementation of the fishing permit, transshipment on the sea, and the use of foreign captain and ship crews.

Executing a resources sustainability-related policy is considered as a paradox action. It results from that in human culture, all things are related with social values and nature. The fisheries Moratorium policy issued by Indonesian Government has resulted in contrary response of the fisheries business executing groups. They feel uncomfortable to accept the policy even though it is actually intended to stop the illegal fishing, unregulated, and unreported catches in Indonesia waters (Rahmayanti et al 2017). A courage is needed to make an unpopular policy although it is intended to support the public interests, such as the natural resources sustainability that will positively impact on the future life in economic and social aspects (Warburton 1998).

Recent government implementation of the policy in marine and fisheries sector is believed to have macro-targets in improving the performance of marine and fisheries sector. The economic loss of Indonesia from the illegal fishing activities of the foreign vessels is estimated as IDR 30 trillion/year (Financial Auditing Board 2013), while the loss impact from illegal operations of the former foreign vessels in Indonesia waters is higher.

Since the IUU fishing activities still occur in Indonesia waters and are practiced by foreign fishermen, the Indonesian Government has obligations to immediately take actions in order to secure the fisheries resources as national property. The Moratorium policy included in the Minister's decree of Marine Affairs and Fisheries numbered 56/2014 has the policy direction to focusing on the marine and fisheries resources sustainability of Indonesia that the resources can be used by this nation. The prohibition of fishing practice of the former foreign vessels without fishing permit or with multiple fishing permits has been renewed with the Minister's decree of Marine Affairs and Fisheries numbered 10/2015 concerning the extension of Moratorium policy.

The IUU fishing activities eradication has manifested its contribution to the Gross Domestic Product from the fisheries sector. The Investment Coordinating Board recorded that the investment of fisheries sector up to first semester of 2016 reaches IDR 5.5 trillion and 89% of which is fish processing industries. Other achievement is fuel savings up to 1.2 million liters due to no illegal use of national fuel of the foreign vessels (Investment Coordinating Board 2016).

Bitung is a fisheries port municipality with high number of former foreign vessel operations. The fisheries production of Bitung is so far supported by the operation of the former foreign vessels and the transshipment. Contrary attitude against the Moratorium policy results from that the long life fisheries activities are disturbed by the government policy. It is believed to have demolished the economy relying on various fisheries entrepreneurships. Several developed fish processing entrepreneurships have to terminate their production. According to Pangemanan et al (2014), there are 8 of 55 fish processing companies in Bitung city stopping their operations due to running out of raw materials. Fish production can only supply 10-15% of the raw materials required by the fish processing companies (Suyasa et al 2017). This condition is still the same until now (*pers. obs.*).

Bitung is a coastal city that is part of North Sulawesi Province possessing a port managed by the Ministry of Transportation and another one as fisheries port. This municipality has tens of fisheries companies, either in fishing activities or fish processing, and export.

The implementation of the decrees of Marine Affairs and Fisheries Minister numbered 56, 57, and 58/2014, has brought various negative impacts on the industrial-scaled private sector.

Since the transshipment has been banned, many interest groups complain and reported that 1) transshipment prohibition has weakened Indonesian fisheries exports, the short-term in particular, because numerous fish carriers cannot operate so that the legal fish carriers are hard to land the fish in fresh condition, and 2) the fisheries industries of Indonesia, including Bitung municipality, go with raw material deficiency, so that the momentum to gain high profit from export cannot be benefited.

The export value of fisheries product based on the target countries, i.e. the United States, Japan, ASEAN, China, European Union, and others was USD 4.231 million in 2014. It declined as much as 14.84% with the value of USD 3.231 million in 2015, then slowly rose to USD 3.782 million in 2016 and USD 4.089 million at the end of 2017. This condition has not reached the export value in 2014 (Minister of Marine Affairs and Fisheries 2018).

On the other hand, the implementation of this government policy is felt to give positive impact on the small-scale fishing fisheries. Nurlaili et al (2016) found that the implementation of Moratorium policy is blessing for the traditional fishermen, in which high number of baby tuna go into the coastal waters, a phenomenon that never happens for tens of years, and the fishermen believe that the baby tuna have been confronted by big vessels in the open sea. High number of fish entering the coastal waters makes the fishing ground of the traditional fishermen becomes closer. Other positive impact is increase in fish selling price from IDR 5,000/kg to IDR 15,000/kg, so that the fishermen's income increases. Besides, this policy implementation makes the fisheries production of smaller fishing vessels < 10 GT increase up to 200%, from the previous maximum of 500 kg/trip to 1-2 tons/trip. The 10 GT-vessels can also operate every day in closer fishing ground distance of 2 seamiles than the previous of 4 miles and reduce operational cost down to 30%.

Based on previous studies, it is found that the fisheries communities are generally impacted by the Moratorium policy implementation (Pangemanan et al 2014). However, there is no study yet on how these economic executors try to survive through adaptation to worth living challenge in the fisheries sector. The adaptation to the impact of the Moratorium policy, either positive or negative, is focused in this study.

This present study is to model the path of the relationship between the characteristics of fishermen families, social capital, institutions, entrepreneurial orientation, and family solidarity, and sustainable livelihoods of Bitung City fishermen, North Sulawesi, Indonesia.

Material and Method

Data characteristics. The study was carried out for approximately one-year, from November 2018-May 2019 for field data collection and then for data analyses. It focused on fishermen's households in Bitung city (Figure 1), the village of Girian Bawah, Wangurer, Aertembaga 1, Aertembaga 2, and Bitung Fisheries Port as landing base.

Data collection employed purposive sampling on the fishermen under the following criteria: 1) the profession as fishermen in Bitung is longer than one year; 2) the selected fishermen are those who do one-day fishing activity and have much time to meet among fishermen and the capital holder; 3) at least 17 years old-married fishermen; ready to be interviewed. Using Partial Least Squares (PLS)-Structural Equation Modelling (PLS-SEM) (Hair et al 2016; Cohen 1992), 150 fishermen were selected as respondents. Data were collected through direct field observations and interviews. The latter was carried out using questioners as a guide to obtain direct information needed from the fishermen. Other data were taken from the fisheries and other related government institutions considered to support the study.

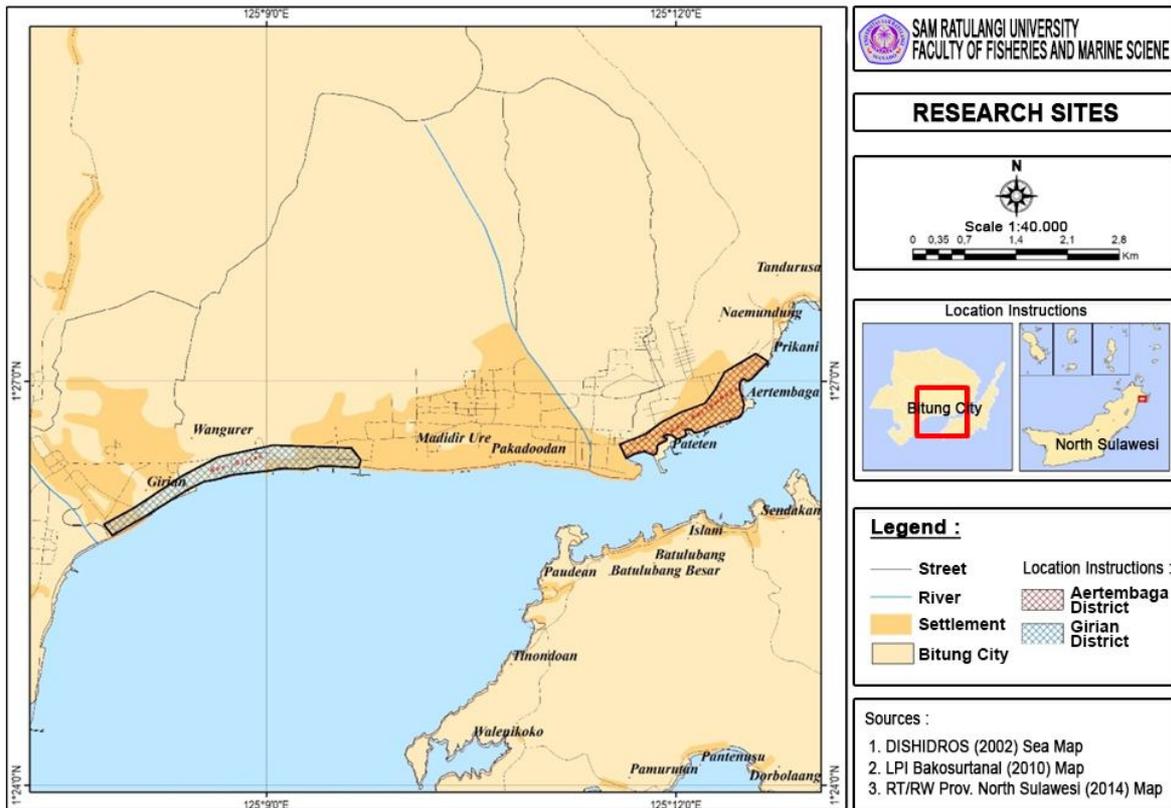


Figure 1. Bitung city, North Sulawesi.

