

# Performance of indigenous institutions in purse seine fisheries management at Sawang Ba'u Fish Landing Base, South Aceh District, Indonesia

Nurmala, Muhammad Rizal, Teuku Amarullah, Giovanni Oktavinanda

Fisheries Study Program, Fisheries and Marine Sciences Faculty, Teuku Umar University, Aceh, Indonesia. Corresponding author: M. Rizal, rizalmuhammadfpikutu@gmail.com

**Abstracts.** Purse seine fishing gear is a dominant fishing gear with a big impact on the preservation of fish resources in the territorial sea of Sawang Ba'u sub-district, Indonesia. The purse seine fishing unit generates high productivity, so that fishermen use it to obtain more profits in the area. The aim of this study was to determine the performance of managing purse seine fishers at the Sawang Ba'u fish landing base. The aspects being studied were institutions, technology, and policy in Sawang Ba'u Fish Landing Base South Aceh District. The data analyses were carried out to determine the importance and performance of the studied aspects. The results showed that indicators of institutional, technological, and policy aspects were scattered in all quadrants, whereas indicators considered important by purse seine fishermen were included in quadrant A. The average value of the existing institutional aspects was 1.44 with the expected value of 2.78. Next, the technological aspect was 1.2 with the expected value of 2.86, and the value of existing policy aspects was 1.25 with the expected value of 2.93. Among the three aspects, there were several indicators that must be considered in policy aspects, namely the planning process, evaluation and monitoring of joint work, purse seines management institution, bookkeeping for activities, duties and functions of customary institutions, participation of Panglima laot in preventing transigent at sea, and regular meetings of purse seine fishermen. Furthermore, indicators of technological aspects were technology in catch handling, catch processing, technology for determining zones of purse seine fishing, technology for determining fishing grounds, and technology for purse seine equipment. The policy aspect indicators covered regulations in managing purse seine by Panglima laot, zoning regulations for fishing areas, purse seine SOP regulations, and the synergy between indigenous institutions, the Marine and Fisheries Ministry, and purse seine fishermen.

**Key Words:** development, purse seine, Sawang Ba'u fish landing base, sustainable.

**Introduction.** South Aceh is one of the regencies of Aceh Province, Indonesia, located along the coastline of the Indian Ocean. Some of the fish landing sites are built by the government and some others are built independently by the local community. Capture fisheries activities in South Aceh are supported by the existence of a Fish Landing Base, namely Sawang Ba'u Fish Landing Base, and has supported the operational activities. The sustainable potential generated from catch production in Sawang reaches 11879.02 tons per year. The Fish Landing Base in Sawang Ba'u, South Aceh, is one of the fishing ports in South Aceh regency categorized as type D (Fish Landing Base). The facilities at Sawang Ba'u Fish Landing Base are deficient and not in accordance with the needs of the community and the increasing number of the fishing boats (Yanis 2018).

The purse seine fishing gear is predominantly used and has a big impact on the sustainability of fish resources. Purse seine generates high productivity in the area, and accordingly, fishermen try to catch as much fish as possible for a bigger profit. Referring to this fact, the management of purse seine fishery activities needs to be carried out in this area, aiming to optimize the utilization of fish resource potential, to increase the income of fishermen and to maintain the sustainability of fish resources in the area (South Aceh Marine and Fishery Department 2016). The management of purse seine fishery activities is closely related to the role of the local Panglima laot institution. Panglima laot is an indigenous institution for fishermen with the power to regulate issues related to fishing activities (Adli et al 2006). In this study, the researchers are interested in examining the way this institution manages the purse seine fishery sector at Sawang Ba'U Fish Landing

Base, in terms of institutions, technology, policies, fishing gear, fishing boards, fishermen and others.

## Material and Method

**Time and place.** This research was conducted at the start of 2020, at Sawang Ba'u Fish Landing Base, South Aceh, Indonesia. This is one of the regencies in the Aceh Province, directly adjacent to the Indian Ocean (Figure 1).

