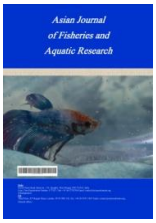

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Analysis of the Competitiveness of Ponds Aquaculture in West Java Province

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Authors' contributions

This work was carried out in collaboration between both authors. Author AAHS designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author DTN managed the analyses of the study and managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

The level of competitiveness is one of the parameters in the concept of sustainability. The fisheries sector has a strategic role in national development, one of which is aquaculture. Ponds aquaculture is the most widespread in the province of West Java. So that fishery production in West Java is mostly dominated by production from ponds and has the opportunity to be developed when viewed from the productivity achieved at this time which is already quite high. The purpose of this study is to analyze the competitiveness profile of ponds aquaculture in the regency/city of West Java Province. The study was conducted in November 2020 – June 2021. The method used was a literature survey to determine the competitiveness of aquaculture in ponds in West Java Province. The data obtained in the form of primary data and secondary data were analyzed descriptively. Primary data in the form of expert opinions. Secondary data is in the form of aquaculture statistical data in ponds with the main indicators, namely human resources, facilities, facilities and infrastructure, production, and Science and Technology with time series data from 2004 – 2019 Department of Marine and Fisheries of West Java Province. The results showed that the competitiveness profile of aquaculture in ponds in 2019 in West Java Province with the first rank of very high competitiveness was occupied by Ciamis Regency because it was superior in human

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resources, facilities and infrastructure, and production, the second rank of high competitiveness is occupied by Bogor Regency because it was superior in production, the third rank of high competitiveness is occupied by Indramayu Regency because it was superior in production and the application of science and technology.

Keywords: Competitiveness; West Java; aquaculture in ponds; profile.

1. INTRODUCTION

Economic development is essentially an effort to improve people's welfare. The implementation of economic development is based on a populist economic system and the development of leading sectors, especially those that absorb a lot of manpower, which is supported by increasing the capacity of human resources and technology to strengthen the foundation for sustainable development and increase competitiveness and be oriented towards economic globalization [1].

The level of competitiveness is one of the parameters in the concept of sustainability [2]. Competitiveness is one of the criteria to determine the success and achievement of a better goal by a country in increasing income and economic growth. Increased productivity can be caused by an increase in the number of physical inputs of capital and labor, an increase in the quality of the input used and an increase in technology [3]. In addition, there is a trend of decentralization which has led to a stronger need to determine competitiveness at the regional level [4].

Regional competitiveness is related to the ability of the region to utilize, develop, and optimize the potential of its natural resources and human resources to compete with other regions and regions. Regional competitiveness aims to encourage sustainable economic growth in accordance with superior potential and regional needs in order to meet people's welfare [5]. The higher the level of competitiveness of a regency/city, the higher the level of community welfare [2].

The fishery sector has a strategic role in national development, because it plays a role in absorbing labor and is a potential activity to utilize the results of fishery resources and can provide high added value for the national economy [6]. West Java is one of the areas with the highest fishery production after East Java. Coastal and ocean areas in West Java Province have abundant fisheries resources and commodities, so that West Java Province is one of the aquaculture sectors in Indonesia [7].

Ponds are the most widespread cultivation medium for freshwater fisheries in West Java Province. So that fishery production in West Java is mostly dominated by production from ponds and has the opportunity to be developed when viewed from the currently high productivity achieved [8].

The competitiveness of aquaculture in ponds can be used as a benchmark for the development and utilization of resources in creating economic opportunities to support sustainable aquaculture growth and mitigate impacts on ecosystems. with the main indicators, namely human resources, facilities, facilities and infrastructure, production, and Science and Technology. In addition, there are still not many studies conducted to determine the competitiveness of aquaculture in ponds in West Java Province. Therefore, it is necessary to conduct research on analyzing of the competitiveness of ponds aquaculture in West Java Province.

2. METODOLOGY

The research was carried out in November 2020 – June 2021 in Bandung City, West Java Province. This research activity began with the collection of secondary data from the Department of Marine Affairs and Fisheries of West Java Province. The primary data used is the opinion of experts or people who are competent in the field of aquaculture. Secondary data and primary data which have been obtained will then be analyzed by descriptive quantitative.

2.1 Types and Sources of Data

The data used in this research consists of primary data and secondary data. The primary data is in the form of a questionnaire as many as 20 expert judgments or people who are competent in the field of aquaculture consisting of nine lecturers from the Faculty of Fisheries and Marine Sciences, Padjadjaran University and 11 employees of the Department of Marine and Fisheries of West Java Province. Secondary data consists of seven types of data sourced from the

Department of Marine Affairs and Fisheries of West Java Province in the period 2004 to 2019.