The empirical PLS-based model used SmartPLS 3 software as follows:

a. Model specification. The PLS-SEM-based path models in this study had two elements, measurement model and structural model. The former describes the relationship between latent variables and their indicators, while the latter expresses the relationship among latent variables.

The structural model in this study followed the equations:

$$Y_1 = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + \mu_1 \quad (1)$$

$$Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu_2 \quad (2)$$

$$Y_3 = \gamma_0 + \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3 + \gamma_4 Y_1 + \gamma_5 Y_2 + \mu_3 \quad (3)$$

The components of Y_1 and Y_2 in equation (3) can be substituted with equations (1) and (2) as follows:

$$Y_3 = (\gamma_0 + \gamma_4 a_0 + \gamma_5 \beta_0) + (\gamma_1 + \gamma_4 a_1 + \gamma_5 \beta_1) X_1 + (\gamma_2 + \gamma_4 a_2 + \gamma_5 \beta_2) X_2 + (\gamma_3 + \gamma_4 a_3 + \gamma_5 \beta_3) X_3 + (\gamma_4 \mu_1 + \gamma_5 \mu_2 + \mu_3) \quad (4)$$

These structural equations can be written in the reduced form:

$$Y_1 = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + \mu_1$$

$$Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu_2$$

$$Y_3 = \lambda_0 + \lambda_1 X_1 + \lambda_2 X_2 + \lambda_3 X_3 + \mu_4$$

Where X_1 is family characteristics, X_2 is social capital, X_3 is organization, Y_1 is business orientation, Y_2 is family solidarity, Y_3 is sustainable livelihood, $a_1, a_2, a_3, \beta_1, \beta_2, \beta_3, \gamma_1, \gamma_2, \gamma_3, \gamma_4, \gamma_5, \lambda_1, \lambda_2,$ and λ_3 are μ_1, μ_2, μ_3 coefficient, μ_4 is error.

b. Model evaluation. Measurement model was evaluated with reflective indicator in convergent validity and discriminant validity of the indicators used and composite reliability of the entire indicators (Chin 1998).

Convergent validity with the reflective indicators was tested by calculating the correlation between latent variables and the indicators, either the exogenous variables or the endogenous variables in the structural model. The correlation (loading) value of 0.5 or higher is considered to be enough to describe the variance in the construct (Hair et al 2016).

Discriminant validity and the reflective indicators were measured with the cross loadings analysis between the indicators and the latent variables. If the cross loading value of the variable has the biggest value compared to other latent variables, it is considered to be valid. Other method used was to compare the squares root of average variance extracted (AVE) of each construct with the correlation between other construct in the model. If the construct AVE value is bigger than the correlation value with all other constructs, the model is considered to have good discriminant validity (Hair et al 2016).

Composite reliability is used to determine the consistence of internal indicators, in which a latent variable with good composite reliability has a value > 0.7 (Hair et al 2016).

The structural model was evaluated using *R-square* value of the latent construct to see the structural path coefficient. The stability of this estimation was examined using t-test through bootstrapping procedure (Hair et al 2016). In general, R^2 value of 0.25 for the target construct is weak, 0.50 is medium, and 0.75 is substantial (Hair et al 2016), while Q-square predictive relevance is used to measure how good the observational data given by the model. If *Q-square* > 0 is categorized to have predictive relevance, while if *Q-square* ≤ 0 , the model does not have predictive relevance (Chin 1998).

Respondents. Results showed that the fishermen are, in general, 30-60 years old men that have Elementary School level (21.33%), Secondary School level (49.33%), High School level (26.67%), and Diploma (0.07%), with fishing vessels below 8 GT.

Research variables. There were six variables on study: household characteristics (X1), social capital (X2), institution (X3) as exogenous latent variables, and entrepreneurship orientation (Y1), family solidarity (Y2), and family livelihood (Y3) as endogenous latent variables. The entrepreneurship and family solidarity also act as mediating variable due to having the antecedence and the consequence. The respondent's response has mean score classification as follows: 1.00-1.80 was categorized as very low, 1.81-2.60 as low, 2.61-3.40 as moderate, 3.41-4.20 as high, and 4.21-5.00 very high.

Household characteristics (X1). The household characteristics (X1) were measured involving 8 question indicators, i.e. husband's age (X11), spouse's age (X12), oldest kid's age (X13), family's education (X14), number of family members (X15), profession durability (X16), fishermen's status (X17), and spouse's status (X18). Based on the interviews, the husband's age (X11) had the highest score, 3.59, in which the indicator with the high value was given by 40% respondents and very high by 18.67% respondents (Table 1). The indicator of oldest kid's age (X13) had the lowest mean value, 1.56, indicating that the respondent's responses were in low and very low category, 48% and 48.67%, respectively.

Based on this information, it was found that the fishermen's household characteristics have significant impact on the spouse's age, while the oldest kid's age was categorized as low indicating that this dimension slightly influences the family's adaptation.

Table 1

Household characteristics (X1) description

Indicator	Score 1		Score 2		Score 3		Score 4		Score 5		Mean of indicator	Mean of dimension
	F	%	F	%	F	%	F	%	F	%		
X11	24	16.00	60	40.00	48	32.00	15	10.00	3	2.00	2.42	2.44
X12	10	6.67	8	5.33	44	29.33	60	40.00	28	18.67	3.59	
X13	73	48.67	72	48.00	4	2.67	0	0.00	1	0.67	1.56	
X14	1	0.67	29	19.33	79	52.67	39	26.00	2	1.33	3.08	
X15	1	0.67	30	20.00	70	46.67	27	18.00	12	8.00	2.93	
X16	61	40.67	31	20.67	37	24.67	21	14.00	0	0.00	2.12	
X17	19	12.67	96	64.00	16	10.67	9	6.00	8	5.33	2.23	
X18	83	55.33	30	20.00	19	12.67	7	4.67	2	1.33	1.59	

Source: processed data 2018.

Social capital (X2). This parameter (X2) was entirely measured in 3 dimensions, belief (X21), norm (X22), and network (X23) involving 6 question indicators given in the questioners or research operational definition. Each of these three dimensions has 4 measurement indicators, and the mean of all indicators are in the range of 1.99-4.09, so that all indicators are in high category. Table 2 shows that mean score of each dimension ranges between 3.07 and 4.03 meaning that the social capital variable (X2) is in high category (competitive) in which norm (X22) has the highest value. Several respondents gave low perception, particularly score 1-3 on the indicator of X211 (6.00%), X213 (4.00%), X214 (1.33%), X231 (20.00%), X232 (29.33%), X233 (1.33%), and X234 (0.67%).