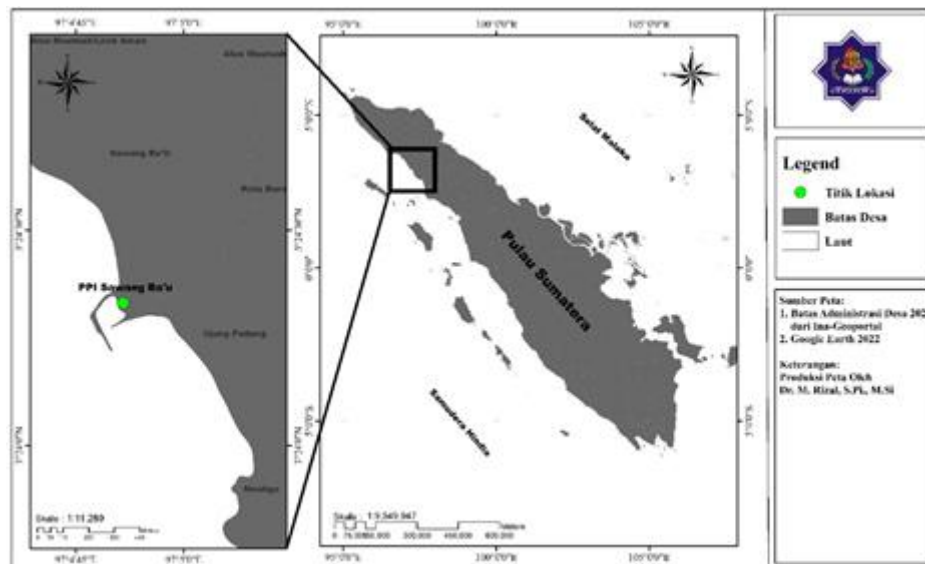


Figure 1. Sawang Ba'u Fish Landing Base, South Aceh, Indonesia.

**Data collection.** The data were collected by employing purposive sampling. This research used a 90% reliability level and a 10% inaccuracy leeway level. According to Sugiyono (2008), rounding up is done based on the sample size table and the error limit for the 10% level of research allowance. Thus, a number of 24 respondents was reached. The survey method was adopted based on the consideration that all respondents have the same fishing business pattern, using the purse seine fishing gear.

**Data analysis.** The data on management performance of the indigenous institution in purse seine fisheries were processed adopting the Importance and Performance Analysis (IPA) method. They were processed in Excel 2019 and represented in a matrix image. Furthermore, the data were analysed using the gap analysis. According to Rizal (2017), regarding the development of fishermen perception's measurement toward the existing performance value and the level of importance value, the determination score of performance and importance level to assess the gap used a 4-level scale, namely: very good (score 0.1-1), good (1.1-2), poor (2.1-3) and very poor (3.1-4).

Table 1  
Performance intervals of the indigenous institution of purse seine fishermen in Sawang Ba'u

Score	Performance appraisal criteria
0.1-1.0	Good
1.1-2.0	Fairly good
2.1-3.0	Poor
3.1-4.0	Very poor

Note: adapted from Rizal (2017).

To obtain information about the performance level of the purse seine fisheries indigenous institution, measurement of the current level of importance and existing performance conditions were carried out. Dinah et al (2012) explained that the score of the existing performance and importance level of each informant for all factors uses the following formula:

$$XI = \frac{XI}{n}$$

$$YI = \frac{YI}{n}$$

Where: XI - average score of performance level indicators; YI - average score of the importance level indicator; N - number of respondents.

The Cartesian diagram is a matrix divided into four parts bounded by two lines intersected perpendicularly in points X and Y (Ramadhani et al 2014) (Table 2). The Cartesian diagram was created to locate the attributes according to the level of importance and existing performance based on the calculation value of importance index and the existing performance index of the Panglima laot purse seine fishermen (Table 3).