2.2 Sampling Technique

The data collection method used in this research is literature survey. The data obtained and used in the form of primary data and secondary data which is realized in the form of numbers and analyzed using descriptive statistics. Secondary data in the form of data on the main indicators of competitiveness of aquaculture ponds in West Java Province which consists of human resources, facilities, facilities and infrastructure, production, as well as Science and Technology. This research uses time series data from 2004 to 2019.

2.3 Data analysis

Data analysis was performed using quantitative descriptive analysis. The quantitative descriptive analysis in this study was intended to obtain a profile of the competitiveness of ponds aquaculture in the Regency / City of West Java Province. The analytical tool used to profile the competitiveness of the aquaculture sector in ponds is using productivity and quartiles.

Analysis of Ponds cultivation competitiveness profiles in the regencies / cities of West Java Province through several stages, as follows:

1. Determine the main indicators and variables including human resources, facilities and infrastructure, production and production value, the application of science and technology for mini aquaculture fisheries, and productivity.
2. The stage of carrying out the research is taking data in the field of pond aquaculture in West Java Province from 2004 to 2019.
3. Identify priority weights or relative importance between indicators, variables, and sub-variables.
4. Taking primary data in the form of expert judgment which gives weight to the main indicators and variables. The experts who became respondents were 20 people consisting of nine lecturers of the Faculty of Fisheries and Marine Sciences, Padjadjaran University and 11 employees of the Department of Marine Affairs and Fisheries of West Java Province.
5. Calculate the weight of the results of the expert judgment of each indicator, variable and sub-variable.
6. Processing data that has been obtained during the study, using secondary data, namely fisheries statistics of West Java Province in 2019 to determine the competitiveness profile of each regency/city.
7. Calculate scores and values of main indicators, variables and sub-variables from secondary data and calculate values based on weights and scores obtained.

   Score $= \frac{Data\ eac\square\ Regency/City}{Total\ Province\ Data}$ x 100

   Value = Weight x score
8. Specifies criteria for the competitiveness of aquaculture in ponds all regencies / cities in West Java by using quartiles. Competitiveness profiles are divided into four categories of competitiveness based on quartiles. Q1 means to have very high competitiveness, Q2 means to have high competitiveness, Q3 means to have sufficient competitiveness, and Q4 means to have low competitiveness.

As for productivity is calculated from fishery statistical data of West Java Province. Here's the formula productivity is calculated for the main indicators of competitiveness of fisheries [9]:

a. Productivity Production per Land

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

Information:

Ppt: Productivity production per land area (tonnes/ m^2)
P : Total Production (tons)
The types of fish produced are in the hatchery and enlargement stage
T : Total Land Area (m^2)
i : Regency i (i = 1, ..., 27)
k : The period time

b. Productivity Production per Workforce

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

Information:

Ppn : Productivity per workforce production (tons/person)
P : Total Production (tons)

The types of fish produced are in the hatchery and enlargement stage
N : The total number of fish aquaculture workers (people)
i : Regency i (i = 1, ..., 27)
k : The period time

c. Productivity Production Value per Land Area

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

Information:

Pnpt: The productivity of the production value per land area (IDR / m^2)
NP : Values Production (Rupiah)
The types of fish produced are in the hatchery and enlargement stage
T : Total Land Area (m^2)
i : Regency i (i = 1, ..., 27)
k : The period time

d. Productivity Production Value per Workforce

$$Pnpn=\frac{NPik}{Nik} \quad (4)$$

Information:

Pnpn: The productivity of the production value per workforce (IDR / person)
NP: Values Production (Rupiah)
The types of fish produced are in the hatchery and enlargement stage
N : The total number of fish aquaculture workers (people)
i : Regency i (i = 1, ..., 27)
k : The period time

3. RESULT AND DISCUSSION

3.1 Geographical Condition of Research Location

West Java Province is located at a position of 104°48'- 108°48' East Longitude and 5°50" - 7°20" South Latitude. The area in West Java Province has a land area of 35,377.76 km² with a coastline of 724.85 km. West Java Province has regional boundaries, namely to the north of the Java Sea and DKI Jakarta, to the west of the Sunda Strait, to the south of the Indonesian Ocean, and to the east of Central Java Province (Fig. 1).

Natural conditions in West Java Province have a complex geological structure with mountainous areas in the middle and south and lowlands in the north. Rainfall in the province of West Java ranges from 2000-4000 mm/year with a high level of rainfall intensity, and has 40 watersheds (DAS) with a surface water discharge of 81 billion m^3/year and ground water of 150 million m^3/year. West Java is also one of the provinces that has the largest area of cultivation, the number of cultivators, and the contribution of freshwater fishery production in Indonesia. Subsistence and commercial aquaculture is a business that has long been known in West Java [10].

