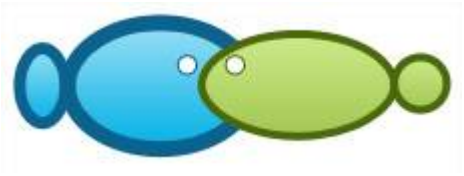

Performance of local fishermen: competitiveness of smoked fish domestic supplier in Kei Islands, Indonesia

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Abstract. Smoked fish is a kind of fisheries product that is processed using smoking technology as a food preservation method. It also has a high economic value due to its high potential demand and cheap production costs. However, smoked fish vendors, particularly in the Kei Islands, are very reliant on the supply of raw materials from local fishermen. So, the seller of smoked fish in the area needs to have good resilience in terms of navigating around the uncertainty of supply of fish from local fishermen. The goal of this study was to find out how different factors affect the performance of local fishermen in the Kei Islands. This research surveyed a total of 231 respondents, all of whom were fishermen in the Kei Islands, using a purposive sample approach. Path analysis using Smart PLS was the analytical technique employed. The findings indicated that cooperation among fishing-related parties, such as between fishermen, between fishermen and sellers, between fishermen and local suppliers, and financing access for fishermen to loans and other forms of finance had a significant effect on the performance of capture fisheries. This is in addition to the fact that selling price and marketing factors must be considered in order to maintain the catch's competitiveness. The competitiveness would have an effect on the performance of smoked fish sellers in this region.
Key Words: cooperation, financing, path analysis, resilience, smoked fish.

Introduction. In most parts of the coastal regions in Indonesia, portions of the local people can support themselves through fishing and inland fishing. Skipjack, mackerel, and anchovies are among the fish species that are found and collected in the small island region, as commonly found in small island regions around the world (Robertson 2001). One of the reasons why fishing communities dwell in coastal locations is because of large catches with low and inexpensive people's buying power. In addition, in Indonesia's coastal areas, notably the archipelago regions, the catch is not simply for household consumption. Fishing is also sold as fresh food and processed fish dishes, such as smoked fish (Wicaksana et al 2020). This processed fish is sold throughout the region at traditional markets and is distributed across the surrounding area. This scenario creates business opportunities for fishermen and coastal towns, thus boosting the local economy's multiplier impact. In order for this economic potential to be realized, local fishermen in coastal areas must be able to keep up a steady supply of fish.

In general, this region has an abudance potential in term of fishes resources which acount for more than half of the regions potential (Teniwut et al 2019b). Kei Island waters have both pelagic and demersal fish. Pelagic fish are a kind of fish that live in the water's top layers (Timisela et al 2017). The most distinguishing aspect of these species of fish is that they live in groups and that all of its behaviors, such as migrating, are always carried out in groups as well. The continental shelf, which is a very shallow water with generally flat and muddy bottoms, provides a fishing area for demersal fish resources. Other sections of Indonesia have relatively small demersal fishing zones. Demersal fishes are those that spend most of their lives on or near the bottom of the sea (Newman et al 2016). Generally speaking, pelagic fish are a kind of fish that live and

work at or on the surface of the water (Saraux et al 2019). Some of the fish species found in abundance in the seas of the Kei Islands are as follows: *Caesio xanthonota*, *Decapterus macrosoma*, *Euthynnus affinis*, and *Lethrinus lentjan*. Along with the species of fish, other species such as *Auxis rochei* are sometimes collected in significant numbers (Hamid et al 2020). In general, this region has an abundance potential in terms of fish resources, which accounts for more than half of the region's potential (Teniwut et al 2019a).

Capture fisheries have a vital and crucial role in Indonesia, providing economic development, food, notably animal protein (Rizal et al 2018; Sanger et al 2019), and job opportunities and a welfare system for food supply and food secuiry (Béné & Tewfik 2001; Béné et al 2007). The importance of the fishing industry in various nations has increased dramatically, in China for instance, fishing has contributed significantly on the economic and social impacts (Huang & He 2019). According to Fauzi & Anna (2002), fisheries are one of the country's most valuable assets if properly managed. In 2016, marine capture fisheries contributed 46.38% of total global fisheries output. Marine capture fisheries output fell from 81.25 million tons in 2015 to 79.28 million tons in 2016 (FAO 2018).

