Performance level evaluation of the Poumako Fishing Port, Central Papua of Indonesia

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Abstract. This study assesses the performance of Poumako Fishing Port in Central Papua, Indonesia, emphasizing the significance of port facilities in enhancing the logistics system for the fisheries processing industry. Key challenges facing Indonesian fishing ports include inadequate infrastructure and a lack of integration, which hinder overall efficiency. In response, the government has established guidelines aimed at improving port performance and fostering stakeholder collaboration for sustainable fisheries management. Using a qualitative approach, this research involved interviews with various port stakeholders and an evaluation of performance based on established criteria. The findings indicate an overall performance score of 66.40%, categorizing the port's performance as "good". However, areas requiring substantial improvement were identified, particularly in administration, information systems, and investment in processing facilities. Recommendations for enhancing port performance include upgrading infrastructure, enhancing human resource capabilities, and attracting private investment. The results highlight the critical need for effective governance and policy alignment among stakeholders to optimize the operational efficiency of fishing ports and stimulate the growth of the fishing industry in the region.
Key Words: port evaluation, port facilities, port management, success level.

Introduction. Fishing port management has faced a fast changing sea and land-borne volume of trade, accompanied by significant structural changes in fishing fleet operations, fish handling and transport, and has had to cope with rising industrialization of initially traditional fish processing processes (Scheffczyk 2010). In the same context, seaports are even affected by a wide range of economic, technological and geopolitical situation (Notteboom & Neyens 2017).

Various research results have shown that the condition of fishing port facilities and governance is positively correlated with port performance and user satisfaction. Common challenges hindering the effectiveness of fishing ports in Indonesia include substandard port facilities and infrastructure, as well as a lack of integration among fishing ports. Good facilities can improve port performance (Al-Bayyinah et al 2016) and is needed to increase fishermen welfare. Therefore, governments need to participate in developing fishing ports by providing and improving port facilities (Fatoni et al 2021).

Several factors have an important influence on the performance of fishing ports. Studies at several fishing ports in Indonesia, such as the Palabuhanratu - Sukabumi, Kejawanan - Cirebon, Karangantu - Banten, and Pengambengan - Bali fishing ports show that internal factors such as the availability of human resources for port managers, budget support, port services and productivity, conditions of fishermen, fish processors and fish traders, have a significant influence on supporting the performance of fishing ports (Suherman et al 2020a, b, c, d). In the case of the Paotere Fishing Port, although the operational performance of the port has been very good, limited land is an obstacle in upgrading the port class to improve services to the community (Fada et al 2021).

The involvement of all stakeholders is needed in the preparation and implementation of sustainable fisheries management policies (Zulbainarni et al 2020). However, improving

the performance of fishing ports is often hampered by differences in interests in fisheries management. Therefore, joint management (co-management) between various stakeholders from the Central Government, Provincial Government, and District Government is needed in fisheries development (Muawanah et al 2018). Port authorities need to improve communication with various local stakeholders to improve the quality of services to the community (Putri et al 2020).

The government of Indonesia has intervened through the construction of supporting facilities and improvement of human resources to improve the management of fishing ports according to Indonesian national standards. The support provided by fishery port facilities is crucial for ensuring a steady supply of high-quality raw materials to meet the demands of the fish processing industry. The government continues to encourage improvements in the performance of fisheries ports, including by establishing policies in development and management by issuing the Decree of the Director General of Capture Fisheries Number 20 of 2015 concerning Guidelines for Evaluation of Fishing Port Performance (DGCF 2015).

Poumako Fishing Port in Mimika Regency, Central Papua Province, is one of the feeder ports in Fisheries Management Area (FMA) 718, where fishing areas include Aru Bay, the Arafura Sea, and the eastern part of the Timor Sea. This port also has unique attribute as a considerable small port but it became a nexus of various interests. Firstly, Poumako fishing port is located in southern Papua that is relatively far as stopover port of origin for fishing vessel heading to Java island, meaning that fish transportation from this area to consumer areas takes a relatively long time. Secondly, government has designated them as special port in the national integrated fisheries centers program as well as one of port in National Fish Logistics System corridor (Utomo et al 2024a, b).