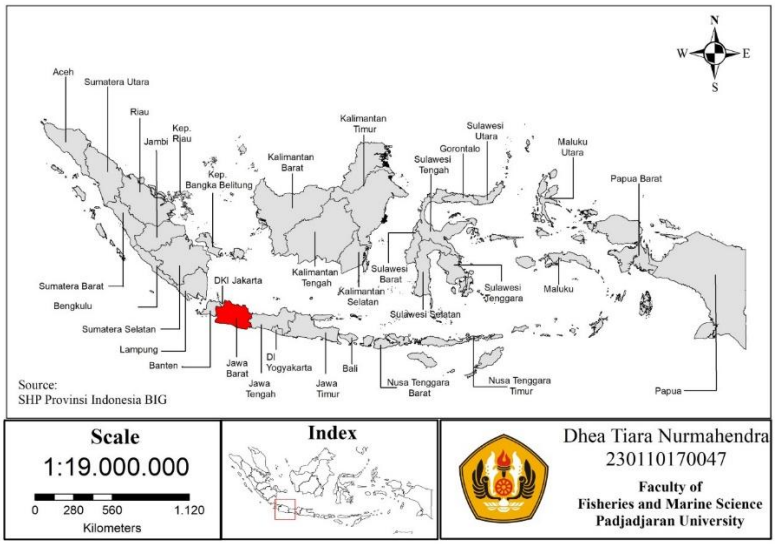

Fig. 1. West Java province index map

3.2 Profile of Competitiveness of Aquaculture in Ponds in West Java Province

Aquaculture in ponds in West Java Province has a significant level of competitiveness and is quite different. In 2019, the highest production value from pond cultivation was owned by Bogor Regency with a value of Rp. 2,289,223,080,-, followed by Ciamis Regency with a value of Rp. 1,660,760,723, then Indramayu Regency, and Tasikmalaya Regency (2019 Aquaculture Data).

The competitiveness of aquaculture in ponds in West Java Province, which consists of 27 regencies/cities and obtained from the results of quartile calculations, is then categorized based on Q1 (very high), Q2 (high), Q3 (adequate), and Q4 (low).

3.3 Overall Competitiveness Profile of Pond Cultivation

Based on the research that has been done, the final value of the main indicators found in each regency/city in West Java Province is obtained by showing the ranking and category of competitiveness it gets from very high to low (Table 1).

Table 1. Regency/city competitiveness ranking of West Java province in 2019

Regency /City	X1	X2	X3	X4	X5	Final Score	Ranked	Competitiveness Category
Ciamis Regency	3,471	0,000	2,420	3,137	0,207	9,235	1	Very High
Bogor Regency	0,295	0,000	1,541	4,129	1,594	7,559	2	
Indramayu Regency	0,103	0,000	1,003	2,856	2,923	6,886	3	
Tasikmalaya Regency	0,797	0,000	3,183	2,213	0,152	6,346	4	
Garut Regency	1,581	0,000	3,106	1,193	0,107	5,987	5	
Depok City	0,025	0,000	0,000	0,016	5,757	5,798	6	
Cianjur Regency	0,172	0,000	1,387	1,730	1,087	4,376	7	
Sukabumi Regency	0,626	0,000	0,711	1,099	0,293	2,729	8	High
Bandung Regency	0,277	0,000	1,189	0,407	0,173	2,047	9	
Bekasi City	0,008	0,000	0,004	0,059	1,869	1,941	10	
Subang Regency	0,074	0,000	0,119	0,556	1,138	1,887	11	
Bogor City	0,012	0,000	0,030	0,169	1,660	1,871	12	
Kuningan Regency	0,399	0,000	0,344	0,625	0,257	1,624	13	
Tasikmalaya City	0,419	0,000	0,600	0,302	0,116	1,438	14	
Cirebon Regency	0,208	0,000	0,339	0,501	0,368	1,416	15	Enough
Sumedang Regency	0,483	0,000	0,481	0,250	0,093	1,307	16	
Majalengka Regency	0,166	0,000	0,650	0,265	0,191	1,272	17	
Karawang Regency	0,141	0,000	0,925	0,083	0,065	1,214	18	
Pangandaran Regency	0,092	0,000	0,952	0,006	0,007	1,057	19	
Bekasi Regency	0,109	0,000	0,308	0,133	0,158	0,708	20	
Bandung Barat Regency	0,096	0,000	0,266	0,116	0,138	0,616	21	Low
Sukabumi City	0,012	0,000	0,029	0,047	0,454	0,542	22	
Cimahi City	0,003	0,000	0,007	0,012	0,505	0,527	23	
Cirebon City	0,004	0,000	0,001	0,004	0,513	0,521	24	
Banjar City	0,075	0,000	0,197	0,082	0,143	0,498	25	
Bandung City	0,008	0,000	0,040	0,025	0,374	0,447	26	
Purwakarta Regency	0,112	0,000	0,093	0,044	0,074	0,322	27	

(Source: Data Processing Results 2021)

Information:

X1 = Human Resources

X2 = Pond Aquaculture Service Facility

X3 = Facilities and Infrastructure of Ponds Aquaculture

X4 = Pond Aquaculture Production

X5 = Application of Science and Technology of Pond Aquaculture

Based on Table 1 above, it shows that Ciamis Regency is ranked 1st in the competitiveness of West Java Province with a final score of 9,235 and is included in the category of very high competitiveness. The thing that pushed Ciamis Regency to rank first because it excels in the main indicators, namely human resources with a value of 3,471, facilities and infrastructure with a value of 2,420, and aquaculture production in West Java Province with a value of 3,137. Ciamis Regency is one of the centers of fish production that has good prospects for development [11].