Fishing capacity would expand in conjunction with the growing demand for fish as a source of protein (Eales & Wessells 1999). The fishing industry may enhance its fishing efforts in order to maximize profit. Small groups of pelagic fish that live in coastal regions are reasonably easy to approach using different kinds of fishing gear (Utne 2008). Increased fishing production is accomplished through technical efficiency improvements such as changing tool dimensions, increasing fishing effort, and utilizing fishing technology. Fishing capacity is also connected to fishermen's effort allocation, namely the process of selecting fishing sites based on the kind of fish to be caught, the day of operation, or the frequency of fishing operations (Bastardie et al 2010). These activities have an effect on the fishing region, specifically on the target's availability for fishing.

The catch largely determines the welfare of fishermen. The number of catches is also reflected in the amount of money earned by fishermen, the majority of which is used for family expenses. Thus, the extent to which a family's consumption needs are satisfied is essentially determined by its income, as a result of their low productivity, high production costs, low skill levels, and inefficiency of catches compared to expenditures spent, as well as insufficient integration of capture fishing firms in the region. Fisheries is a crucial sector for economic growth. Adrianto (2005) argues that fisheries play a vital role in supplying food, employment opportunities, recreation, commerce, and economic well-being not only for the community around the resource environment but also for a particular place or community. Teniwut et al (2019a) also say that if community spending went up, fishermen would have more money to buy things.

The common perception of traditional fishermen is that they are destitute people with low food quality and consumption, limited savings and investments, and a low standard of living. According to Olaoye et al (2012), traditional fishing practices involve hunting, gathering, and catching fish. One main feature of the low family income of fishermen is that their fishing company generates a low profit from the catch. Consequently, the quantity of food and non-food consumed differs between traditional fishermen, notably those who fish from outboard motor boats and those who fish from non-motorized boats. Then, these factors affect the changes in production and earnings in the fishing industry, as well as changes in household income and spending.

Several studies indicate that small-scale fishing is always related to traditional techniques, subsistence products, and poverty (Sharma 2011). According to Sharma (2011), the decline of small-scale capture fisheries may be related to a lack of technological and social development in the industry. Conflict will also result if the management of small-scale catch fisheries is not improved, preventing them from keeping up with the rate of economic development, population growth, food shortages, poverty, etc. According to Kittinger (2013), the traditional lifestyles and livelihoods of coastal communities and cultures are in jeopardy due to the lack of competitiveness of small-scale fisheries in the face of local and global threats, social vulnerabilities, and pressures related to job security, food security, welfare, and traditional lifestyles. In

contrast, small-scale fishing contributes to the supply of food, the generation of revenue, and the alleviation of poverty (Barnes-Mauthe et al 2013).

The revenue of fishermen, especially traditional fishermen, differs from that of other types of businesses, such as traders and farmers. From a revenue prediction point of view, fishing SMEs (small-medium enterprises) are uncertain, speculative, and fluctuating, while traders and farmers can predict their monthly revenues. Compared to fishermen, other farmers are able to earn a more diversified income from non-agricultural endeavors than fishermen (Riptanti 2005). As a permanent part of family income, the frequency of a fishing and a famine season affects the spending and consumption of fishermen's families on both food and non-food products, as well as fishing essentials. Acquah & Abunyuwah (2011) argue that fishing is a cultural, economic, and labor contribution to coastal communities.

Due to the complexity of the factors affecting the competitiveness and performance of capture fishermen in operating their businesses, as well as the consistency of the catch, it is imperative that all relevant parties pay special attention simultaneously and comprehensively, thereby significantly enhancing the welfare of fishing fishermen, especially in the Kei Islands. The objective of this research was to examine the impact of various variables on the performance and competitiveness of Kei Island local fishermen. This is essential to sustain not just the competitiveness of fishing but also the competitiveness and consistency of the Kei Islands' smoked fish business, which is mostly dependent on local fishermen for supply.