For this reason, this research aims to evaluate the performance level of the Poumako Fishing Port and providing recommendation to be implemented accordingly.

Material and Method. This research is a qualitative research with descriptive methods. It was conducted from April to August 2023 at Poumako Fishing Port. Data collection was carried out through interviews with port stakeholders using a questionnaire, namely port masters, fisheries supervisors, port administration officers, fish quarantine officers, fisheries service officers, and fishing business actors (fishermen, traders, boat owners). Fishing port performance was evaluated by assessing the standard parameters of fishing ports as stated in the Directorate General of Capture Fisheries of Indonesia (DGCF) decree of 2015. Performance parameters consisted of administration and information systems, port facilities, public services, and investment and industry. Each category was assessed based on several indicators (Table 1).

Table 1

Parameters and performance indicators of fishing ports

No.	*Parameters and indicators*	*Maximum success value*
A	*Administration and information systems*	
1	Use of fishing port application	4
2	Use of e-logbooks	2
3	Use of online sailing approval letter	2
4	Use of fish catch application	2
5	Use of the fish unloading inspection application	2
6	Use of capture fisheries data application	2
7	Use of government spending	4
8	Port revenue	4
9	Availability of competent port managers	4
	Amount A	26
B	*Port facilities utilization*	
1	Harbor pool capacity	4
2	Pier length	4
3	Pool depth	4
4	Repair facilities (docking, repair shop)	2

5	Fish marketing and distribution facilities	2
6	Availability of port areas to be developed	4
	Amount B	20
C	*Public services*	
1	Mooring service	5
2	Fisheries production monitoring	5
3	Ship visits monitoring	5
4	Ship arrival report	5
5	Technical port guidelines dissemination	4
6	Port support of fish quality, quarantine, and fish surveillance	4
7	Port environmental, health and safety guidelines	4
8	Clean water facilities	4
9	Ice plant	4
10	Fuel storage	5
	Amount C	45
D	*Investment and industry*	
1	Fish processing unit	3
2	Port areas availibity	3
3	Employment	3
	Amount D	9
	Total value	100

Source: DGCF (2015).

Each performance parameter was assessed based on the weight and scale of its constituent indicators to obtain an assessment score which is the success value. The answers from all informants were averaged to obtain a success value score, which was then divided by 4 (four) based on the Benchmark Criteria, namely: Administration and information systems, Utilization of port facilities, Public services, and Investment and industry. The results of the Poumako Fishing Port performance evaluation are determined using the following formula:

$$Succes = \frac{\text{Weight x Sacle}}{4}$$

The success value score will determine the performance level of a fishing port shown in Table 2.

Table 2

Performance level of fishing ports

No.	*Performance level*	*Success value score (%)*
1.	Very good	86-100
2.	Good	66-85
3.	Medium	46-65
4.	Not enough	0-45

Result and Discussion

Poumako Fishing Port facilities. Poumako Fishing Port has been included in the criteria for a Coastal Fishing Port by the Decree of the Minister of Maritime Affairs and Fisheries Number 109 of 2021 concerning the National Fishing Port Master Plan (MMAF 2021). These criteria are supported by indicators that the operational range of ships carrying out loading and unloading at the Poumako Fishing Port has reached the exclusive economic zone with a minimum ship size of 10 GT, a minimum dock length of 100 m, a port pool depth of minus 2 m, a minimum ship capacity of 30 units (total 300 GT), port land area of at least 5 ha, there are loading and unloading activities, preparation of supplies for sea, processing industry, marketing, and investment. Apart from that, port operations are also supported by relatively available management human resources (Table 3).