Table 2

Social capital description (X2)

Dimension	Indicator	Score 1		Score 2		Score 3		Score 4		Score 5		Score 6		Mean indicator	Mean dimension
		F	%	F	%	F	%	F	%	F	%	F	%		
X21	X211	9	6.00	14	9.33	42	28.00	80	53.33	5	3.33	0	0.00	3.39	3.65
	X212	0	0.00	1	0.67	43	28.67	91	60.67	15	10.00	0	0.00	3.80	
	X213	6	4.00	10	6.67	48	32.00	82	54.67	4	2.67	0	0.00	3.45	
	X214	2	1.33	4	2.67	8	5.33	118	78.67	18	12.00	0	0.00	3.97	
X22	X221	0	0.00	3	2.00	22	14.67	107	71.33	18	12.00	0	0.00	3.93	4.03
	X222	0	0.00	0	0.00	10	6.67	119	79.33	21	14.00	0	0.00	4.07	
	X223	0	0.00	2	1.33	17	11.33	109	72.67	21	14.00	1	0.67	4.01	
	X224	0	0.00	1	0.67	11	7.33	113	75.33	24	16.00	1	0.67	4.09	
X23	X231	30	20.00	53	35.33	42	28.00	20	13.33	5	3.33	0	0.00	2.45	3.07
	X232	44	29.33	76	50.67	21	14.00	6	4.00	3	2.00	0	0.00	1.99	
	X233	20	1.33	8	5.33	25	16.67	106	70.67	9	6.00	0	0.00	3.75	
	X234	1	0.67	1	0.67	14	9.33	103	68.67	31	20.67	0	0.00	4.08	

Source: Processed data 2018

Institution (X3). Institution (X3) was measured in 4 dimensions, government's regulation and policy (X31), law enforcement (X32), work orientation (X33), and solidarity (X34), that included 12 question indicators (Table 3). The government's regulation and policy (X31) were measured in 3 indicators with the highest mean value of 3.35 (moderate category) in X311 indicator. Law enforcement (X32) was measured in 3 indicators with the highest mean value of 3.77 (high category) in X322. Work orientation (X33) had the highest mean value of 3.91 (high category) in X331. Solidarity (34) measured in 3 indicators had the highest mean value of 4.06 (high interpretation) in X342. The analysis found mean score of each dimension between 3.22-3.94 meaning that institution (X3) occurs in high category with the highest category in the solidarity dimension (X34). Several respondents giving relatively low perception with response score of 1-3 on the indicators of X311 (10.00%), X312 (9.33%), X313 (7.33%), X323 (3.33%), X321 (2.67%), and X322 (0.67%). The highest mean response occurs in fishermen's solidarity. It is a strong fishermen's attitude to have human's interdependence, since fishermen consider the solidarity as part of social living hereditarily generated.

Table 3

Institution description (X3)

Dimension	Indicator	Score 1		Score 2		Score 3		Score 4		Score 5		Mean indicator	Mean dimension
		F	%	F	%	F	%	F	%	F	%		
X31	X311	15	10.00	17	11.33	27	18.00	82	54.67	9	6.00	3.35	3.22
	X312	14	9.33	19	12.67	36	24.00	67	44.67	14	9.33	3.32	
	X313	11	7.33	36	24.00	47	31.33	56	37.33	0	0.00	2.99	
X32	X321	4	2.67	12	8.00	22	14.67	100	66.67	12	8.00	3.69	3.62
	X322	1	0.67	10	6.67	20	13.33	110	73.33	9	6.00	3.77	
	X323	5	3.33	23	15.33	30	20.00	90	60.00	2	1.33	3.41	
X33	X331	0	0.00	1	0.67	22	14.67	116	77.33	11	7.33	3.91	3.65
	X332	0	0.00	12	8.00	56	37.33	81	54.00	1	0.67	3.47	
	X333	0	0.00	9	6.00	66	37.33	83	55.33	2	1.33	3.52	
X34	X341	0	0.00	4	2.67	26	17.33	108	72.00	12	8.00	3.85	3.94
	X342	0	0.00	1	0.67	10	6.67	118	78.67	21	14.00	4.06	
	X343	0	0.00	1	0.67	21	14.00	117	78.00	11	7.33	3.92	

Source: Processed data 2018

Entrepreneurship orientation (Y1). Entrepreneurship orientation (Y1) was measured in 4 dimensions, self-support (Y11), innovation (Y12), risk taking (Y13), and proactiveness (Y14), as a whole involve 12 question indicators in the questioners or research operational definition (Table 4). The self-support dimension (Y11) was measured in 3 indicators in which the indicator of Y113 has the highest mean value of 3.40 (interpreted as moderate). Innovation (Y12) was measured in 3 indicators with the highest mean value of 3.45 (high category) in Y121. The risk taking (Y13) was measured in 3 indicators with the highest mean score of 3.45 (high category) in Y131. Proactiveness (Y14) was measured in 3 indicators in which the highest mean value was 3.77 (high category) in Y143. The mean score of each dimension ranges between 2.82 and 3.77. It indicates that the entrepreneurship orientation (Y1) is in moderate category with the highest value in proactiveness (Y14). Several respondents discern the entrepreneurship orientation at the relatively low level, especially with the response score of 1-3 in the indicators of Y112 (7.33%), Y133 (4.67%), Y111 (4%), Y113 (4%), Y132 (3.33%), Y123 (2.67%), Y122 (2%), Y121 (1.33%), and Y131 (1.33%).

Table 4

Entrepreneurship orientation description (Y1)

Dimension	Indicator	Score 1		Score 2		Score 3		Score 4		Score 5		Mean indicator	Mean dimension
		F	%	F	%	F	%	F	%	F	%		
Y11	Y111	6	4.00	17	11.33	27	18.00	82	54.67	9	6.00	3.35	3.30
	Y112	11	7.33	19	12.67	36	24.00	67	44.67	14	9.33	3.32	
	Y113	6	4.00	36	24.00	47	31.33	56	37.33	0	0.00	2.99	
Y12	Y121	2	1.33	19	12.67	46	30.67	75	50.00	8	5.33	3.45	3.24
	Y1322	3	2.00	34	22.67	42	28.00	67	44.67	4	2.67	3.23	
	Y123	4	2.56	49	32.67	45	30.00	43	28.67	9	6.00	3.03	
Y13	Y131	2	1.33	17	11.33	50	33.33	73	48.67	8	5.33	3.45	3.08
	Y132	5	3.33	42	28.00	59	39.33	42	28.00	2	1.33	2.96	
	Y133	7	4.67	42	28.00	75	50.00	23	15.33	3	2.00	2.82	
Y14	Y141	0	0.00	10	6.67	55	36.67	84	56.00	1	0.67	3.51	3.63
	Y142	0	0.00	6	4.00	50	33.33	88	58.67	6	4.00	3.63	
	Y143	0	0.00	9	6.00	27	18.00	104	69.33	10	6.67	3.77	

Source: Processed data 2018.

Family solidarity (Y2). This parameter (Y2) was measured in 3 dimensions, commitment (Y21), solidarity (Y22) and help and support (Y23), that totally involve 9 question indicators in the questioners or research operational definition (Table 5). The commitment (Y21) was measured in 3 indicators with the highest mean value of 4.14 in the indicator of Y211 (high category). Solidarity (Y22) was measured in 3 indicators with the highest value of 4.15 (high category) in the indicator of Y223. Assistance and support (Y23) were measured in 3 indicators, assistance in problem solving (Y231), freedom to ask help among family members (Y232), spontaneous help to the family head to make a living (233) with the highest value of 3.84 (high category) in the indicator of Y231. Mean

score of each dimension ranges between 3.64 and 4.15. It means that family solidarity (Y2) is in high category with the highest value in the commitment (Y21). Several respondents place the family solidarity at the relatively low level, especially the response score of 1-3 for the indicator of Y232 (2.67%), Y231 (2%), and Y232 (2%). The fishermen considered that solidarity in a family is part of the success in their life, so that spending much time to do housework together when not going fishing is important.