Table 2

High priority and maintained achievement of purse seine fishermen in Sawang Ba'u

High importance	High Priority A	Maintained Achievement B
Low importance	Low Priority C	Exaggerated D

Note: Rangkuti (2008).

Table 3

Aspects and attributes of the performance of purse seine fishermen indigenous institution in Sawang Ba'u

<i>Aspect</i>	<i>Criteria</i>	<i>Description</i>
Institution	19	Forms of activities in managing purse seine, consensus decision-making techniques, establish a proper schedule for fishing.
Technology	10	Effectiveness of target catch species, assistive technology regarding purse seines; the technology used in handling catches.
Policy	13	Purse seine fishing zoning regulations, prohibition of using chemicals, purse seine operation, operational standard regulations.

## Results and Discussion

**Panglima laot.** The activity of Panglima laot in Sawang Ba'u sub-district is represented by the existence of sea party activities that happen every year or depending on the agreement with fishermen, and attended by Panglima laot, of village apparatus, fishermen, and the surrounding community. Until now, fishermen have been obedient to the standing laot customary law. Disputes and violations of laot customary law have rarely occurred in Sawang Ba'u District. Panglima laot has been helpful in matters regarding catch and disputes among fishermen. Panglima laot can maintain the customary law, so that violations and disputes between fishermen can be solved properly.

**Institutional aspects.** Table 4 presents the results of the assessment regarding the existing performance and importance level. The gap value (GAP) was 1.34. On the institutional aspect, the performance gap value of Panglima laot fisherman with purse seine at Sawang Ba'U Fish Landing Base was categorized in the fairly good category.

Table 4

Assessment indicators of Sawang Ba'U purse seine fisheries institution in 2020

No	Indicators	Existing condition	Importance value	Gap
1	Form of activities in managing purse seine fishing	1.20	3.00	1.80
2	Consensus decision-making techniques	1.80	2.40	0.60
3	Establish a proper schedule for fishing	1.80	2.50	0.70
4	Panglima laot institutional structure	1.90	3.20	1.30
5	The goal of increasing the income of fishermen	1.70	2.40	0.70
6	Joint work evaluation planning and monitoring	1.00	3.20	2.20
7	Good communication between fishermen and indigenous institutions	1.50	2.50	1.00
8	Purse seine management institution	1.00	3.20	2.20
9	Quick steps for resolving purse seine fishermen conflicts	2.00	3.20	1.20
10	Maintain a continuous catch	2.00	3.50	1.50
11	Maintain harmony among fishermen	1.70	2.20	0.50
12	Perform complete bookkeeping	1.20	3.00	1.80
13	Carry out duties and functions as an indigenous institution	1.20	3.50	2.30
14	Concern in preserving the environment	1.00	2.00	1.00
15	Facilitating assistance to fishermen from Marine and Science Department/Government	2.00	3.00	1.00
16	The participation of Panglima Laout in preventing transigent at sea	1.10	3.00	1.90
17	Regular meetings between fishermen	1.00	3.00	2.00
18	Helping fishermen solve problems	1.00	2.00	1.00
19	Developing the quality of life of purse seine fishermen	1.20	2.00	0.80
Total		27.30	52.80	25.00
Average		1.44	2.78	1.34

The indicators contained in the institutional aspect are spread out in all quadrants, as presented in Figure 2.

**Technological aspects.** The expected value of fishermen was within the average value of 2.86, while the existing value at the moment was 1.20. Therefore, the gap value is 1.66. The existing performance assessment and the level of importance of the technological aspects can be seen in Table 5.