Table 3

Poumako Fishing Port facilities

No.	*Facility*	*Capacity*
	A. Principal facilities	
1.	Plaster	150 m
2.	Dock	85 x 12 m
3.	Jetty	100 x 10 m
4.	Harbor pool	Depth 10 m, lowest tide 2 m, capacity ±50 ships
5.	Shipping lanes	-
6.	Complex roads and drainage	512 x 6 m
7.	Harbor land	49.6 ha
	B. Functional facilities	
1.	Fish marketing place	24 x 18 m
2.	Shipping navigation and communications	Not yet available
3.	Clean water	150 ton water storage tank
4.	Fuel station	Not yet available
5.	Block ice factory	Capacity 150 ton day^{-1}
6.	Electrical installation	300 KVA
7.	Dock/slipway, workshop, net repair area	Not yet available
8.	Place for handling and processing fishery products	2 cold storage units with a capacity of 200 tons
9.	Office	3 units belonging to the fisheries supervisor, fish marketing place, and harbor master's office
10.	Refrigerated car	2 units
11.	Wastewater treatment plant, temporary disposal place	Not yet available
12.	Harbor fence	Not yet built
	C. Supporting facilities	
1.	Fishermen's meeting hall	Not yet available
2.	Operator's mess	Not yet available
3.	Fisherman's guesthouse	Not yet available
4.	Worship facilities	1 unit
5.	Toilet	1 unit

Source: Results of interviews with stakeholders.

The Poumako Fishing Port was built in 2016 by the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia. This development includes a pier, fish auction site, port office, and all functional facilities that support port operations, including fishing equipment, cold storage, and an ice factory. The Central Papua Provincial Government functions to operate the Poumako Fishing Port to support the development of the capture fisheries industry. Meanwhile, the Mimika Regency Government is preparing port land, establishing the "Mama-Mama Papua Iwaro" Fish Market in the port area, and operating a fish marketing site. A number of problems are still being faced by the Poumako Fishing Port as a feeder port that need attention. Problems with basic facilities are related to shallowing of the port pool and use of port land. Shallowing around the river mouth causes the capacity of the docks and port pools to be unable to accommodate ships mooring. Therefore, efforts to dredge the harbor pool periodically are needed.

The land for developing the Poumako Fishing Port is still quite large because its utilization is only around 20%. However, the construction of port facilities is constrained because there is no agreement regarding land use between the Central Papua Provincial Government and the Mimika Regency Government. The Mimika Regency Government still owns the port land, but the Central Papua Provincial Government controls the port administration. The expansion of the Poumako Fishing Port requires careful land use planning. Effective collaboration among diverse parties is crucial for the management of port land (Susman et al 2021). It will also attract investors in business in the port area (Wahyuni et al 2020).

The functional facilities that need to be repaired are office locations because the port area often experiences tidal floods, which submerge the offices of the Harbor Master and Fisheries Supervisor. Fuel stations also need to be built to make it easier for fishermen to obtain diesel fuel in the port area. It is also necessary to build a dock/slipway, workshop, net repair area, and harbor fence. Increasing port facilities will improve port performance (Wicaksono et al 2019). Increasing comfort for fishermen by building adequate supporting facilities for fishing operations is one strategy for improving the class of fishing ports (Suyoga et al 2021). Port supporting facilities such as a fishermen's hall, operator's housing, and shops also need to be built to support port performance.

Poumako Fishing Harbor performance. The results of the performance evaluation of the Poumako Fishing Port are shown in Table 4. The results of the performance evaluation of the administration and information system parameters shown in Table 4 have achieved a Success Value score of 14.49 out of a total score of 26 or 55.73% or in the medium category.