Bogor Regency is ranked 2nd in the competitiveness of West Java Province with a final score of 7,559 which is superior in the main indicator of aquaculture production in ponds. Bogor Regency has a fairly strategic area and is supported by land resources, adequate water, access and wide market reach [12].

In addition, Indramayu Regency ranks 3rd in the competitiveness of West Java Province with a final score of 6,886 which is superior in the main indicators of production and application of science and technology. Indramayu Regency is one of the regencies in West Java Province that has been designated by the Ministry of Maritime Affairs and Fisheries (KKP) of the Republic of Indonesia as a minapolitan development location based on the Decree of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number KEP. 32/MEN/2010 concerning Designation of Minapolitan Area [13].

Then followed by Tasikmalaya Regency which was ranked 4th with a final score of 6,346 which was superior in facilities and infrastructure as well as aquaculture production in ponds. Fishery land in Tasikmalaya Regency is mostly used for freshwater fish hatchery with commodities like Carp, Tilapia, Nilem, Tawes, Gurame, Catfish and other types of fish [14].

The district that ranks low is the 27th rank of the competitiveness of regencies/cities in West Java Province with a final score of 0.322. From the resulting quartiles, it can be described that there are six regencies and one city in the very high competitiveness category. Then high competitiveness with four regencies and three cities, sufficient competitiveness with six regencies, and for low competitiveness there are two regencies and five cities (Fig. 2).

3.4 Competitiveness Based on Human Resources Indicators

Based on the research that has been done, then the final value of the main indicators of human resources in each regencies/city in West Java Province is obtained by showing the rankings and categories of competitiveness obtained from very high to low (Table 2).

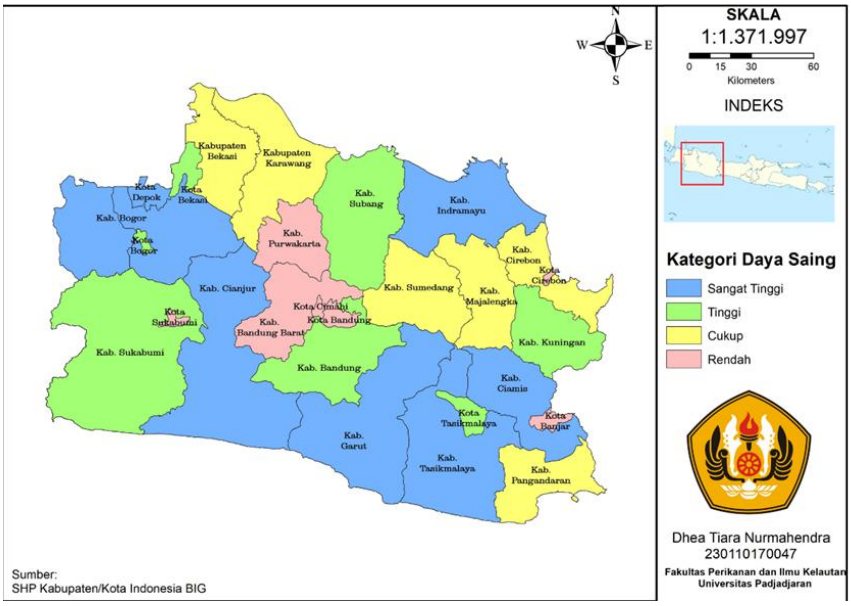

Fig. 2. Profile of competitiveness of aquaculture in ponds in 2019

Table 2. Regency/City competitiveness ranking of West Java province based on main indicators of human resources

Regency/City	Final Score	Ranked	Competitiveness Category
Ciamis Regency	17,319	1	Very High
Garut Regency	7,888	2	
Tasikmalaya Regency	3,977	3	
Sukabumi Regency	3,122	4	
Sumedang Regency	2,408	5	
Tasikmalaya City	2,092	6	
Kuningan Regency	1,989	7	
Bogor Regency	1,471	8	High
Bandung Regency	1,383	9	
Cirebon Regency	1,037	10	
Cianjur Regency	0,856	11	
Majalengka Regency	0,827	12	
Karawang Regency	0,702	13	
Purwakarta Regency	0,557	14	
Bekasi Regency	0,541	15	Enough
Indramayu Regency	0,516	16	
Bandung Barat Regency	0,480	17	
Pangandaran Regency	0,458	18	
Banjar City	0,375	19	
Subang Regency	0,370	20	
Depok City	0,125	21	Low
Sukabumi City	0,061	22	
Bogor City	0,061	23	
Bekasi City	0,041	24	
Bandung City	0,038	25	
Cirebon City	0,019	26	
Cimahi City	0,016	27	