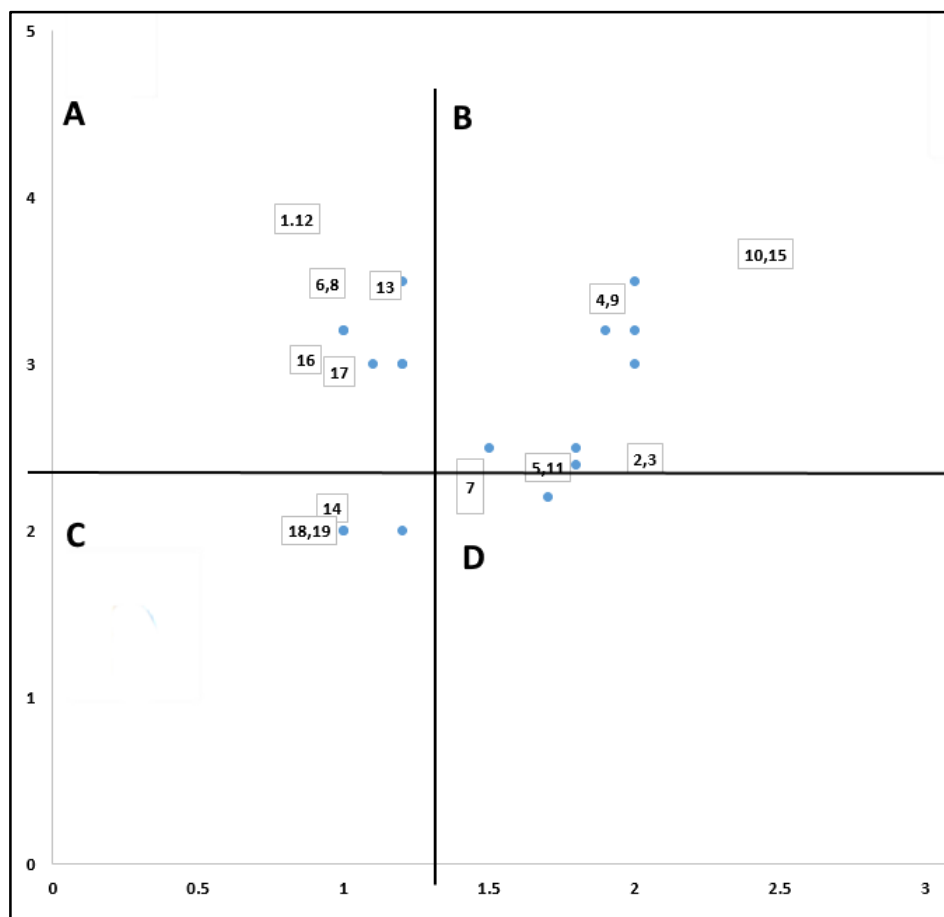


Figure 2. Cartesian diagram of purse seine fishermen institutional aspects at Sawang Ba'u Fish Landing Base in 2020.

Table 5  
Assessment indicators on the technological aspects of Sawang Ba'U purse seine fisheries in 2020

No	Indicators	Existing condition	Importance value	Gap
1	The effectiveness of targeting fish	1.30	2.90	1.60
2	Assistive technology on purse seine ships	1.40	2.90	1.50
3	Catch handling technology	1.00	2.70	1.70
4	Catch processing	1.10	3.20	2.10
5	Purse seine capture zoning technology	1.20	3.10	1.90
6	Technology in determining fishing grounds	1.00	2.70	1.70
7	Purse seine trawl assisting technology	1.30	2.70	1.40
8	Technology using purse seine tools	1.00	3.40	2.40
9	Fishing gear operation methods	1.20	2.30	1.10
10	Mesh size modification	1.50	2.70	1.20
	Total	12.00	28.60	16.60
	Average	1.20	2.86	1.66

Furthermore, to determine the placement of indicators in each quadrant on the technological aspects, a Cartesian diagram was used, and the boundary location of two

lines that intersect perpendicularly (X, Y) was determined. The X-axis center line was with an average value of 1.20, as the existing value at Sawang Ba'u Fish Landing Base, and the Y-axis, with an average value expected by purse seine fishermen, was 2.85. Each indicator spread across three quadrants, namely A, B, and D (Figure 3). Quadrant C had no indicator.