Material and Method

Conceptual framework. Numerous aspects must come together to achieve the required performance for fishermen and domestic capture fisheries output, both for local consumption and as a source of raw materials for small smoked fish enterprises in the Kei Islands. Cooperation between fishermen and smoked fish businesses is also important as a motivator for fishermen's fishing operations, as it benefits both the selling of catches in local markets and the fishermen's management competence (Rahantoknam et al 2017; Hamid et al 2020). The psychology of capture fisherman must also be examining in its relation with the performance of fishermen and fishing production, since it has an effect on their capacity to manage their money and businesses. The government's intervention is also critical, since capture fishermen's microenterprises are very susceptible, particularly in terms of management and access to funding (Hamid et al 2017; Pentury 2021). Thus, a better knowledge of the contribution and significance of these aspects would aid in the improvement and maintenance of capture fishermen's performance in carrying out production operations (Figure 1).

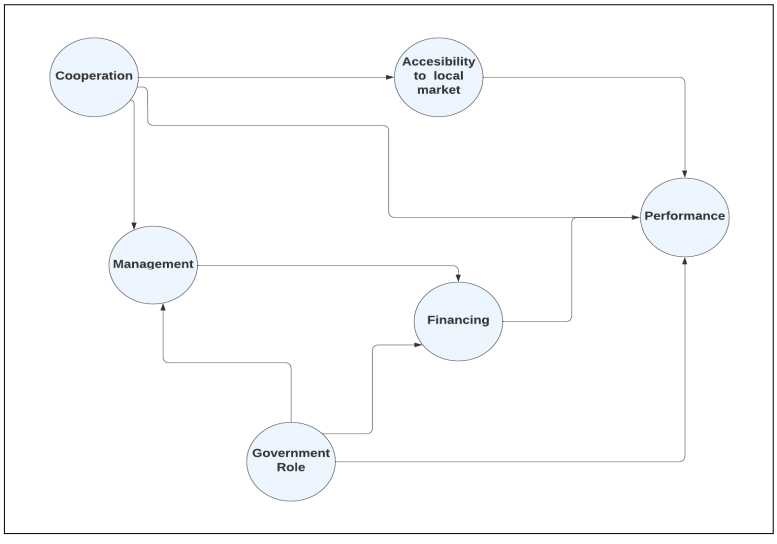

Figure 1. Conceptual framework.

Study location. Southeast Maluku is particularly rich in marine resources, both fish and non-fish, having a total coastline length of 632.15 kilometers. The issue that persists is a habit of communal behavior that is often detrimental in its application. It is vital to manage and repair the marine and aquatic environments in line with the findings of marine potential research. Apart from the chances, potentials, and difficulties mentioned above, Southeast Maluku is also very exposed to economic, commercial, and transportation concerns, where local communities in the region still uphold the local wisdom in conducting their daily activities, including fishing (Betaubun et al 2019). This region is an archipelago with a total of 68 islands. The territorial waters of the region are protected from waves by the island of Ubur. The Kei Islands are also close to the Arafura exclusive economic zone, which is known for the shrimp and bottom-dwelling fish that can be caught there (Figure 2).