Table 4

Performance evaluation of Poumako Fishing Port

No.	*Parameters and indicators*	*MSV*	*Real value*	
			Score	*%*
A	*Administration and information systems*			
1	Use of fishing port information center application	4	1.27	31.82
2	Use of e-logbooks	2	2.00	100.00
3	Use of online sailing approval letter	2	2.00	100.00
4	Use of certificate of fish catch application	2	0.67	33.33
5	Use of the fish unloading inspection application	2	1.10	55.00
6	Use of capture fisheries statistics data collection application	2	0.80	40.00
7	Realization of budget absorption	4	1.83	45.83
8	Port revenue	4	2.00	50.00
9	Availability of human resources for port managers	4	2.82	70.45
	Amount A	26	14.49	55.73
B	*Port facilities*			
1	Harbor pool capacity	4	3.45	86.36
2	Pier length	4	4.00	100.00
3	Pool depth	4	3.91	97.73
4	Repair facilities (docking, repair shop)	2	0.64	31.82
5	Complete fish marketing and distribution facilities	2	1.23	61.36
6	Availability of port land	4	4.00	100.00
	Amount B	20	17.23	86.14
C	*Public services*			
1	Mooring service	5	5.00	100.00
2	Fisheries production	5	4.77	95.45
3	Frequency of ship visits	5	4.77	95.45
4	Proof of Ship Arrival Report	5	3.93	78.57
5	Socialization and technical guidance	4	1.60	40.00
6	Facilitate education, supervision and control of fish resources	4	2.20	55.00
7	Implementation of security, cleanliness, beauty, safety and port order	4	2.36	59.09
8	Clean water distribution	4	2.36	59.09
9	Ice distribution	4	1.91	47.73
10	Fuel distribution	5	2.50	50.00
	Amount C	45	31.41	69.80
D	*Investment and industry*			
1	Fishery product processing services	3	1.43	47.73
2	Port land use	3	1.09	36.36
3	Employment	3	0.75	25.00
	Amount D	9	3.27	36.36
	Total value	100	66.40	66.40

Source: Results of interviews with stakeholders (processed data); MSV = maximum succes value.

To enhance administrative performance and information systems, improvements are needed in the use of the Management Information System (MIS) application, budget absorption, and port revenue management. Effective use of this system requires reliable internet connectivity and skilled operators. However, the internet network around Poumako Coastal Fishery Port is currently insufficient, hindering the operation of the MIS. Therefore, expanding the internet network in the port's administration office and providing training for MIS operators are essential. While related to the issue of budget absorption not being maximized due to the ongoing construction of port facilities, specifically the guardrails, this section will be able to optimize budget absorption once the project is completed. The funds for the port area guardrail project are sourced from the Central Papua Province Marine and Fisheries Service.

The performance parameters of port facilities and public services are already good at 86.14% (very good category) and 69.80% (good category), respectively. However, there is still potential to increase port revenues if the performance of both parameters is improved. Poumako Fishing Port's revenue is still limited to administration fees for Sailing Approval Letters, mooring services, and retribution fees for fish auction sites. Improving port facilities and public services, such as expanding docks, dredging port pools, ship repair facilities, and distributing clean water, ice, and diesel fuel for fishermen's needs, will be able to increase state income from the Poumako Fishing Port. The performance indicators can be increased because of the relatively high number of vessels anchored at the Poumako Fishing Port and the fishermen's production of captured fisheries.

Meanwhile, the industrial and investment performance indicators have an inadequate value, only reaching a value of 3.27 out of 9 or only 36.36%. The lack of fishery product processing facilities and the difficulty of attracting investment due to land ownership status issues resulted in low labor absorption for the development of the fishing industry in the Poumako Coastal Fishing Port area. There are only two units of cold storage operated at the port with a capacity of 200 tons and two units of refrigerated cars as a means of transporting fish from ships to fish handling and processing sites. The fishery product processing facilities are assisted by the Ministry of Maritime Affairs and Fisheries and rented by private parties. On port land, no private entity constructed any processing facilities for fisheries products, and this might negatively affect the Poumako Fishing Port's fishing business development.

