



# Analysis of Human Resources Competitiveness of Capture Fisheries in Indonesia

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## Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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## ABSTRACT

Capture fisheries competitiveness may be used as a standard for regional development planning, mapping, and development. The goal of this study is to assess the competitiveness of capture fisheries in Indonesia's thirty-four provinces. The literature survey approach is used in this study. Ten respondents provided primary data in the form of expert judgment. From 2005 to 2018, secondary data in statistics data was collected from the Ministry of Marine Affairs and Fisheries Center. Quantitative descriptive analysis was used to analyze the data. According to the findings of this study, DKI Jakarta, Central Java, East Java, Maluku, South Sulawesi, North Sumatra, North Sulawesi, and Southeast Sulawesi are the eight provinces with the highest competitiveness. DKI Jakarta Province is ranked first in the country, with an overall score of 8.87. The indices of output and production value, and productivity are DKI Jakarta Province's advantages. Meanwhile, West Sulawesi, Banten, Central Kalimantan, South Sumatra, Bengkulu, Jambi, North Kalimantan, and DI Yogyakarta occupy eight provinces with poor competitiveness.

**Keywords:** Competitiveness; Capture Fisheries; Developments; Indonesia.

## 1. INTRODUCTION

Indonesia is the largest maritime country globally because it has a water area of 3.25 million km<sup>2</sup> [1]. Indonesia is split into 34 provinces, each with its own natural resources, including marine and fisheries. The capture fisheries sector is one of the possible marine and fisheries resources. Every year, Indonesia produces a very significant amount of capture fisheries, making capture fisheries the major engine of the national economy. Thus, the catch fisheries industry is vital to Indonesians' economic and social well-being. In Indonesia, it is projected that 3,326,900 people work as a fisherman, with 2,573,300 people working at sea and 753,600 workings in public waterways [2].

In 2018, Indonesian capture fisheries produced 6,696,336.16 tons in maritime waters. Maluku province produced the most, accounting for 9% of total output in Indonesia, followed by East Java and Central Java, which contributed 6.99 percent and 6.02 percent, respectively. DI Yogyakarta, which provided 0.07 percent of total production, was the province with the lowest contribution [3]. Small pelagic fish groups accounted for 36% of total capture fisheries production in Indonesian seas in 2015, while giant pelagic fish accounted for 25% [4]. Indonesian capture fisheries output contributes significantly to global capture fisheries production. According to FAO [5], Indonesia contributes a significant amount to global catch output, with 7% or approximately 6.5 million tons in 2016, which is one level below China's contribution of 19% or over 17.5 million tons.

One of the factors used to assess a country's performance and attainment of a better objective in terms of rising wealth and economic growth is its competitiveness. Competitiveness is the ability to produce better, quicker, or more significant outcomes [6]. Therefore, capture fisheries competitiveness may be utilized as a regional mapping, regional development, and regional planning indicator. Each province in Indonesia has benefits and drawbacks in the marine capture fisheries sector. Competitiveness is a good example of these benefits and drawbacks. It is believed that the benefits and drawbacks of each province may be utilized as a baseline for the growth of Indonesian capture fisheries, allowing for equitable development.

The economic competitiveness of a region as a whole reflects the economic competitiveness of

a country. According to the World Economic Forum (WEF) [7], a country's competitiveness requires long-term economic growth. Appropriate institutions, policies, and economic features all contribute to the achievement of long-term economic growth [8]. Human resource data such as facilities, facilities productivity value of capture fisheries activities, capture fishery production, capture fishery production value, and Fisheries Households and Fisheries Companies can show the potential and competitiveness of the capture fisheries sector in Indonesia. Fishery Homes are households that engage in all aspects of the fishing industry, including capturing, growing, and selling fish and other aquatic creatures, to profit from the sale either partially or entirely. According to Zubair and Yasin [9], a fisheries business is an economic unit having a legal entity that engages in all operations connected to catching, growing, and using other aquatic creatures to benefit from sales. Productivity is a broad term that refers to the ability to create many goods and services with limited resources [10].