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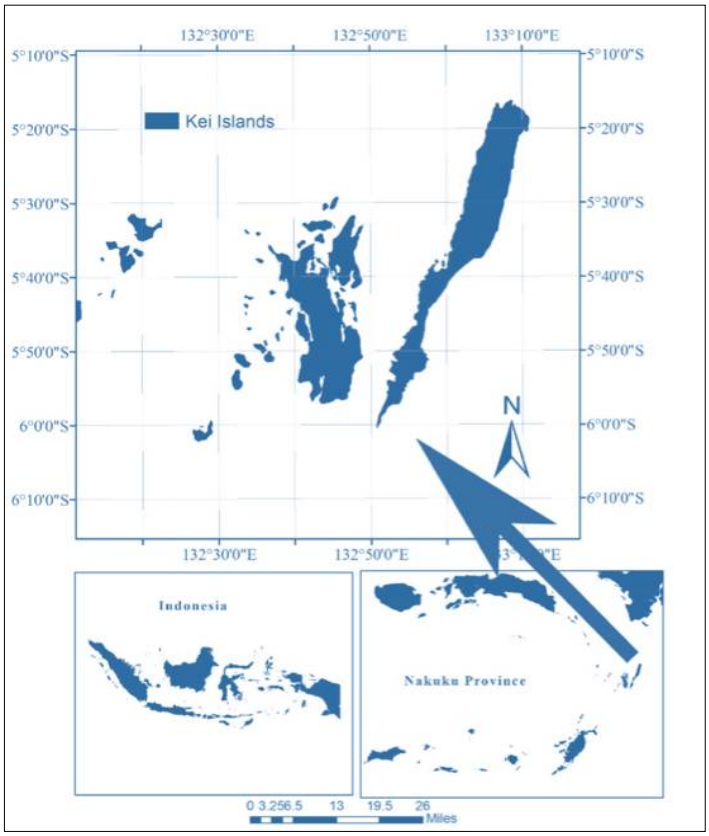

Figure 2. The study location (Sources: authors processing with ArcGIS).

Data collection and analysis. As advised by Hair et al (2010), the ratio of observations to independent variables should not be less than a fifth; nevertheless, the ratio of ten for each independent variable should be ten to one. As a result, the minimum number of respondents for each of the 18 variables in this study was 180 respondents. A purposive sample strategy was used in this survey, which resulted in 231 responses. The majority of those who answered the survey were frequent fishers. A standardized questionnaire was used to collect data for the study, which took place between November 2021 and April 2022. Because of this, self-administered questionnaires with researcher assistance were used to increase response rates; nonetheless, only 231 of the 300 questionnaires were chosen for data analysis. The questionnaire for this study was individually customized and changed by each member of the research team to meet field conditions.

When utilizing a component-centered approach, partial least squares (PLS), which is a regression-based modeling technique, expresses directed dependence between a collection of variables in a component-centered way, rather than using a regression-based method (Hair et al 2012). In addition to its advantages, may be used to confirm causal relationships that have already been established, and it is especially valuable for

research and the development of theoretical models (Ringle et al 2005). To analyze the data, we employed the PLS approach using the Smart PLS M2 Version 2.0 software, and then we used the findings to draw conclusions. In this research, the bootstrap method was utilized to determine the level of significance for the load, weight, and route coefficients (Gil-Garcia 2008).

Results. Table 1 shows the demographics of the respondents in this survey, which revealed that 67.66 percent of them were male and that the majority of them were between the ages of 30 and 50 years old. Furthermore, the respondents' highest degree of education in this survey was high school, with as many as 41.01 percent having no formal education and as much as 32.05 percent having no formal education. The majority of respondents (63.06 percent) are self-employed, with the highest monthly income being less than 1 million IDR in 54.1 percent of the instances. Furthermore, more than 60% of those who answered the survey had more than four family members, which includes their wife.

Table 1

Respondents' characteristics

Variable	*Frequency*	*Percentage*
Sex		
Male	154	67.67
Female	77	33.33
Age		
< 20	3	1.03
20-30	31	13.04
30-40	66	28.06
40-50	86	37.02
> 50	41	17.07
Education		
No education and elementary	75	32.05
Junior high	45	19.05
High school	95	41.01
College	13	5.06
Job		
Entrepreneur	147	63.06
Civil servant	2	0.9
Retired	4	1.07
*Income**		
< IDR. 1.000.000	177	76.06
IDR. 1,000,000- IDR. 2,000,000	26	11.03
> IDR. 3,000,000 – IDR. 4,000,000	14	06.01
> IDR. 4,000,000 – IDR. 5,000,000	5	02.02
> IDR. 5,000,000	1	0.4
Family members		
< 2	5	02.02
2-3	71	30.07
4-5	70	30.03
> 5	76	32.90