(Source: Data Processing Results 2021)

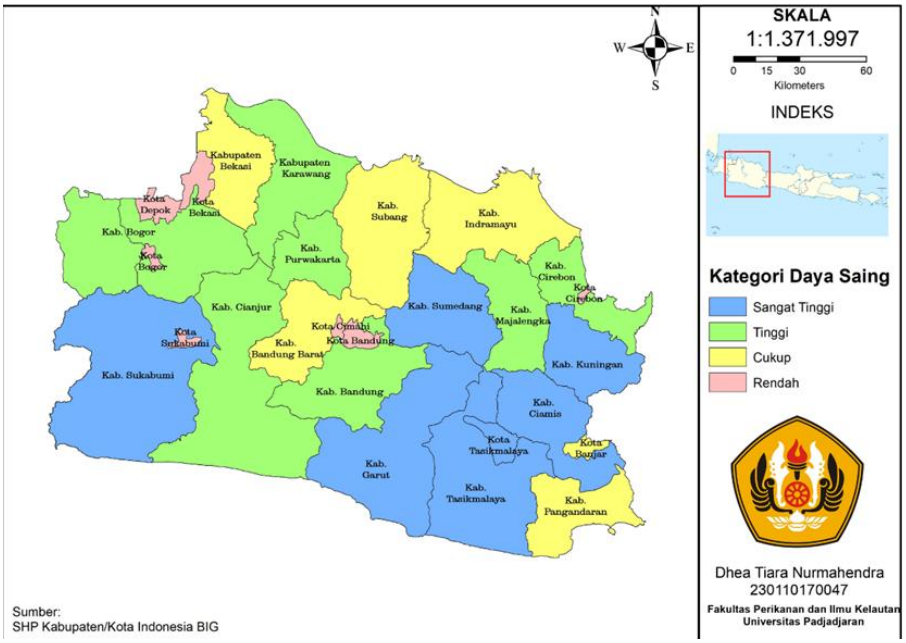

Fig. 3. Profile of human resources competitiveness in aquaculture in ponds in 2019

Based on Table 2 above, it shows that Ciamis Regency occupies the highest rank in the competitiveness of regencies/cities in West Java Province based on the main indicators of human resources with a final score of 17,319, this result is very high and differs greatly from other regencies/cities. So it is included in the category of very high competitiveness. Ciamis Regency is dominated by 87,580 RTP in the category of technology that it uses is still traditional, and 1,856 semi-intensive RTP. It can be said that Ciamis Regency has far more RTP/PP than other regencies/cities in West Java Province, thus encouraging Ciamis Regency to excel in pond cultivation activities, although the technology used tends to be simple.

Garut Regency is ranked 2nd in the competitiveness of regencies/cities in West Java Province based on the main indicators of human resources with a final score of 7.888 and is included in the category of very high competitiveness. Garut Regency has 3,325 semi-intensive RTP and 1,425 RTP in the traditional technology category. It can be said that cultivators in Garut Regency excel in the use of semi-intensive technology.

Tasikmalaya Regency is ranked 3rd with a final score of 3,977 and is included in the category of very high competitiveness. Tasikmalaya Regency has 9,528 intensive RTP, 25,406 RTP in the semi-intensive category, and is dominated by 28,581 RTP in the traditional technology category. While for the lowest rank is Cimahi City with a final score of 0.016, this is because Cimahi City has the least RTP of 90 people.

From the resulting quartiles, it can be illustrated that there are six regencies and one city in the very high competitiveness category. Then for high competitiveness with seven regencies, enough competitiveness with five regencies and one city, and for low competitiveness there are seven regencies, the majority of which are in the central region of West Java Province (Fig. 3).

3.5 Competitiveness Based on Facility Indicators

Based on the research that has been done, then the final value of the main indicators of the facilities available in each regency/city in West Java Province is obtained by showing the ranking and category of competitiveness it gets from very high to low (Table 3).

Based on Table 3 above, it shows that Tasikmalaya Regency occupies the highest rank in the competitiveness of regencies/cities in West Java Province based on the main indicators of facilities with a final score of 59,287. The facilities in Tasikmalaya Regency are dominated by 48,306 plots, then distributed by 15,658 classification plots. It can be said that Tasikmalaya Regency has superior facilities for cultivation activities carried out in ponds compared to other regencies/cities in West Java Province.