Table 5

Family solidarity description (Y2)

Dimension	Indicator	Score 1		Score 2		Score 3		Score 4		Score 5		Mean indicator	Mean dimension
		F	%	F	%	F	%	F	%	F	%		
Y21	Y211	0	0.00	2	1.33	9	6.00	105	70.00	34	22.67	4.14	4.09
	Y212	0	0.00	2	1.33	6	4.00	123	82.00	19	12.67	4.06	
	Y213	0	0.00	1	0.67	6	4.00	123	82.00	20	13.33	4.08	
Y22	Y221	0	0.00	2	1.33	30	20.00	112	74.67	6	4.00	3.81	3.91
	Y222	0	0.00	3	2.00	33	22.00	110	73.33	4	2.67	3.77	
	Y223	0	0.00	1	0.67	9	6.00	107	71.33	33	22.00	4.15	
Y23	Y231	3	2.00	3	2.00	20	13.33	113	75.33	11	7.33	3.84	3.72
	Y232	4	2.67	6	4.00	31	20.67	102	68.00	7	4.67	3.68	
	Y233	3	2.00	13	8.67	28	18.67	97	64.67	9	6.00	3.64	

Source: Processed data 2018.

Sustainable livelihood (Y3). Sustainable livelihood (Y3) was measured in 3 dimensions, access to the job (Y31), access to the physical resources (Y32), and access to the financial resources (Y33) (Table 6). The first access (Y31) was measured in 8 indicators with the highest mean of 3.30 (moderate category) in the indicator of Y312. The access to the physical resources (Y32) was measured in 6 indicators in which the highest mean value of 3.89 (high category) occurred in the indicator of Y326. The access to the financial resources (Y23) was measured in 4 indicators with the highest mean of 3.63 (high category) in the indicator of Y334. Mean score of each dimension ranges from 2.29 to 3.18. It reveals that the sustainable livelihood (Y3) is in moderate category with the highest value in the access to the physical resources (Y32). Despite high category of these 3 dimensions, the sustainable livelihood (Y3) was at the relatively low level, particularly the response score of 1-3, 39.33% in the indicator of Y316, 38% in Y314, and 0.67% in Y326.

Table 6

Sustainable livelihood description (Y3)

Dimension	Indicator	Score 1		Score 2		Score 3		Score 4		Score 5		Mean indicator	Mean dimension
		F	%	F	%	F	%	F	%	F	%		
Y31	Y311	48	32.00	30	20.00	35	23.33	35	23.33	2	1.33	2.42	2.29
	Y312	8	5.33	24	16.00	44	29.33	63	42.00	11	7.33	3.30	
	Y313	55	36.67	30	20.00	43	28.67	22	14.67	0	0.00	2.21	
	Y314	57	38.00	33	22.00	46	30.67	14	9.33	0	0.00	2.11	
	Y315	51	34.00	60	40.00	27	18.00	12	8.00	0	0.00	2.00	
	Y316	59	39.33	61	40.67	26	17.33	4	2.67	0	0.00	1.83	
	Y317	55	36.67	37	24.67	45	30.00	13	8.67	0	0.00	2.11	
	Y318	40	26.67	44	29.33	46	30.67	20	13.33	0	0.00	2.31	
Y32	Y321	4	2.67	18	12.00	37	24.67	85	56.67	6	4.00	3.47	3.18
	Y322	47	31.33	54	36.00	34	22.67	15	10.00	0	0.00	2.11	
	Y323	51	34.00	38	25.33	24	16.00	35	23.33	2	1.33	2.33	
	Y324	3	2.00	9	6.00	31	20.67	105	70.00	2	1.33	3.63	
	Y325	2	1.33	4	2.67	39	26.00	103	68.67	2	1.33	3.66	
	Y326	1	0.67	1	0.67	27	18.00	105	70.00	16	10.67	3.89	
Y33	Y331	34	22.67	43	28.67	30	20.00	41	27.33	2	1.33	2.56	2.63
	Y332	44	29.33	51	34.00	34	22.67	21	14.00	0	0.00	2.21	
	Y333	49	32.67	51	34.00	37	24.67	13	8.67	0	0.00	2.09	
	Y334	3	2.00	5	3.33	43	28.67	92	61.33	7	4.67	3.63	

Source: Processed data 2018.

Research instrument test. This instrument used validity and reliability tests that involve 6 variables, family characteristics (X1), social capital (X2), institution (X3), entrepreneurship orientation (Y1), family solidarity (Y2), and sustainable livelihood (Y3).

Table 7 shows that all indicators have significant correlation coefficient, except that of X14 (0.066), Y325 (0.133), Y326 (0.040), and Y334 (-0.045). Hence, all indicators in these variable measurements are considered to be valid. Based on Cronbach alpha coefficient, these 6 variables have a reliability coefficient above 0.6 meaning that all research variables, either family characteristics (X1), social capital (X2), and institution (X3), or entrepreneurship orientation (Y1), family solidarity (Y2), and sustainable livelihood (Y3), are accepted to be valid and reliable.

Table 7

Research instrument test			
<i>Variable</i>	<i>Indicator</i>	<i>Validity</i>	<i>Reliability</i>
Family characteristics (X1)	X11	0.826	0.744
	X12	0.845	
	X13	0.666	
	X14	0.066 ns	
	X15	0.705	
	X16	0.726	
	X17	0.550	
	X18	0.317	
	Social capital (X2)	X211	
X212		0.465	
X213		0.475	
X214		0.465	
X221		0.540	
X222		0.529	
X223		0.612	
X224		0.440	
X231		0.487	
X232		0.473	
X233		0.414	
X234		0.499	
Institution (X3)		X311	0.510
	X312	0.669	
	X313	0.466	
	X321	0.672	
	X322	0.727	
	X323	0.629	
	X331	0.554	
	X332	0.531	
	X333	0.540	
	X341	0.432	
	X342	0.518	
	X343	0.411	
	Entrepreneurship orientation (Y1)	Y111	0.607
Y112		0.728	
Y113		0.734	
Y121		0.658	
Y122		0.581	
Y123		0.552	
Y131		0.326	
Y132		0.473	
Y133		0.398	
Y141		0.567	
Y142		0.483	
Y143		0.370	
Family solidarity (Y2)		Y211	0.311
	Y212	0.482	
	Y213	0.436	
	Y221	0.523	
	Y222	0.501	
	Y223	0.415	
	Y231	0.665	
	Y232	0.601	
	Y233	0.647	

Sustainable livelihood (Y3)	Y311	0.693	0.855
	Y312	0.522	
	Y313	0.971	
	Y314	0.778	
	Y315	0.655	
	Y316	0.718	
	Y317	0.740	
	Y318	0.609	
	Y321	0.190	
	Y322	0.666	
	Y323	0.797	
	Y324	0.469	
	Y325	0.133 ns	
	Y326	0.040 ns	
	Y331	0.332	
	Y332	0.580	
Y333	0.545		
Y334	-0.045 ns		

Note: ns – non significant.

Results and Discussion

Convergent validity. This test shows that an indicator accurately measures the construct. The measurement of convergent validity of the outer model was done to observe the outer loading of each variable. If the outer loadings above 0.4, the indicator will be categorized as valid convergence. The analysis indicates that the outer loading in each research variable measurement has varied values from -0.258 to 0.849. The value below 0.4 was found in the indicators of X14, X18, and Y13 meaning that the outer loading is invalid convergence. Further testing with bootstrapping method indicates that the outer loading of X14 (-0.328) and X18 (-0.258) is not significant ($p > 0.05$), and only the indicator of Y13 (0.326) is significant ($p \leq 0.05$). Nevertheless, the outer loading of the dominant indicators is valid convergence with a value above 0.4 (Table 8).