Efforts to improve the performance of the Poumako Fishing Port. In general, the performance of Poumako Fishing Port based on DGCF (2015), is classified as "good" with a Performance Value score of 66.40 out of 100 or 66.40%. However, there are two performance parameters that need to be improved, namely (1) administration and information systems, and (2) investment and industry (Figure 1).

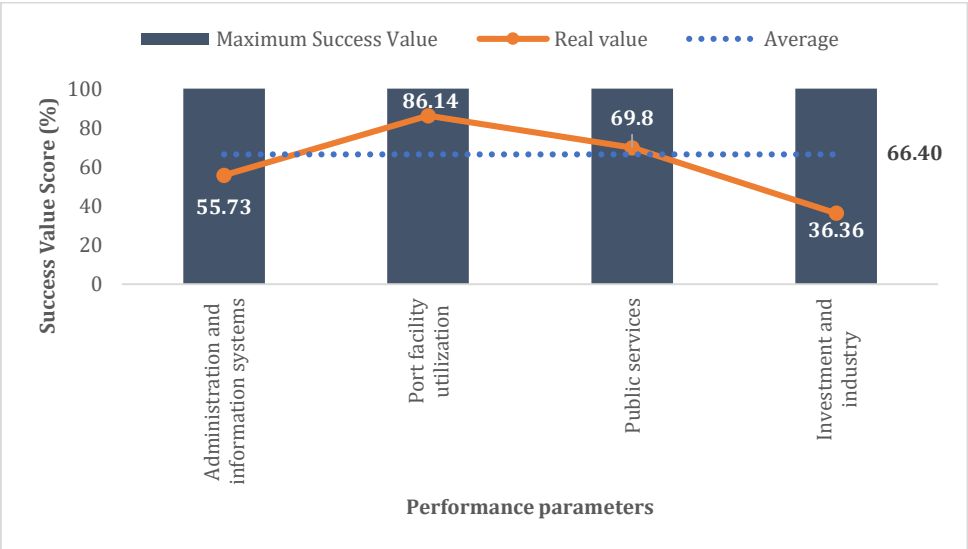

Figure 1. Comparison of performance parameters in Poumako Fishing Port.

Fishing ports should be able to encourage the improvement of the fishing industry, but this function is not yet optimal as seen in the Poumako Fishing Port as shown in Figure 1. In the Minister of Maritime Affairs and Fisheries Decree Number PER.08/MEN/2012 concerning Fishing Ports, it is stated that fishing ports have a function supporting fisheries business systems that facilitate mooring/anchoring of fishing vessels, loading/unloading of fish equipped with shipping safety facilities and infrastructure and fisheries supporting activities. Therefore, fishing ports are expected to play an important role in ensuring the availability of fish supplies because they are centers for collecting catches, places for fishery product transactions, providers of fish processing, storage and distribution facilities, and sources of data in sustainable capture fisheries management.

According to performance parameters as seen in Figure 1, Poumako Fishing Port has been running well but not at optimal level due to some problems. Hence, it is necessary implementing the following measures:

(1) Improving port infrastructure. The port facilities that need to be improved include extending the dock, dredging the harbor pool, fuel storage, clean water, ice factory, and cold storage. To improve port infrastructure, the government can gradually increase the budget for providing additional jetty, dredging harbor pools and providing clean water while investors can build fish processing units and provide container yards since one of the indexes of port operational performance is the container throughput handled annually (Nguyen & Woo 2021).

(2) Attracting private investment by utilizing areas that remain undeveloped. With the growing demand for integrated logistics services and intensifying port competition, a port should collaborate and cooperate with its supply chain partners for providing value-added services to port users (Han 2018). In the case of the Poumako Fishing Port, efforts to bring in investors are hampered by land status which connected to customary right status with local Papua people. It needs to be synchronized between the Central Papua Province and the Mimika Regency. Utilization of customary rights in Papua is often a complex issue because it involves various interests, including indigenous communities, the government and the private sector. Solutions for effective cooperation in utilizing customary rights in Papua require a holistic and participatory approach, taking into account legal, social, cultural and economic aspects. The following solutions can be implemented: increasing understanding and respect for indigenous rights through education and legal recognition, participatory dialogue and consultation, fair cooperation agreements, economic empowerment of indigenous communities, sustainable management, and conflict resolution mechanisms based on local wisdom.