Households in the Fisheries Industry/Capture Fisheries Companies and fishers are the two most important human resource measures. Households in the Fisheries Industry/Capture Fisheries Companies in Indonesia include powered boats ranging in size from 5 GT to 200 GT, boats with temple motors, boats without motors, and boats without a boat, depending on the scale of their company. The number of journeys is also included in the study's main indicator, which is the overall number of travels not separated by season. Fishermen must be able to engage as subjects, not only as objects, in the development of coastal areas [11]. The engagement of fisherman with capturing fisheries resources will determine the success of sustainable development. Involvement can be defined in this context as proportionate participation in an activity. The fishing community's engagement demonstrates a recognition of the necessity of having a feeling of responsibility for utilizing resources optimally and sustainably. Therefore, very important to research about analysis of human resources competitiveness of capture fisheries in Indonesia.

## 2. METHODOLOGY

From August 2020 to July 2021, research was conducted at the Ministry of Maritime Affairs and Fisheries to assess the development trend of

Indonesian catch fisheries. The development trend of Indonesian capture fisheries in 34 provinces was determined using a survey literature approach. In addition, secondary data is used, which is represented as numbers and evaluated using descriptive statistics. The Ministry of Marine Affairs and Fisheries in Jakarta provided statistical data for secondary data gathering procedures.

## 2.1 Data Analysis

The data was analyzed using quantitative descriptive analysis. The quantitative descriptive analysis in this study aims to determine the development trend of Indonesian capture fisheries.

1. Determine the most crucial metrics and variables, including human resources, facilities and infrastructure, output and value, and productivity. The project's next stage is to gather secondary data from statistics on Indonesian catch fisheries between 2006 and 2018.
2. Determine the relative significance of indicators, variables, and sub-variables by assigning priority weights to them.
3. Based on the original data, expert judgment is utilized to weigh the main indicators and variables. Ten experts were interviewed, including lecturers from the Department of Social Economic FPIK Padjadjaran University and the Department of Water Resources FPIK Padjadjaran University, as well as four representatives from the West Java Province's Marine Affairs and Fisheries Office, including the Head of Capture Fisheries, the Head of Section of Fish Resource Management, and the Director.
4. Depending on the findings of the expert judgment questionnaire, we determined the weight of each indicator, variable, and sub-variable.
5. Process data acquired during the study using secondary data, statistical data on capture fisheries in Indonesia in 2018 to evaluate the competitiveness profile of each province.
6. Calculate the scores and values of key indicators, variables, and sub-variables and a value based on weight and score using secondary data.

Score = (Data each Province)/(Total data of Indonesia) x 100

Value = Weights x Score

Productivity is calculated using information from the Ministry of Marine and Fisheries. The formula for estimating productivity for the key fisheries competitiveness:

- a. Productivity Production per Trip

$$Ppt = \frac{Pik}{Tik} \dots\dots\dots(1)$$

Information :

Ppt : Manufacturing productivity per trip (ton / trip)  
 P : Total Production (tonnes)  
 T : Total Trip (trip)  
 i : Province i (i = 1, ..., 34)  
 k : Period of time

- b. Productivity Production per Fishermen

$$Ppn = \frac{Pik}{Nik} \dots\dots\dots(2)$$

Information :

Ppn : Productivity per fisherman production (tons / person)  
 P : Total Production (tonnes)  
 N : The total number of fishermen (people)  
 i : Province i (i = 1, ..., 34)  
 k : Period of time

- c. Productivity Production Value per Trip

$$Pnpt = \frac{NPik}{Tik} \dots\dots\dots(3)$$

Information :

Pnpt : The productivity of the production value per trip (IDR / trip)  
 NP : Values Production (IDR)  
 T : Total Trip (trip)  
 i : Province i (i = 1, ..., 34)  
 k : Period of time

- d. Productivity Production Value per Fishermen

$$Pnpn = \frac{NPik}{Nik} \dots\dots\dots(3)$$

Information :