Table 8

Convergent validity test

Variable	Indicator	Loading	Remarks
X1	X11	0.664	Valid convergence
	X12	0.720	Valid convergence
	X13	0.652	Valid convergence
	X14	-0.328	Invalid convergence
	X15	0.789	Valid convergence
	X16	0.791	Valid convergence
	X17	0.486	Valid convergence
	X18	-0.258	Invalid convergence
X2	X21	0.630	Valid convergence
	X22	0.602	Valid convergence
	X23	0.757	Valid convergence
X3	X31	0.570	Valid convergence
	X32	0.784	Valid convergence
	X33	0.837	Valid convergence
	X34	0.583	Valid convergence
Y1	Y11	0.738	Valid convergence
	Y12	0.834	Valid convergence
	Y13	0.326	Invalid convergence
	Y14	0.604	Valid convergence
Y2	Y21	0.689	Valid convergence
	Y22	0.824	Valid convergence
	Y23	0.476	Valid convergence
Y3	Y31	0.727	Valid convergence
	Y32	0.849	Valid convergence
	Y33	0.710	Valid convergence

Discriminant validity. Table 9 demonstrates that the value of root of AVE for variables X1, X2, X3, Y1, Y2, and Y3 is bigger than that of correlation between latent variables. Thus, the construct has met the discriminant validity testing.

Table 9

Discriminant validity test

Variable	Mean	Root of mean	Correlation coefficient of latent variable					
			X1	X2	X3	Y1	Y2	Y3
X1	0.380	0.616	1					
X2	0.460	0.678	-0.096	1				
X3	0.495	0.703	-0.133	0.317	1			
Y1	0.428	0.654	-0.246	0.304	0.601	1		
Y2	0.444	0.666	-0.033	0.293	0.454	0.406	1	
Y3	0.585	0.765	-0.238	0.238	0.173	0.322	0.488	1

The discriminant validity was also tested using cross loading, in which if the value is the highest (on each row) for each measurement variable, the discriminant validity variable is fulfilled. The indicators X11, X12, X13, X15, and X16 are valid to measure the family characteristics (X1) due to the highest loading in variable X1, while X11, X12, X13, X15, and X16 are not valid to measure the family cohesiveness (X2), institution (X3), entrepreneurship (Y1), social capital (Y2), and sustainable livelihood (Y3). Similar discriminant validity can also be indicated for other indicators as presented in Table 10.

Table 10

Cross loading analysis

Indicator	Family characteristics	Family solidarity	Institution	Entrepreneurship	Social capital	Sustainable livelihood
X11	0.664	-0.053	0.026	-0.027	-0.025	-0.028
X12	0.720	-0.057	-0.030	-0.104	-0.009	-0.128
X13	0.652	0.081	0.068	-0.015	0.028	-0.071
X14	-0.328	0.107	-0.211	-0.005	-0.175	0.146
X15	0.789	-0.017	-0.119	-0.182	-0.040	-0.193
X16	0.791	-0.048	-0.125	-0.174	-0.031	-0.241
X17	0.486	-0.096	-0.148	-0.143	-0.106	-0.043
X18	-0.258	0.087	0.169	0.237	0.044	0.074
X21	-0.112	0.266	0.323	0.375	0.630	0.129
X22	-0.058	0.256	0.367	0.248	0.602	0.196
X23	0.068	0.107	0.252	0.216	0.757	0.569
X31	0.024	0.118	0.570	0.224	0.323	0.184
X32	-0.080	0.238	0.784	0.470	0.219	-0.056
X33	-0.169	0.329	0.837	0.586	0.408	0.245
X34	-0.077	0.114	0.583	0.272	0.360	0.096
Y11	-0.091	0.156	0.388	0.738	0.280	0.163
Y12	-0.248	0.302	0.484	0.834	0.450	0.445
Y13	-0.093	0.343	0.167	0.326	0.020	-0.106
Y14	-0.168	0.112	0.463	0.604	0.094	0.011
Y21	-0.088	0.689	0.262	0.103	0.219	0.145
Y22	-0.071	0.824	0.228	0.248	0.185	0.193
Y23	-0.027	0.476	0.136	0.294	0.191	0.142
Y31	-0.174	0.170	0.319	0.333	0.388	0.727
Y32	-0.232	0.198	0.090	0.306	0.369	0.849
Y33	-0.134	0.176	0.001	0.095	0.369	0.710

Composite reliability. The tested construct reliability refers to the composite reliability whose value is bigger than 0.7 even though 0.6 can still be accepted (Hair et al 2008). All values obtained were > 0.7 (Table 11) meaning that composite reliability is fulfilled and all indicators become each construct measure.

Composite reliability

Variable	Composite reliability
Family characteristics	0.714
Family solidarity	0.710
Institution	0.792
Entrepreneurship	0.732
Social capital	0.703
Sustainable livelihood	0.808

Goodness of fit in PLS model. Based on the determination coefficient (R^2) of each variable, the goodness of fit model was obtained using SmartPLS application.

Figure 2 shows that the endogenous variables of family cohesiveness (Y2), entrepreneurship (Y1), and sustainable livelihood (Y3) have the determination coefficient less than 0.5 but they are statistically significant. Therefore, even though the construct or the endogenous variables is significantly affected by a number of exogenous variables, the highest percentage is determined by other variables

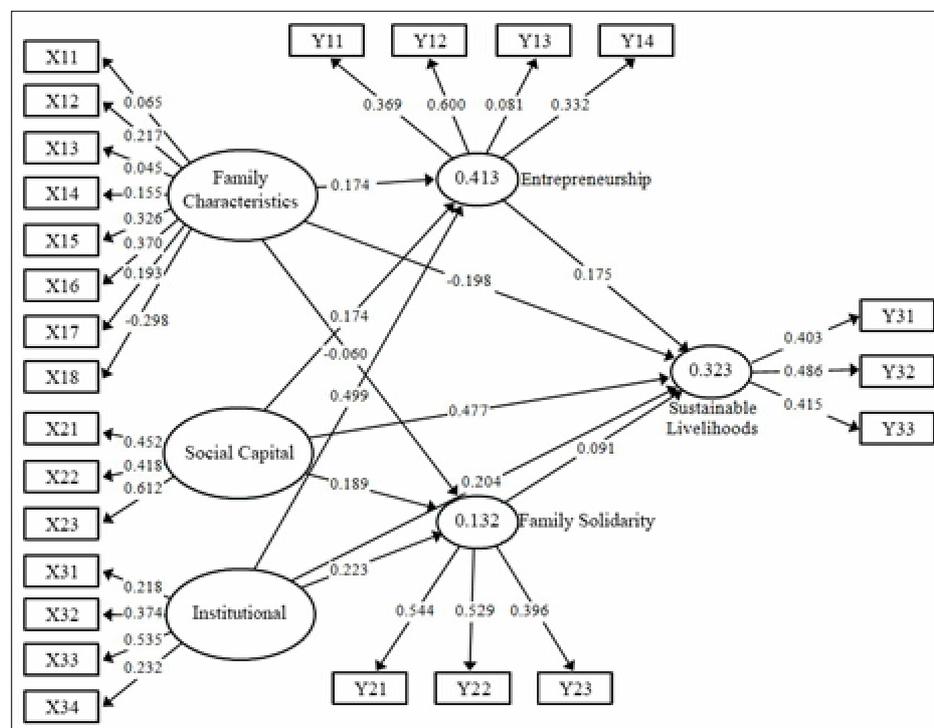


Figure 2. Determination coefficient of endogenous variable.

The determination coefficient of the family cohesiveness is 0.132 indicating that 13.2% of the family cohesiveness is determined by family characteristics (X1), social capital (X2), and institution (X3). The exogenous variables also determine the endogenous variable of entrepreneurship as much as 41.3%. Moreover, the sustainable livelihood as a form of fishermen's adaptation is indicated with a determination coefficient of 0.323 on the entrepreneurship (Y1), family cohesiveness (Y2), family characteristics (X1), social capital (X2), and institution (X3).

According to Hair et al (2016), the determination coefficient of 0.25 for the target construct is considered to be weak, 0.50 as moderate, and 0.75 as substantial. Therefore, these 3 target constructs could be accepted as follows: (1) entrepreneurship construct (Y1) approaches to moderate, (2) solidarity construct (Y2) is weak enough, and (3) sustainable livelihood construct (Y3) is not weak but below medium.

Outer model PLS. Data analysis using SmartPLS showed the statistical significance of the path coefficient as outer loading. Table 12 demonstrates that the family characteristics (X1) with the path coefficient of indicator X11 and X12 are significant ($t >$

1.96; $p < 0.05$). All indicators of the social capital (X2) are significant path coefficient ($p < 0.05$). The path coefficient of all indicators of institution variable (X3) is also significant ($p < 0.05$). The same condition occurs in the path coefficient of variables Y1, Y2, and Y3.