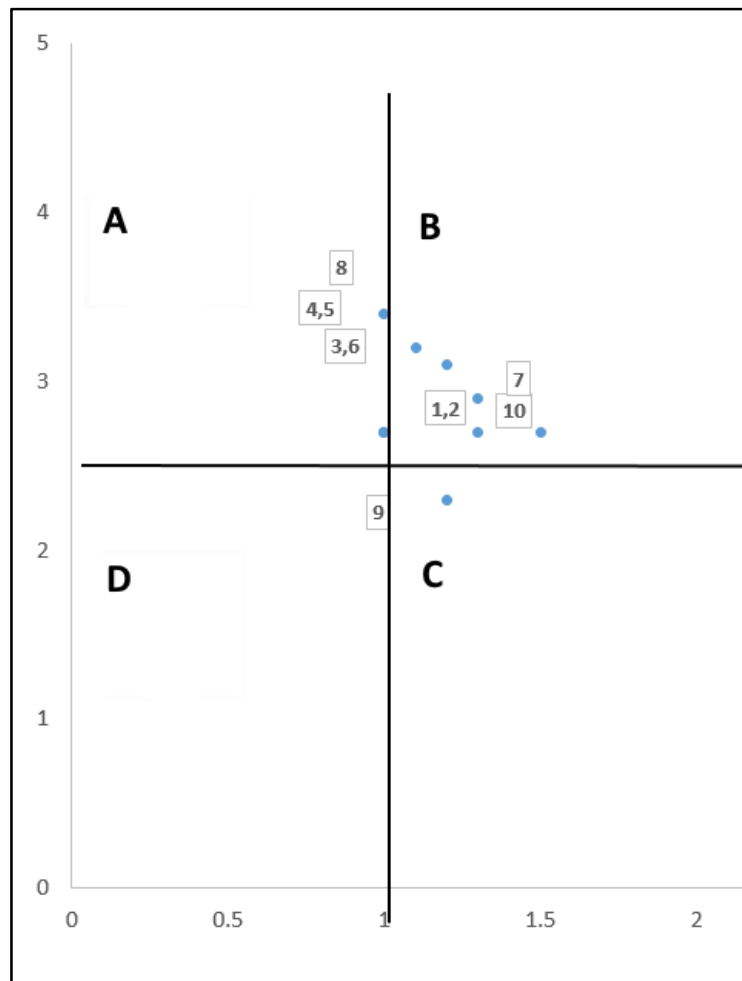


Figure 3. Cartesian diagram of the technological aspects of purse seine fishermen at Sawang Ba'u Fish Landing Base in 2020.

**Policy aspect.** Based on the assessment of the 13 indicators of policy, the expected value for policy aspects of Panglima laot is 2.93. The obtained value of the existing conditions in Sawang Ba'U Fish Landing Base towards Panglima laot's performance was 1.25, so the gap value between the present and the expected value of fishermen was 1.68, meaning that Panglima laot's performance on the policy aspect had entered the fairly good category. More details regarding the assessment of Panglima laot's performance can be seen in Table 6.

X and Y axes had the average values of 1.25 and 2.93, respectively. The indicators contained in the policy attribute were spread in each quadrant. The placement of policy aspect indicators in each quadrant can be seen in Figure 4.

Attribute conditions based on gap analysis for the performance of Panglima laot purse seine in Sawang Ba'U Fish Landing Base, South Aceh, covering institutional, technological and policy aspects had the values of 1.34, 1.66, and 1.69, respectively, being included in the "fairly good" category. There was conformity between the existing performance value and the expected importance level value by purse seine fishermen, with the implementation of the performance activities of 19 attributes in the institutional aspect, 10 attributes in the technological aspect, and 13 attributes in the policy aspect. This condition boosted the activities of purse seine fishermen to a very good level.