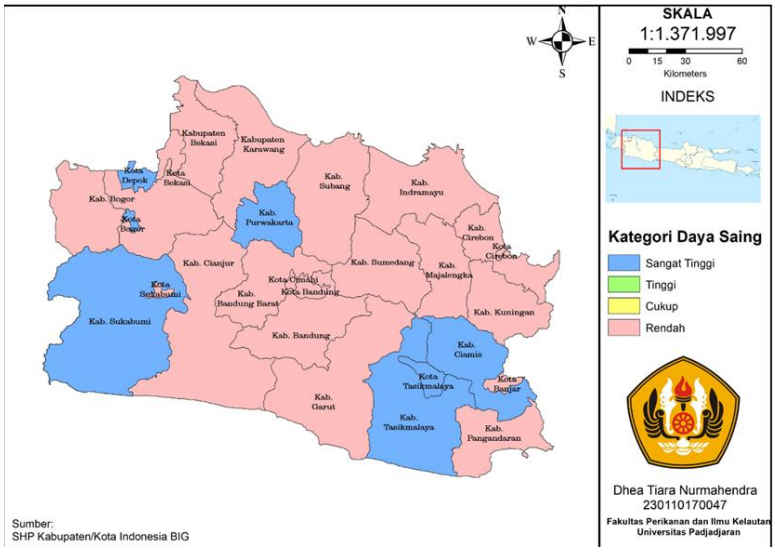

Fig. 4. Profile of facilities competitiveness in aquaculture in ponds in 2014

Table 3. Regency/city competitiveness ranking of West Java province based on main indicators of facilities

Regency/City	Final Score	Ranked	Competitiveness Category
Tasikmalaya Regency	59,287	1	Very High
Sukabumi Regency	16,829	2	
Ciamis Regency	12,754	3	
Tasikmalaya City	4,297	4	
Purwakarta Regency	2,392	5	
Depok City	1,777	6	
Bogor City	1,575	7	
Bekasi City	0,940	8	Low
Cimahi City	0,149	9	
Bogor Regency	0	10	
Cianjur Regency	0		
Bandung Regency	0		
Garut Regency	0		
Kuningan Regency	0		
Cirebon Regency	0		
Majalengka Regency	0		
Sumedang Regency	0		
Indramayu Regency	0		
Subang Regency	0		
Karawang Regency	0		
Bekasi Regency	0		
Sukabumi City	0		
Bandung City	0		
Cirebon City	0		
Banjar City	0		
Bandung Barat Regency	0		
Pangandaran Regency	0		

(Source: Data Processing Results 2021)

Sukabumi Regency is ranked 2nd with a final score of 16,829 and is included in the category of high competitiveness. The facilities in Sukabumi Regency are dominated by 35,011 usage plots, 8 water pumps, 18 waterwheels, and 4 water test kits. Aquaculture activities in ponds in Sukabumi Regency take place optimally and can take advantage of existing facilities so as to produce an optimal amount of production.

Ciamis Regency is ranked 3rd with a final score of 12,754 and is included in the category of high competitiveness. The facilities in Ciamis Regency are dominated by 6,325 plots, then distributed by 4,217 classification plots, and 350 water pumps. Cultivation activities in ponds in Ciamis Regency take place optimally and can take advantage of existing facilities so as to produce a fairly high amount of production.

From the resulting quartiles, it can be illustrated that for the high competitiveness category there are four regencies, namely Tasikmalaya Regency, Sukabumi Regency, Ciamis Regency, Purwakarta Regency, and there are three cities namely Tasikmalaya City, Depok City, and Bogor City. As for the low power category, there are 14 regencies and also six cities (Fig. 4).

3.6 Competitiveness Based on Facilities and Infrastructure Indicators

Based on the research that has been done, then the final value of the main indicators of the facilities and infrastructure found in each regency/city in West Java Province is obtained by showing the ranking and category of competitiveness that it gets from very high to low (Table 4).

Based on Table 4 above, it shows that Tasikmalaya Regency ranks the highest on the competitiveness of aquaculture in regency/city ponds in West Java Province based on the main indicators of facilities and infrastructure with a final score of 15,978. Tasikmalaya Regency has a land area of 3,295.2 ha which shows that

Tasikmalaya Regency has a high level of competitiveness and has great potential for cultivation activities in ponds supported by a very large area of land, so as to optimize the cultivation activities carried out in Tasikmalaya Regency.