Table 12

Outer loading analysis

Variable	Indicators	Original sample (O)	Sample mean (M)	Standard error (STERR)	T statistics (O/STERR)	P values
Family characteristics	X11	0.664	0.541	0.314	2.115	0.035
	X12	0.720	0.571	0.352	2.046	0.041
	X13	0.652	0.506	0.341	1.912	0.056
	X14	-0.328	-0.182	0.321	1.021	0.308
	X15	0.789	0.578	0.432	1.826	0.068
	X16	0.791	0.583	0.446	1.773	0.077
	X17	0.486	0.395	0.274	1.773	0.077
	X18	-0.258	-0.092	0.343	0.752	0.452
Social capital	X21	0.630	0.616	0.144	4.390	0.000
	X22	0.602	0.591	0.174	3.459	0.001
	X23	0.757	0.744	0.099	7.613	0.000
Institution	X31	0.570	0.570	0.095	6.030	0.000
	X32	0.784	0.777	0.051	15.228	0.000
	X33	0.837	0.836	0.033	25.642	0.000
	X34	0.583	0.581	0.097	6.002	0.000
Entrepreneurship	Y11	0.738	0.725	0.074	10.005	0.000
	Y12	0.834	0.828	0.048	17.329	0.000
	Y13	0.326	0.326	0.142	2.296	0.022
	Y14	0.604	0.593	0.110	5.495	0.000
Family solidarity	Y21	0.689	0.653	0.187	3.675	0.000
	Y22	0.824	0.813	0.091	9.108	0.000
	Y23	0.476	0.472	0.193	2.467	0.014
Sustainable livelihood	Y31	0.727	0.719	0.104	6.987	0.000
	Y32	0.849	0.842	0.071	12.025	0.000
	Y33	0.710	0.706	0.095	7.441	0.000

Structural model testing. The structural model (outer model) was evaluated using R^2 . This coefficient (R^2) was used to measure the change in the independent latent variables against the dependent latent variables. The higher the determination coefficient (R^2) is, the better the prediction model will be (Abdullah & Jogiyanto 2015). The graph is presented as structural model in relation with sustainable livelihood as solid line and discontinuous (Figure 3).

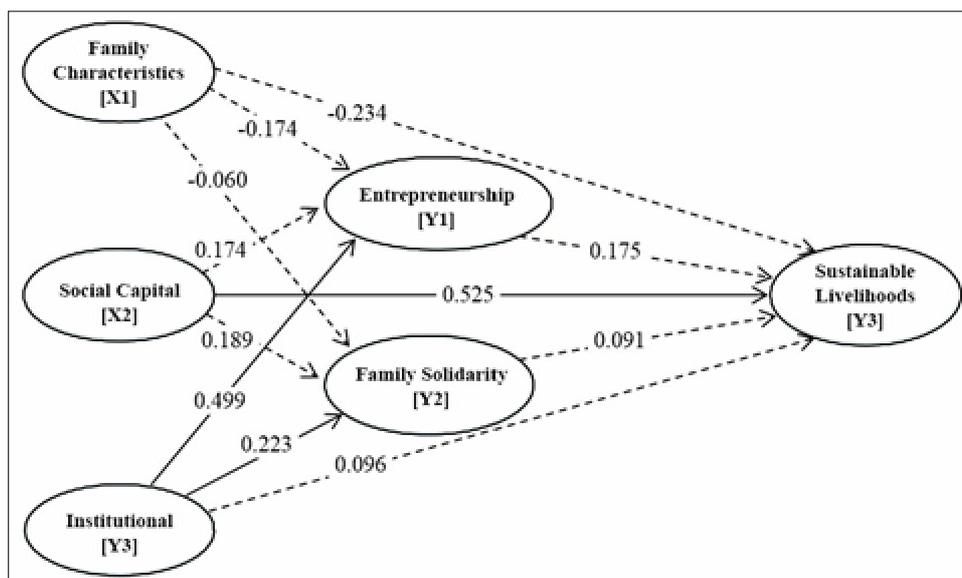


Figure 3. Structural model of fishermen's sustainable livelihood.

In this case, the family characteristics (X1) indicated with discontinuous lines show non-significant coefficient against the variables Y3, Y2, and Y1, meaning that the family characteristics do not affect the sustainable livelihood (Y3), entrepreneurship orientation (Y1), and family solidarity (Y2) ($p > 0.05$). Social capital (X2) significantly influences the sustainable livelihood (Y3) ($p < 0.05$), but does not affect the entrepreneurship orientation (Y1) and the family solidarity (Y2) ($p > 0.05$). Institution (X3) significantly affects both entrepreneurship orientation (Y1) and the family solidarity (Y2) ($p < 0.05$) but does not influence the sustainable livelihood (Y3) ($p > 0.05$).

Sustainable livelihood, as fishermen's adaptation indicator, has directly path coefficient of entrepreneurship orientation (Y1) and family solidarity (Y2). The statistical test indicates that the path coefficient is small and not significant ($p > 0.05$). Therefore, the variables Y1 and Y2 do not significantly influence the sustainable livelihood (Y3) ($p > 0.05$).

Table 13 demonstrates relationship between variables as post-moratorium adaptation indicator. It is indirectly significantly affected by institution (X3) ($p < 0.05$) through family cohesiveness (Y2) and entrepreneurship orientation (Y1). Institution (X2) has positive function with R^2 of 0.108 indicating that the institution contributes 10.8% to the sustainable livelihood through mediation of family solidarity and entrepreneurship orientation.

Table 13

Path coefficient analysis of relationship between variables: indirect impact on the sustainable livelihood

<i>Relationship</i>	<i>Original sample (O)</i>	<i>Sample mean (M)</i>	<i>Standard error (STERR)</i>	<i>T statistics (O/STERR)</i>	<i>P values</i>
Family characteristic - Family solidarity					
Family characteristics - Entrepreneurship					
Family characteristics - Sustainable livelihood	-0.036	-0.031	0.032	1.112	0.267
Family solidarity - Sustainable livelihood					
Institution - Family solidarity					
Institution - Entrepreneurship					
Institution - Sustainable livelihood	0.108	0.105	0.054	1.977	0.049
Entrepreneurship - Sustainable livelihood					
Social capital - Family solidarity					
Social capital - Entrepreneurship					
Social capital - Sustainable livelihood	0.048	0.045	0.027	1.774	0.077

Data analysis employing Smart-PLS application succeeded to model the structural equation showing the direct and indirect effect of exogenous variables on the fishermen's sustainable livelihood of Bitung municipality after the fisheries moratorium had been terminated.

Direct effect on the endogenous variable of the sustainable livelihood is only significantly contributed by the exogenous variable of the social capital. Besides, the exogenous variable of institution has directly significant effect on either entrepreneurship orientation or family solidarity. Indirect effect on the sustainable livelihood is significant through entrepreneurship orientation and family cohesiveness. Family characteristics did not also significantly influence the sustainable livelihood through entrepreneurship orientation and family solidarity. There is no indirect effect of the social capital on the sustainable livelihood as well.

Impact of fishermen's household characteristics on entrepreneurship orientation, family cohesiveness, sustainable livelihood. As an exogenous variable, the family characteristics hypothesized as partial undetermined response on each endogenous variable were supported by the testing outcome (Figure 4). Thus, the fishermen's family characteristics do not directly partially influence the entrepreneurship orientation, family cohesiveness, and sustainable livelihood ($p > 0.05$).