We choose composite reliability larger than 0.7 (Gefen et al 2000) and the average variance extracted greater than 0.5 (Fornell & Larcker 1981) as criteria for assessing the fit model in this investigation. The fit model's outcomes in this study are shown in Table 2. As a result, it can be determined that the model in this research is appropriate for analysis since all of the constructs have values more than 0.7 and less than 0.5. For each construct, we assessed the constructs in terms of discriminant validity, and it seems that each construct has correlated correlations smaller than the average variance retrieved by indicators assessing that construct, which indicates appropriate discriminant validity (Table 3).

Table 2

Measurement model

Construct	*Items*	*Loadings*	*CR*	*AVE*
Cooperation	Coop3	0.773	0.758	0.674
	Coop4	0.770		
	Coop5	0.912		
Financing	Fin1	0.853	0.812	0.723
	Fin2	0.811		
	Fin3	0.884		
Management	Man1	0.885	0.824	0.738
	Man2	0.827		
	Man3	0.865		
Performance	Perf1	0.732	0.729	0.650
	Perf3	0.865		
	Perf4	0.817		
Government role	Gov1	0.836	0.863	0.785
	Gov2	0.922		
	Gov3	0.898		
Accessibility to market	Acc4	0.856	0.729	0.649
	Acc5	0.801		
	Acc6	0.757		

Table 3

Discriminant validity of constructs

	Accessibility to sell	*Cooperation*	*Financing fshermen*	*Government role*	*Management*	*Performance*
Accessibility to sell	0.805					
Cooperation	0.159	0.821				
Financing fishermen	0.155	-0.127	0.850			
Government role	0.314	0.541	-0.179	0.886		
Management	0.374	0.385	-0.135	0.713	0.859	
Performance	0.452	-0.105	0.342	-0.027	-0.033	0.806

Table 4 and Figure 3 show the findings of hypothesis testing in this research, with R squared values of 0.315 for performance. Result also shows the indirect association between the factors that we used to support our findings. This table shows that financing and cooperation play important roles on the performance of fishermen in the region.

Table 4

Path coefficients specific indirect relationship of model

Specific indirect effects	*Coefficient*	*t statistics*	*P values*
Accessibility to sell - > Performance	0.482	6.903	0.000***
Cooperation - > Accessibility to sell	0.159	2.125	0.034***
Cooperation - > Management	-0.001	0.019	0.985
Cooperation - > Performance	-0.109	1.428	0.154
Financing fishermen - > Performance	0.239	3.234	0.001***
Government Role - > Financing fishermen	-0.169	1.453	0.147
Government role - > Management	0.714	12.851	0.000***
Government role - > Performance	0.045	0.386	0.700
Management - > Financing fishermen	-0.014	0.128	0.898
Management - > Performance	-0.171	1.580	0.115

Note: *p < 0.05; ** p < 0.01.