Table 4. Regency/city competitiveness ranking of West Java province based on main indicators of facilities and infrastructure

Regency/City	Final Score	Ranked	Competitiveness Category
Tasikmalaya Regency	15,978	1	Very High
Garut Regency	15,592	2	
Ciamis Regency	12,145	3	
Bogor Regency	7,735	4	
Cianjur Regency	6,963	5	
Bandung Regency	5,968	6	
Indramayu Regency	5,035	7	
Pangandaran Regency	4,776	8	High
Karawang Regency	4,642	9	
Sukabumi Regency	3,567	10	
Majalengka Regency	3,261	11	
Tasikmalaya City	3,012	12	
Sumedang Regency	2,415	13	
Kuningan Regency	1,725	14	
Cirebon Regency	1,701	15	Enough
Bekasi Regency	1,547	16	
Bandung Barat Regency	1,334	17	
Banjar City	0,988	18	
Subang Regency	0,595	19	
Purwakarta Regency	0,466	20	
Bandung City	0,203	21	Low
Bogor City	0,148	22	
Sukabumi City	0,143	23	
Cimahi City	0,035	24	
Bekasi City	0,021	25	
Cirebon City	0,004	26	
Depok City	0,001	27	

(Source: Data Processing Results 2021)

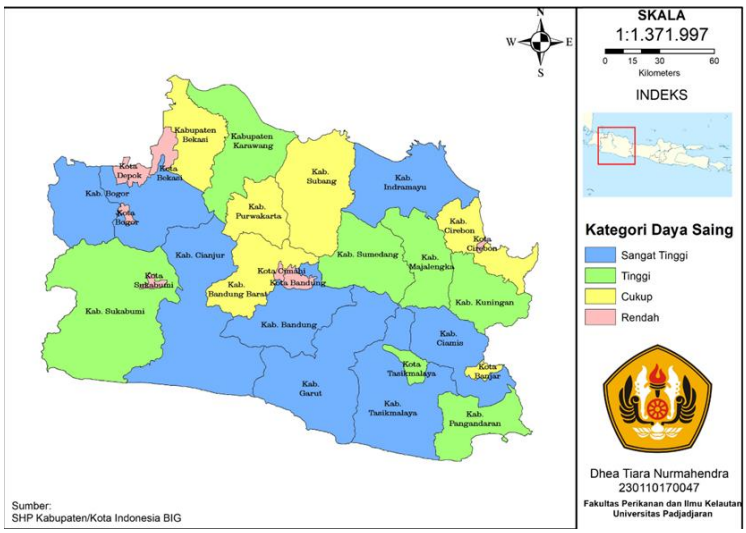

Fig. 5. Profile of facilities and infrastructure competitiveness in aquaculture in ponds in 2019

Garut Regency is ranked 2nd in the competitiveness of regencies/cities in West Java Province based on the main indicators of facilities and infrastructure with a final score of 15,592 and is included in the very high competitiveness category. Garut Regency has a land area for cultivation activities carried out in ponds of 3215.47 ha, this shows that Garut Regency is able to optimize the existing land to produce high production.

Ciamis Regency is ranked 3rd in the competitiveness of regencies/cities in West Java Province based on the main indicators of facilities and infrastructure with a final score of 12.145 and is included in the category of very high competitiveness. Ciamis Regency has an area of 2504.76 ha of land for cultivation activities carried out in ponds. This encourages Ciamis Regency to rank second because it has a very large land area. As for the low rank, namely the 27th rank, namely Depok City with the final score of only 0.001.

From the resulting quartiles, it can be seen that there are seven regencies in the very high competitiveness category. Then high competitiveness with six regencies and one city, enough competitiveness with five regencies and one city, and for low competitiveness there are seven cities (Fig. 5).

3.7 Competitiveness Based on Production Indicators

Based on the research that has been done, then the final value of the main indicators of the production found in each regency/city in West Java Province is obtained by showing the ranking and category of competitiveness that it gets from very high to low (Table 5).

Table 5. Regency/city competitiveness ranking of West Java province based on main indicators of production

Regency/City	Final Score	Ranked	Competitiveness Category
Bogor Regency	20,581	1	Very High
Ciamis Regency	15,635	2	
Indramayu Regency	14,238	3	
Tasikmalaya Regency	11,032	4	
Cianjur Regency	8,625	5	
Garut Regency	5,946	6	
Sukabumi Regency	5,479	7	
Kuningan Regency	3,117	8	High
Subang Regency	2,772	9	
Cirebon Regency	2,499	10	
Bandung Regency	2,031	11	
Tasikmalaya City	1,506	12	
Majalengka Regency	1,321	13	
Sumedang Regency	1,245	14	
Bogor City	0,845	15	Enough
Bekasi Regency	0,662	16	
Bandung Barat Regency	0,580	17	
Karawang Regency	0,413	18	
Banjar City	0,410	19	
Bekasi City	0,296	20	
Kota Sukabumi City	0,236	21	Low
Purwakarta Regency	0,217	22	
Bandung City	0,124	23	
Depok City	0,082	24	
Cimahi City	0,058	25	
Pangandaran Regency	0,032	26	
Cirebon City	0,018	27	

(Source: Data Processing Results 2021)