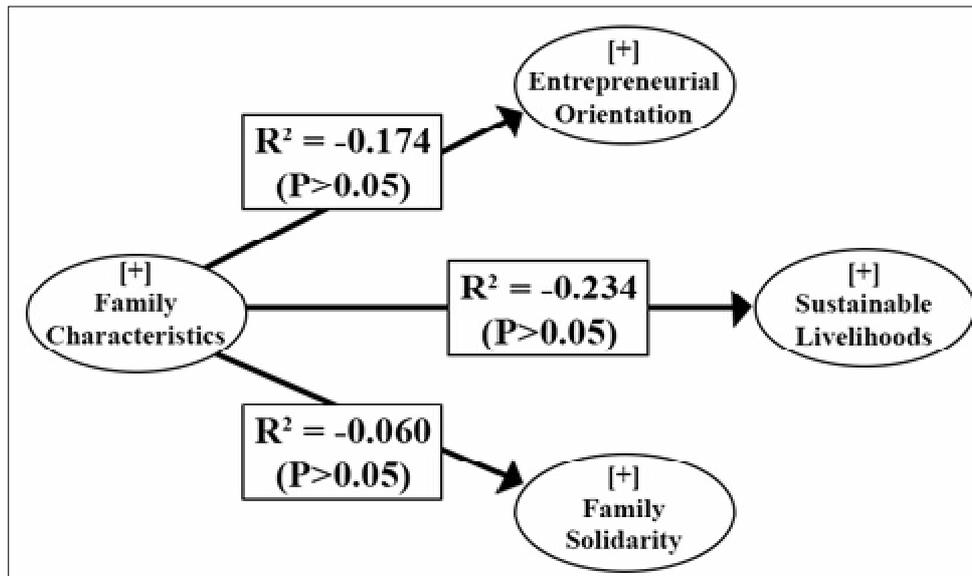


Figure 4. Diagram of partial characteristic effect on the endogenous variables.

Family characteristics indicated with fishermen's respondents are highly varied (Table 1), so that in their different livelihood, either as big or small fishermen or labor fishermen, the response could be seen following the livelihood diversification of the fishermen's adaptation for their livelihood sustainability. Besides, the diversification of family solidarity and entrepreneurship orientation seems to be in line with various fishermen's characteristics. It reconfirms Charles's point of view (2001) followed by De Young et al (2008) concerning the diversification at the individual and the household levels as a characteristic of sustainable fisheries system.

Fishermen's social capital effect on the entrepreneurship orientation, family cohesiveness, and family livelihood. Social capital hypothesized as exogenous variable significantly partially affects the endogenous variables of entrepreneurship orientation, family cohesiveness, and family livelihood. Figure 5 indicates that only endogenous variable of sustainable livelihood is significantly positively influenced ($p < 0.05$) with determination coefficient (R^2) of 0.525. Social capital did not significantly directly determine the entrepreneurship orientation and the family cohesiveness, but could be taken as temporary impact of the fisheries moratorium. It could also be considered as a relationship structure of the factors with the same benefit. The amount of fishermen's social capital responses reflecting the belief, norms, and social networking is relatively consistent with that of the entrepreneurship orientation and the family cohesiveness. The entrepreneurship orientation initially introduced by Miller (1983) in relation with a company management is basically an institutional performance as identified in the present study as well.

The social capital measured with confidence, norm, and network reveals significant effect on the sustainable livelihood of the fishermen communities in Bitung. Strong responses, such as solidarity to the neighbors, government, society leader, and the sensitivity to the environment, then give the comfort to live in their community. Similarly, the networking is strongly supported by the fishermen in which their involvement in the social networking, such as cooperative and business group, gives them good future expectation. Strong solidarity in the social networking becomes the principle of their living development. The fishermen's involvement in religious activities was high as well. This finding is consistent with Putnam (1996) that social capital is part of social living, networking, norms, and belief that encourage them to work together effectively to achieve the common goals.

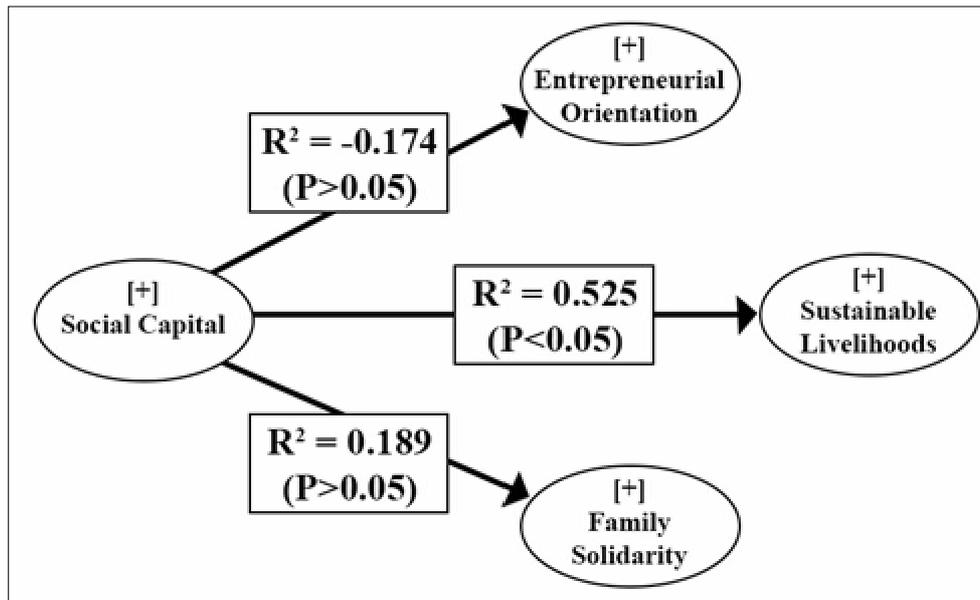


Figure 5. Diagram of marital social capital effect on the endogenous variables.

Family cohesiveness, measured in the dimensions of commitment, solidarity, assistance, and support, is also an independent variable that has a sense relatively reflects social capital as dependent variable. As emotional connection is high in the family (Olson et al 1979; Villarreal-Zegarra & Paz-Jesús 2017), the family cohesion at certain level contributes to the toughness of the fishermen's community to deal with the livelihood disturbance and pressures (Hiruy & Wallo 2018; Leite et al 2019), such as impact of fisheries moratorium on the fishermen in Bitung municipality. According to Pretty (2003), social capital explains the relationship among people of the same objectives and manifested in local groups. Besides social capital bridges the capacity of the group to make contact with other people who have different opinion. Thus, family solidarity is the indicator of social capital and not as variable significantly determined by the independent variable of social capital.

The direct effect positively accepted from the social capital gives the opportunity for sustainable livelihood strategy development with the priority of social capital development. As the impact of fisheries moratorium, this finding is also identical with the impact of climate change. Badjeck et al (2010) stated that fisheries-based livelihood response can be done through policy implementation by developing the social capital. In sustainable livelihood context, social capital that becomes the resources integrated with the fundamental assets of financial, physics, nature, and human, is determinant factor (Gutiérrez et al 2011; Islam et al 2014; Stephenson et al 2016; Hiruy & Wallo 2018; Pour et al 2018).

Impact of the institution on the entrepreneurship orientation, family cohesiveness, family livelihood. Institution as independent variable hypothesized directly had significant effect on the entrepreneurship orientation and the family cohesiveness ($p < 0.05$) (Figure 6).

The post-moratorium sustainable livelihood perceived by Bitung fishermen as mean amount of response was relatively similar to mean response to the institution. Figure 6 shows that the determination coefficient ($R^2 = 0.175$) is not significant ($p > 0.05$). This condition could result from negative response, such as misunderstanding, doubt, and fear of the fishermen to the moratorium policy. The fishermen who run their fisheries-based livelihood assumed that this policy will be taken as permanent regulations. In recent marine policy analysis, it is found that during the moratorium, tuna and skipjack catch landings declined, but most small-scaled fisheries or traditional fisheries have been benefitted with this policy, since they easily obtain fish catch and have shorter fishing operation time due to closer fishing ground. This condition is also reported by Khan et al (2018).