Table 6

Assessment indicators of policy aspects of Sawang Ba'u purse seine fisheries in 2020

No	Indicators	Existing condition	Importance value	Gap
1	Procedures for becoming a member of an indigenous institution	1.30	2.70	1.40
2	Prohibition of using chemical substances	1.20	2.50	1.30
3	Regulations for managing purse seine by Panglima laot	1.30	3.70	2.40
4	Fishing regulations (religious holidays, etc.)	1.30	2.50	1.20
5	Mesh size usage regulation	1.40	3.00	1.60
6	Capture area zoning regulations	1.20	3.50	2.30
7	Standard operation rules of purse seine operation	1.50	3.40	1.90
8	Synergy implementation of indigenous institutions, Marine and Fisheries Ministry, and purse seine fishermen	1.00	3.70	2.70
9	policy on the use of ice bars	1.30	2.70	1.40
10	Rules of sanctions for fishermen	1.30	3.10	1.80
11	Interdictions to catch fish or protected marine biota	1.00	2.00	1.00
12	Determination of sanctions for fishermen	1.10	2.30	1.20
13	Participation in enforcing sea customary law	1.30	3.00	1.70
Total		16.20	38.10	21.90
Average		1.25	2.93	1.68

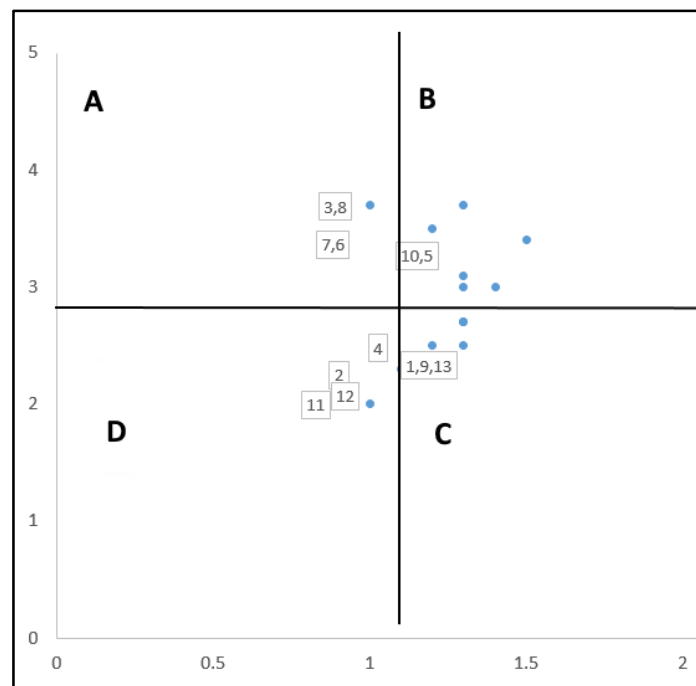


Figure 4. Cartesian diagram of the policy aspects of purse seine fishermen at Sawang Ba'u Fish Landing Base in 2020.

### **Order of quadrants based on institutional, technological, and policy aspects**

*Quadrant A (top priority).* The performance of institutional and policy aspects of Panglima laot purse seine fishermen at Sawang Ba'u Fish Landing Base spread in every quadrant. The technological aspects did not. The results showed that the indicators of institutional aspects included in quadrant A are form of activities in managing purse seine (1); planning, evaluating, and monitoring of joint work (6); purse seine management institution (8); carrying out bookkeeping for each complete activity (12); carrying out duties and functions as an indigenous institution (13); Panglima laot's participation in preventing transigent at sea (16) and routine meetings among purse seine fishermen (17). With such a large number of activities, having information about the process of catching, landing the catch, etc., were not enough for Panglima laot. Therefore, fishermen hoped that there would be a special institution to manage the purse seine specifically. Bookkeeping, for catches and others, needs to be implemented in a fish landing base. With complete bookkeeping, it would be easier to know and access the results obtained during the landing of catches at the base.