Pnpn: The productivity of the production value per fisherman (IDR / person)

NP: Values Production (IDR)

N: The total number of fishermen (people)

i: Province  $i$  ( $i = 1, \dots, 34$ )

k: Period of time

7. All Indonesian provinces have been cautioned about the competitiveness of their fisheries based on the value-weighted average.
8. Specifies criteria for the competitiveness of Indonesian fisheries across the province using quartiles. There are four quartiles for the criteria: Q1 is a very highly competitive environment, Q2 is a high-competitive environment, Q3 is a sufficiently competitive environment, and Q4 is a low, competitive environment.

### 3. RESULTS AND DISCUSSION

The study's findings are presented as competitiveness rankings amongst Indonesian provinces. This total competitiveness rating depicts a region's relative position concerning other areas, taking into consideration all of the factors it possesses and how far it can achieve the variables' potential. Each district's competitiveness rating may be broken down into categories depending on major human resource factors. The competitiveness of capture fisheries in 34 provinces may be determined using the quartile computation, which yields the values Q1, Q2, Q3, and Q4. Each province's value will indicate whether it has a high or low degree of competitiveness. Q1 is a very highly competitive environment, Q2 is a high-competitive environment, Q3 is a Sufficient -competitive environment, and Q4 is a low competitive environment. The value achieved is based on each province's major human resource indicators, yielding a final score that indicates the province's competitiveness rank and category. Table 1 shows the rating of provincial capture fisheries competitiveness in Indonesia.

With a total score of 8.871, DKI Jakarta Province is rated first in Indonesia for competitiveness. DKI Jakarta has quite high two primary indicators: production indicators and production value and productivity indicators. Ocean fishing port Nizam Zachman is an ocean fishing port operated by DKI Jakarta. According to Article 1 paragraph 2 of the Minister of Maritime Affairs and Fisheries Regulation No. 16 of 2006, a

fishing port is a place consisting of land and waters with defined boundaries that is used for government and fishery business system activities and is used for fishing boats to dock and unload fish. Fishery Ports are divided into 4, including Ocean Fishing Ports, Nusantara Fisheries Ports, Coastal Fishing Ports, and Fish Landing Bases [12]. The Nizam Zachman Ocean Fishing Port attracts trade from incoming land-based fish production, particularly in the region around Ocean fishing port Nizam Zachman, such as Lampung Province (average 3 million tons), East Java Province (average 7 million tons), and West Java Province (average 7 million tons) (average 7 million tons). 20 million tons on average) [13]. DKI Jakarta is ranked first in Indonesia for competitiveness as a result of this. Although DKI Jakarta is the most competitive city in Indonesia, the dissection of the rankings by key variables reveals the province's deficiencies in human resources, facilities, and infrastructure. Apart from DKI Jakarta, Central Java, East Java, Maluku, South Sulawesi, North Sumatra, North Sulawesi, and Southeast Sulawesi are still extremely competitive.

The final score of DI Yogyakarta Province, which was 0.511, placed the province in 34th place. The province of Yogyakarta has three indicators. Human resources, facilities, and infrastructure, and manufacturing and production value, are among the lowest-ranking sectors. It is because DI Yogyakarta has about 3,000 fishermen, most of them are small-scale fishermen who only goes out for one day, resulting in a catch that is less than the maximum. Furthermore, human resource capability at DI Yogyakarta is still considered insufficient, with many people still unable to handle huge ships. However, DI Yogyakarta Province does have marine waters with a lot of fish resources [14]. Therefore, it is important to implement development plans, especially in terms of optimizing human resources such as providing counseling and also improving facilities and infrastructure such as providing ship assistance, in order to realize the full potential of DI Yogyakarta [15].