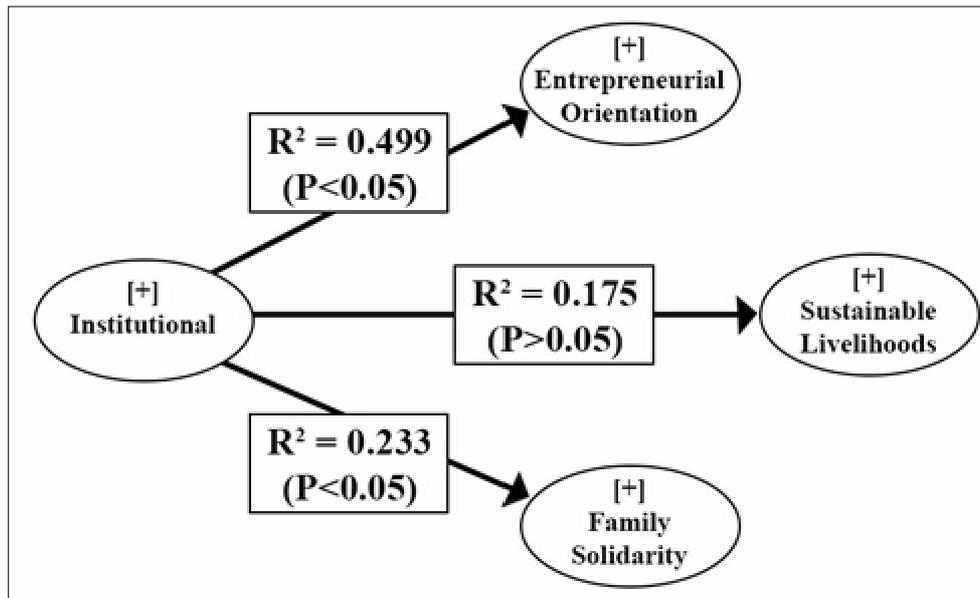


Figure 6. Diagram of partial institutional effect on the endogenous variables.

The entrepreneurship orientation that is positively influenced by the institution (Figure 6) indicates that the institutional contribution of 49.9% determines the entrepreneurship orientation of the fishermen's communities in Bitung municipality. Thus, the present study found that fishing fisheries directed to the entrepreneurship requires institution as a regional fisheries committee included in Indonesian fisheries law. Muawanah et al (2018) stated further that if the fisheries regulations give recognition and ratification of traditional sea tenure right, it will provide good incentive to local communities to independently manage their fisheries resources.

The independence seems to be indicated in the present finding that family cohesiveness is positively and significantly affected by the institutional contribution (Figure 6). Therefore, positive contribution of the institution to family cohesiveness could be increased in order to maintain the toughness of the fishermen and their communities in adapting to the changes in fishing fisheries system.

Impact of institution on the family livelihood through entrepreneurship orientation and family cohesiveness. Indirectly, the independent variables of the institution hypothesized affecting the family livelihood could be significantly and positively accepted. The structural model (Figure 7) demonstrates that the fishermen's sustainable livelihood of Bitung municipality after the fisheries moratorium termination is, in fact, influenced by institution through entrepreneurship orientation and family cohesiveness ($R^2 = 0.108$; $p < 0.05$). It means that institution has indirectly contributed 10.8% to the sustainable livelihood.

The direct impact of the organization is not significant on the sustainable livelihood reflecting that only through mediator, the entrepreneurship orientation and the family solidarity, the sustainable livelihood could be significantly affected by the organization. It, of course, results from the strength of determination factor of the organization. The organizational contribution 49.9% to entrepreneurship orientation determination could have significant effect on the sustainable livelihood. Similarly, the organizational contribution of 23.3% that significantly determines the family solidarity could also mediate the significant effect of the sustainable livelihood of the recent fishermen community in Bitung municipality.

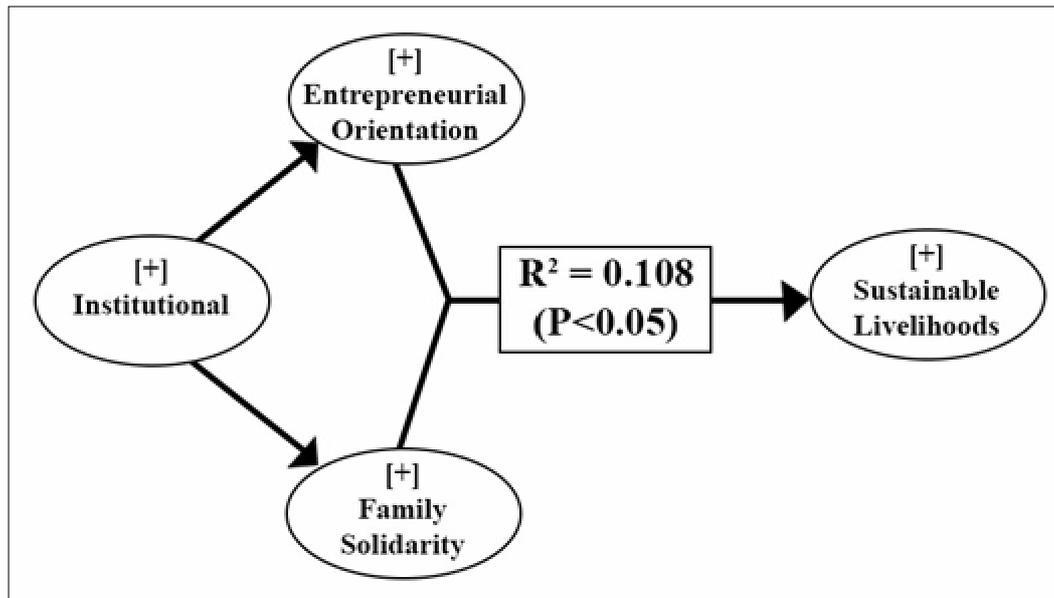


Figure 7. Diagram of characteristic indirect effect on the sustainable livelihood.

Recent condition of the fishermen communities mentioned above relatively indicates the status of the actual adaptation achieved as toughness expression after the moratorium policy termination. The fisheries moratorium policy under the international (Yin 2012) on the fishing permit of foreign and ex-foreign fishing vessels in Indonesia fisheries management territory from November 3rd, 2014 to October 2015 (Khan et al 2018; Satria et al 2018), has resulted in loss of job opportunity for most fishermen at the time and fish catch decline. The negative impact on the social economic condition of the fishermen communities could be strongly faced through adaptation of the fishermen's response to the social capital, organization, entrepreneurship orientation, and family solidarity.

The implication is to develop the sustainable livelihood of the fishermen through social capital strengthening. The sustainable livelihood could also be developed with the organization strengthening through stabilization of entrepreneurship orientation and family solidarity.

Conclusions. Permit moratorium policy of foreign and ex-foreign fishing vessels operating in the fisheries management territory of Indonesia has been terminated. The fishermen's family characteristics did not have significant direct impact on the sustainable livelihood, entrepreneurship orientation, and family cohesiveness. Social capital significantly gave direct positive influence on the sustainable livelihood, but non-significantly direct partial effect on the entrepreneurship orientation and the family cohesiveness. Institution significantly gave partially direct impact on the entrepreneurship orientation and family cohesiveness, but it did not significantly affect the sustainable livelihood. Nevertheless, institution had indirectly positive effect on the sustainable livelihood with mediating variables of entrepreneurship orientation and family cohesiveness.

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Authors:

Florence V. Longdong, Sam Ratulangi University, Faculty of Fisheries and Marine Science, Jln. Kampus Unsrat Bahu, Manado 95115, North Sulawesi, Indonesia, e-mail: florencevera88@unsrat.ac.id

Eddy Mantjoro, Sam Ratulangi University, Faculty of Fisheries and Marine Science, Jln. Kampus Unsrat Bahu, Manado 95115, North Sulawesi, Indonesia, e-mail: eddymantjoro@unsrat.ac.id

Rene Charles Kepel, Sam Ratulangi University, Faculty of Fisheries and Marine Science, Jln. Kampus Unsrat Bahu, Manado 95115, North Sulawesi, Indonesia, e-mail: renecharleskepel65@gmail.com

Johnny Budiman, Sam Ratulangi University, Faculty of Fisheries and Marine Science, Jln. Kampus Unsrat Bahu, Manado 95115, North Sulawesi, Indonesia, e-mail: budimanjj@yahoo.com

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