With the synergy among Panglima laot, Marine and Fisheries Ministry, and purse seine fishermen, it would be easier to achieve goals such as technology indicators in quadrant A, as well as relationships or cooperation that would benefit every involved party. Each attribute located in quadrant A, either institutional, technology, or policy attributes, represents a main task to be implemented by Panglima laot and other organizational members. Therefore, these indicators need to be prioritized by carrying out continuous improvement activities involving Panglima laot, Marine and Fisheries Department and purse seine fishermen.

*Quadrant B (Maintained achievements).* From the results of interviews, Panglima laot also helped fishermen in getting assistance from the Marine and Science Department. The indicators of the institutional aspect were referring to the performance of Panglima laot and fishermen, with the hope that indicators included in quadrant B can be maintained and further improved. Furthermore, the technological indicators included in this quadrant are the effectiveness of targeting fish (1); assistive technology on purse seine ship (2); trawl aided purse seine technology (7); and modification of mesh size (10). The technological indicators included in this quadrant not disputed by fishermen were the effectiveness of targeting fish, assistive equipment technology, and mesh size of purse seines. Modification of mesh sizes has already existed at Sawang Ba'U Fish Landing Base. Fishermen assumed that with more mesh sizes used, the catch will automatically increase.

*Quadrant C (low priority).* Indicators located in quadrant C had a low actual performance level and were considered less important by purse seine fishermen at Sawang Ba'u Fish Landing Base, South Aceh. Therefore, purse seine fishermen do not consider that these attributes need to be prioritized or improved. Institutional indicators located in this quadrant were: decision-making techniques by deliberation (2); establishing a proper schedule for sailing (3); have the same goal in increasing fishermen income (5); good communication between purse seine fishermen and indigenous institutions (7); and maintaining harmony between fishermen (11). All institutional indicators included in quadrant C are implemented by Panglima laot, but do not need to be prioritized. There were no technological indicators located in quadrant C. The policy indicators contained in quadrant C are regulations on procedures for becoming members of indigenous institutions (1); policy on bar ice usage (9); and participation in enforcing sea customary law (13).

*Quadrant D (excessive).* Institutional indicators located in quadrant D were considered satisfactory in their performance, but were excessive. Institutional indicators included the nature of concern in preserving the environment (14); assisting fishermen in solving problems (18); and developing the quality of life of purse seine fishing communities (19).

**Conclusions.** The performance of Panglima laot in Sawang Ba'u Fish Landing Base is seen from the institutional aspect, with a gap value of 1.34, categorized as a fairly good, as well



as from the technological aspect, with the value of 1.66, also in the fairly good category. The policy aspect has an average gap value of 1.52 with a fairly good performance. Based on the assessment of the three aspects, although the average value is in the fairly good category, there is still a need to improve the performance of Panglima laot, to achieve a higher expected level of purse seine fishermen performance in Sawang Ba'u, South Aceh, for the institutional, technological and policy aspects.

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

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Authors:

Nurmala, Faculty of Fisheries and Marine Science, Teuku Umar University, Jl. Alue Peunyareng, 23615 Aceh Barat, Indonesia, e-mail: humaira199978@gmail.com

Muhammad Rizal, Faculty of Fisheries and Marine Sciences, Teuku Umar University, Jl. Alue Peunyareng, 23615 Aceh Barat, Indonesia, e-mail: rizalmuhammadfpikutu@gmail.com

Teuku Amarullah, Faculty of Fisheries and Marine Sciences, Teuku Umar University, Jl. Alue Peunyareng, 23615 Aceh Barat, Indonesia, e-mail: t.amarullah@gmail.com

Giovanni Oktavinanda, Faculty of Fisheries and Marine Sciences, Teuku Umar University, Jl. Alue Peunyareng, 23615 Aceh Barat, Indonesia, e-mail: g.oktavinanda@gmail.com

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