With a rating of 2.67, North Sumatra Province is rated first in terms of human resource indices. North Sumatra Province has more fisheries households/fishing firms than other provinces, and outboard motors and motorboats are used by most fisheries households in North Sumatra

**Table 1. Ranked competitiveness province in indonesia**

Province	X1	X2	X3	X4	Final Score	Ranked	Category Competitiveness
DKI Jakarta	0.10	0.12	2.38	6.27	8.87	1	Very High
Central Jawa	0.37	0.42	2.58	3.64	7.01	2	
East Jawa	1.92	2.08	2.27	0.47	6.74	3	
Maluku	2.41	1.47	1.33	0.68	5.90	4	High
South Sulawesi	2.29	1.88	1.38	0.27	5.82	5	
North Sumatra	2.67	1.08	0.88	0.36	4.99	6	
North Sulawesi	1.18	0.78	1.85	0.74	4.55	7	
South East Sulawesi	1.68	1.34	0.69	0.23	3.95	8	
Aceh	0.94	0.68	1.25	1.04	3.93	9	
Central Sulawesi	1.14	1.95	0.34	0.12	3.55	10	
Papua	1.31	1.13	0.53	0.13	3.10	11	
West Nusa Tenggara	1.27	1.09	0.44	0.13	2.93	12	
West Jawa	0.44	0.58	1.12	0.73	2.86	13	
South Kalimantan	0.40	0.81	0.66	0.93	2.79	14	Sufficient
North Maluku	0.48	0.29	0.64	1.09	2.50	15	
East Kalimantan	0.68	0.70	0.62	0.43	2.43	16	
East Nusa Tenggara	1.00	0.77	0.38	0.19	2.34	17	
Bangka Belitung Islands	0.66	0.64	0.60	0.39	2.29	18	
West Kalimantan	0.42	1.09	0.35	0.31	2.17	19	
West Sumatra	0.48	0.64	0.64	0.37	2.14	20	
Riau Islands	0.82	0.89	0.27	0.14	2.13	21	
West Papua	0.41	0.62	0.47	0.42	1.92	22	
Bali	0.42	0.66	0.45	0.35	1.88	23	
Riau	0.47	0.51	0.30	0.24	1.53	24	Low
Lampung	0.37	0.49	0.31	0.34	1.52	25	
Gorontalo	0.29	0.36	0.30	0.46	1.41	26	
West Sulawesi	0.54	0.58	0.17	0.11	1.40	27	
Banten	0.35	0.37	0.28	0.28	1.27	28	
Central Kalimantan	0.22	0.23	0.22	0.54	1.22	29	
South Sumatra	0.13	0.13	0.23	0.69	1.18	30	
Bengkulu	0.33	0.09	0.16	0.58	1.15	31	
Jambi	0.11	0.35	0.16	0.41	1.03	32	
North Kalimantan	0.28	0.23	0.08	0.40	1.00	33	
DI Yogyakarta	0.07	0.03	0.05	0.36	0.51	34	

(Source: Data Processing)

Information:

X1 = Human Resources

X2 = Infrastructures Fishing

X3 = Production and Production Value of Capture Fisheries

X4 = Productivity

Province. Small-scale capture fisheries, with a proportion of small-scale fishing vessels smaller than 5 GT, are still prevalent in Indonesian capture fisheries. In 2004, 93 percent of small-scale fishing vessels were used, 92 percent in 2008, and 90 percent in 2012 [16]. This composition demonstrates that small-scale capture fisheries, which are the backbone of the Indonesian economy, continue to dominate Indonesian capture fisheries.

DI Yogyakarta Province has the lowest human resource indicator, ranking 34th, indicating that it is in the poor competitiveness group. In terms of

human resource indicators, DI Yogyakarta Province has a final value of 0.07. In DI Yogyakarta Province, Fishery Households/ Fisheries Companies (RTP/PP) use 960 outboard motor boats and 1357 without boats. Casual fishermen predominate in DI Yogyakarta Province, with the majority being migrant fishermen from Cilacap. Social elements in the sphere of marine and fisheries must be able to produce labor, offer commercial possibilities, and enhance community and government revenue [17].