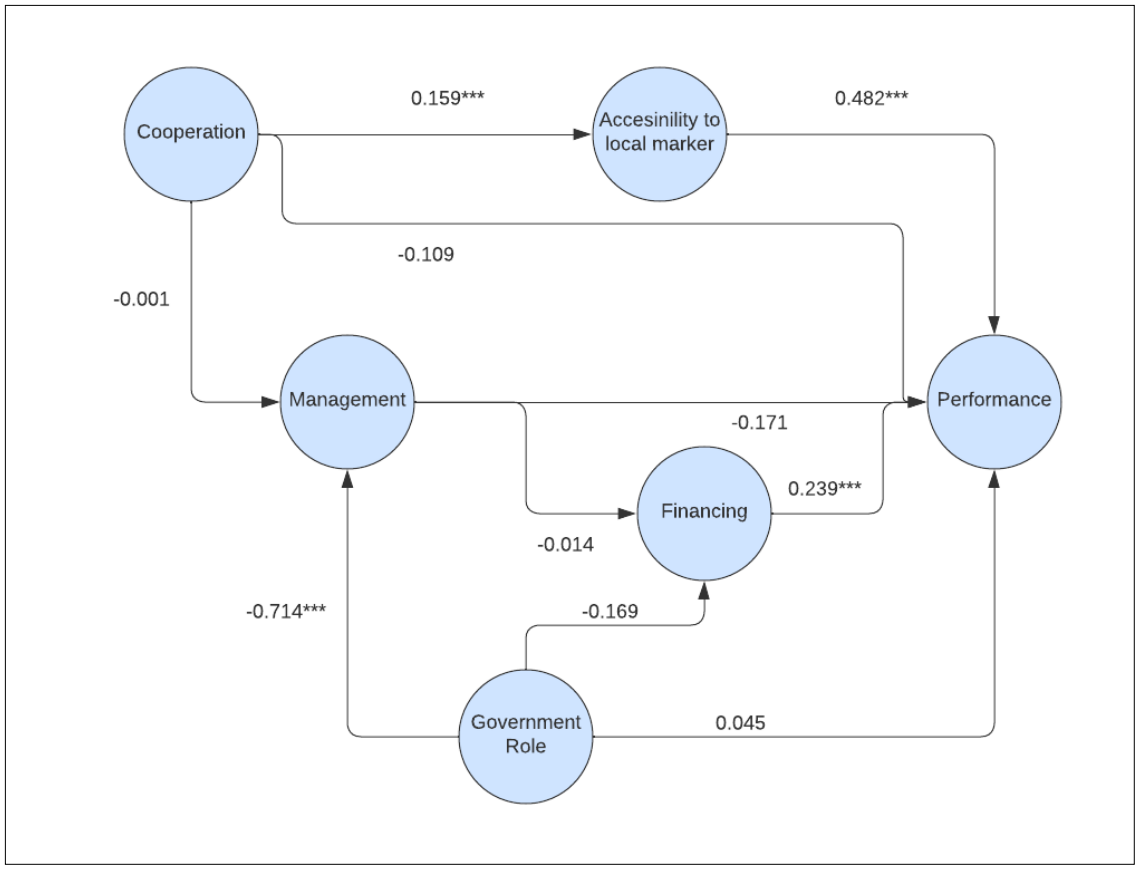

Figure 3. Path model of fishermen performance.

Discussion. The fishing community has distinct life characteristics because the pattern of life is shaped by life in the ocean, which has never been encountered by other communities. The fishing community faces significant risk, particularly risk posed by natural factors, necessitating the use of a unique strategy (Islam et al 2014; Adelekan & Fregene 2015). Apart from the natural factors, the fishermen's facilities are very limited, making it difficult to get fish catches. This situation reduces fishermen's prosperity, and hence the state of fishermen's wellbeing is dependent on coastal circumstances. The difficulty of improving the welfare of traditional fishermen is influenced by a number of factors, including a scarcity of high-quality human resources; a scarcity of business capital and information about fishing technology; difficulties in diversifying the fishing business; and a marketing system for fishery products that favors intermediary traders (Colburn et al 2016).

The abundant fishery potential in this area can only be realized by fishing communities, which are the primary source of national income in the fish catch sector. However, the existing potential is not being managed properly, as fishing communities are still synonymous with poverty for a variety of reasons, including the capital owned by fishermen, the technology used by fishermen is still traditional, market access is difficult, and community participation in management is limited (Rhoumah 2016). Along with economic problems, there are also social ones. For example, the population is growing quickly, people don't get enough education, their health is bad, and fishing villages don't have the tools they need to grow (Carruth et al 2010).