(3) Providing competent operators. Competent fishing port operators are critical for the effective management and sustainability of fishing ports. Their expertise and efficiency directly influence the economic, environmental, and social outcomes of port operations. Below are the key reasons why their competence is essential such as (1) efficient operations management (streamlining processes in vessel berthing, unloading of catch, storage, and transportation as well as reducing turnaround time: minimize delays, optimizing the time fishing vessels spend in port), (2) compliance with regulations (fisheries management, health and safety standards, and environmental laws), economic performance (revenue generation, reducing costs), (3) fostering sustainability (waste management, resource conservation and energy efficiency).

(4) Enhancing the internet network. The Internet network plays a vital role in modernizing and improving operations in fishing ports. Its integration enhances efficiency, sustainability, and profitability while supporting the well-being of the fishing community. Newly updated tools, facilities and technologies are used or are going to be used in a specific context for operators, such as vessel traffic services and enhance safety and security (Alavi et al 2018) as well as the usage for fishing actors (market access, warehouse management system). Internet networks improvement can gain support by collaborating with the Ministry of Communications.

Indonesia has a vast network of fishing ports with significant potential but faces challenges in infrastructure modernization, governance, and sustainability compared to other ASEAN countries like Thailand and Vietnam. To improve, Indonesia can focus on: modernizing infrastructure at major and secondary ports, integrating technology to reduce

post-harvest losses, enhancing regional connectivity and export-oriented operations, strengthening environmental sustainability practices.

In terms of existing port infrastructure and capacity, Indonesia has one of the largest fishing port networks in ASEAN, with more than 600 fishing ports. Various port management in Indonesia are categorized as: Ocean Fishing Port (Pelabuhan Perikanan Samudra - PPS): industrial-scale ports that have complete facilities to support industrial-scale fishing activities; Archipelagic fishing ports (Pelabuhan Perikanan Nusantara - PPN): completeness of facilities at the level below PPS which is widely used for semi-industrial fisheries; Coastal Fishing Port (Pelabuan Perikanan Pantai - PPP): smaller scale, focused on local fisheries; Fish landing base (Pangkalan Pendaratan Ikan - PPI): basic facilities for small-scale fisheries. Having a large number and a very wide distribution of fishing port locations is a challenge that Indonesia must face; until now there are still many ports that do not have modern facilities such as cold storage, processing plants, and auction markets, especially ports in the PPP and PPI categories.

The Poumako Fishing Port is currently still included in the PPI category, but by looking at the development of fishery product traffic that occurs, this port deserves to be upgraded to the Archipelago Fishing Port (PPN). Increasing the category of Poumako Port from PPI to PPN is considered urgent to be able to facilitate fisheries business activities in this area, seeing the increase in ships loading and unloading, the increasing amount of capture fisheries production and the increasing number of service users who use Poumako Fishing Port facilities.

Conclusions. With a success value score of 66.40%, the Poumako Fishing Port's performance review belongs to the good category according to the Director General of Capture Fisheries' Decree Number 20 of 2015 concerning Guidelines for Port Performance evaluation. Two performance parameters, however, require improvement: the investment and industry, with a score of 36.36% (not enough), and the administration and information systems category, with a score of 55.73% (medium).

Based on these findings, enhancement is advised on Poumako Fishing Port's performance. By increasing port management's human resource capacity and providing internet facilities, administrative and information system performance will improve and enhance the performance of industry and investment by using the port land. This facility upgrade will affect around 11,730 fishermen consists of full-time and part-time fishermen working on 137 fishing vessels with size of > 30 GT and hundreds of local fishing boats that landed their catch in Poumako Fishing Port.

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

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