With a score of 2.08, East Java Province is placed first in terms of amenities and

infrastructure. According to statistics from the Ministry of Maritime Affairs and Fisheries [1], outboard motor boats and motor boats dominate the fleet in East Java Province. It demonstrates that East Java Province's facilities and infrastructure can sustain catch fisheries activities. In addition, some provinces, including Central Sulawesi, South Sulawesi, Maluku, Southeast Sulawesi, Papua, West Kalimantan, and West Nusa Tenggara, have very high competitiveness in facilities and infrastructure indices. This demonstrates that the province's facilities and infrastructure have the ability to sustain catch fisheries activities in their respective regions.

DI Yogyakarta Province is the province with the lowest facilities and infrastructure indicators, ranking 34th with a final score of 0.03, indicating that the province has low competitiveness in terms of facilities and infrastructure indicators. DI Yogyakarta Province's fleet consists solely of outboard motor boats, with a total of just 479. In reality, DI Yogyakarta Province is one of the provinces that benefits from government-sponsored fishing vessels known as inkamina boats. On the other hand, fishers seldom utilize the Inkamina boat to conduct fishing operations because they are skeptical of the vessel's operating skills [18].

With a rating of 2.58, Central Java Province is rated first in terms of the key production and production value indices. It demonstrates that Central Java Province has the potential for production that supports capture fisheries activities. Central Java Province produced 403,028.07 tons of capture fisheries, according to statistics from the Ministry of Maritime Affairs and Fisheries [1]. The province of Central Java contributes 6% of Indonesia's total capture fisheries production. According to Farhan Hakim, a scholar and maritime observer, Central Java Province has a huge fishing potential geographically. It is proven by the interest of the Taiwan Business Club Indonesia in the potential of fisheries in Central Java which was submitted to the Indonesian Chamber of Commerce and Industry in Central Java [19].

DI Yogyakarta Province has the lowest production and production value indices, coming in 34th place with a final score of 0.05. According to the Ministry of Maritime Affairs and Fisheries [1], DI Yogyakarta Province produced 4896.96 tons of catch fisheries in 2018. DI Yogyakarta province contributes just 0.07

percent of Indonesia's total catch fisheries production. As a result, it's not unexpected that the DI Yogyakarta Province falls into the low-competitiveness group in production indices and value.

DKI Jakarta, Central Java, North Maluku, Aceh, South Kalimantan, North Sulawesi, West Java, South Sumatra, and Maluku are highly productive competitiveness. It demonstrates that these provinces have a high level of production to support capture fisheries. Meanwhile, Riau, Southeast Sulawesi, East Nusa Tenggara, Riau Islands, West Nusa Tenggara, Papua, Central Sulawesi, and West Sulawesi have the lowest rankings, indicating that these areas have a poor degree of productive competitiveness. According to Nugraha [20], low productivity in the capture fisheries is due to human resources with limited skills and expertise in the sector, resulting in low income and poverty among fishers.

#### 4. CONCLUSION

**As a result of the research, the following results were reached:** DKI Jakarta Province with a total score of 8.871, is a province with very high capture fisheries competitiveness. DKI Jakarta outperforms the provinces in Indonesia in terms of output and production value of capture fisheries, as well as productivity. However, DKI Jakarta's human resources, facilities, and infrastructure are its weaknesses. With a total score of 0.511, DI Yogyakarta Province is included in the category of very low capture fisheries competitiveness. Human resources, facilities and infrastructure, as well as the value of output and production are all in the lowest rank (34th) in DI Yogyakarta Province. The productivity index is only slightly better, ranking 21st overall. Thus, it is necessary to prioritize development to improve the competitiveness of fisheries, one of which is to increase human resources in provinces that are included in the category of low competitiveness by conducting training for fishermen, and also developing a work culture so as to produce quality human resources. Improving facilities and infrastructure in provinces that fall into the category of low competitiveness, such as providing ship assistance to increase the development of the fishery sector. As well as, conducting further research on policy analysis of capture fisheries competitiveness in all provinces in Indonesia by paying attention to its development.

## CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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