Additionally, the financial industry is concerned about the potential for default, given the unpredictable nature of fishermen's revenue (Ogboi & Unuafe 2013). Because the income obtained from fishermen falls short of expectations, finance is required to address the primary issues presently confronting the industry. There are several funding opportunities, but the majority of them need conditions and methods that fishing villages cannot meet (Gizaw et al 2015). To improve fishermen's economic prospects, assistance is required in expanding community access to economic institutions; optimizing community institutions within all government programs; integrating informal institutions

with formal institutions; and activating existing fishing cooperatives to establish new cooperatives with professional management human resources. In terms of the growth of traditional fishing, the banking sector's rules and regulations have mostly allowed this. According to Article 12 of the Banking Law, commercial banks may be designated to develop certain economic sectors or to provide additional attention to cooperatives and economically disadvantaged entrepreneurs or small businesses in order to raise the quality of life for a large number of people.

To date, traditional fishermen have lacked appropriate access to financing. The shipping and processing sectors continue to get the majority of the credit for the marine industry (Mensah & Antwi 2002). According to Bank of Indonesia, there are two reasons why banks are less interested in funding the catch fishing industry. Credit supply to the capture fishing industry is seen as a high-risk activity by financial institutions. As a consequence, financing for the capture fishing industry now requires collateral equal to the loan's economic worth. Additionally, financial institutions report that the collateral requirements imposed by banks are difficult for fishermen to meet. It's understandable that banks lack confidence in fishing villages' ability to repay loans. There is a negative image among fishing areas that fishermen often have bad intentions when it comes to repaying loan payments (Muda et al 2018). Additionally, another negative reputation associated with fishing towns is that of impoverished people who like to spend money. Additionally, the capture fishing industry is a high-risk venture. The success of this activity is contingent upon external elements, such as weather conditions. Fish, on the other hand, is categorized as a perishable item.

Berkes et al (2001) identified the following characteristics of artisanal fishermen: small-scale fishing units, owned by fishermen or their families or communities; work full- or part-time; small boats with an internal motor or an outboard motor assembled by fishermen, or generally not motorized; fishing gear is primarily manual; low to medium-value investments and entirely owned by fishermen; moderate to low catch, generally very low; catch is consumed by family or friends, bartered, or sold in the local market; income ranges from low to moderate; Economic integration is informal or non-existent; data collection on fisheries is challenging. With these distinct unfavourable characteristics, it makes it necessary for fishermen to have strong bonds of cooperation. Fishermen can gather and create communities in order to have better leverage for either financing or to increase their revenue by having a competitive price for the commodities on the market.

The fishing community needs broad access to fishing facilities and infrastructure. Additionally, it is important to connect and maintain many subsystems within the fisheries system, including those connected to the socioeconomic community (humanistic), natural and aquatic ecological subsystems, and system management (Charles 2008). Changes inside and outside the subsystem, such as changes in the structure of water utilization rights, damage to coastal and marine resources, and other regulatory approach could stop small-scale fishermen from having uncertain productivities and eventually can have a big impact on improving supporting subsystem.

Conclusions. The findings indicate that cooperation and financial access have a significant effect on the performance of captured fisheries, in addition to the fact that selling price and marketing factors must be considered in order to maintain the catch's competitiveness, which has an effect on the performance of smoked fish sellers in this region. The fishing community as a whole has a very complex pattern of interaction, as evidenced by cooperative relationships in carrying out activities, joint contact between fishermen and with other communities, and they have clear goals in carrying out their business, which are carried out according to a permanent system consistent with the fishing community's culture. The importance of community empowerment activities via groups stems from the fact that a group may more effectively reflect its members' approval, rejection, or other reactions to policies or the execution of a development program. By cooperating, the fishing community can have more access to the banking system for financing. As fishing is a capital-intensive industry, substantial amounts are required for the acquisition of boats, boat engines, nets, and fishing operation

expenditures. The more company capital is spent, the better the technology that can be deployed, increasing the likelihood that the fishing business will grow. However, capital supply through conventional financial institutions such as banks remains very low.

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Conflict of interest. The authors declare that there is no conflict of interest.

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