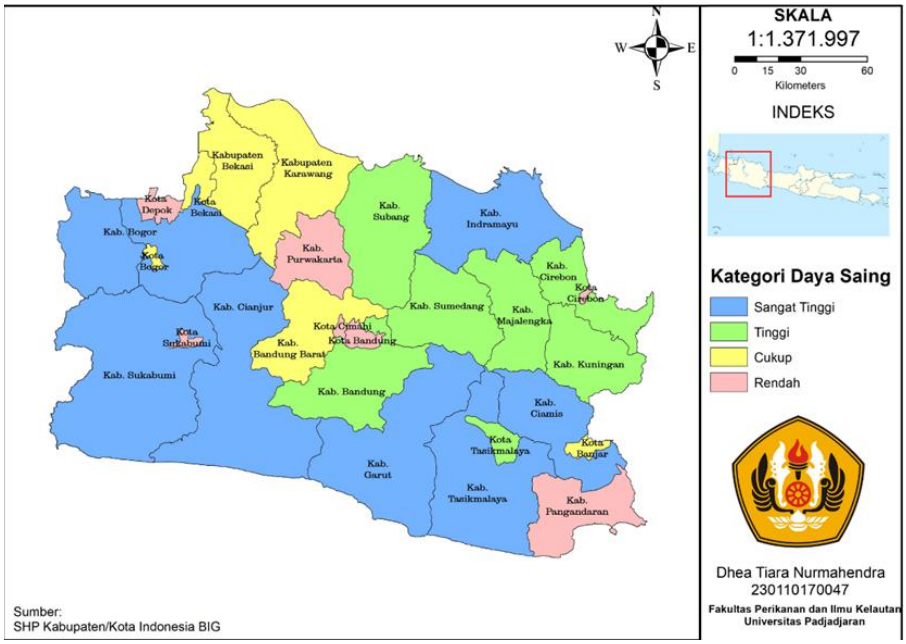

Fig. 6. Profile of production competitiveness in aquaculture in ponds in 2019

Based on Table 5 above, it shows that Bogor Regency is ranked 1st in the competitiveness of aquaculture in regency/municipal ponds in West Java Province based on the main indicators of production with a final score of 20.581 and is included in the very high competitiveness category. Bogor Regency produces production for aquaculture carried out in ponds reaching 121,405 tons or 20.50% of the total production in 27 Regencies/Cities of West Java Province and dominated by catfish as much as 79,583.12 tons. Bogor Regency is one of the areas that has developed freshwater aquaculture carried out in ponds. In fact, it has become a production center for freshwater aquaculture on a national scale [15].

Ciamis Regency is ranked 2nd in the competitiveness of regencies/cities in West Java Province based on the main indicators of production with a final score of 15,635 and is included in the category of very high competitiveness. Ciamis Regency produces production for cultivation carried out in ponds reaching 96,579.24 tons or 16.31%. West Java is an area that has good prospects for the development of fish production, this is because the West Java area has high rainfall so that it can trigger fish to breed well. As is known for West Java, fish farming is usually found in Tasikmalaya, Indramayu, Sukabumi, Bogor and Ciamis [16].

Indramayu Regency is ranked 3rd in the competitiveness of regencies/cities in West Java Province based on the main indicators of production with a final score of 14,238 and is included in the category of very high competitiveness. Indramayu Regency produces production for cultivation carried out in ponds reaching 92,192.60 tons or 15.57%. The market conditions that are quite extensive are used by the people of Indramayu to cultivate catfish which is the flagship of Indramayu Regency with a production of 59,190.48 tons, the cultivation system applied has also used an intensive cultivation system [17].

The district that ranks low is ranked 27th in the competitiveness of regencies/cities in West Java Province based on the main indicator of production, namely the City of Cirebon with a final score of 0.018. The pond system fish production in Cirebon City reached 111,684 tons or 0.019%. Unavailable land because it has been used for other activities or not in accordance with the land allocation that has been determined and excluded from the potential, which also affects the production level of Cirebon City [18].

From the resulting quartiles, it can be seen that there are seven regencies in the very high competitiveness category. Then high competitiveness with six regencies and one city, sufficient competitiveness with three regencies

and three cities respectively, and for low competitiveness there are two regencies and five cities (Fig. 6).

3.8 Competitiveness Based on Science and Technology Indicators

Based on the research that has been done, then the final value of the main indicators of the science and technology found in each regency/city in West Java Province is obtained by showing the ranking and category of competitiveness that it gets from very high to low (Table 6).

Based on Table 6 above, it shows that Depok City is ranked 1st in the competitiveness of aquaculture in regency/city ponds in West Java Province based on the main indicators of Science and Technology with a final score of 28,192 and is included in the category of very competitive competitiveness. tall. Depok City has high productivity, this is due to the high amount of production, production value, labor, and land area. The final total value includes production per land area obtained, which is 1400 tons/ha, production per worker is 0.53 tons/person, production value for land area is 41,464,661.65 rupiah/ha, and production value per worker is 15,756. 57 rupiah/person.

Indramayu Regency is ranked 2nd with a final score of 14,317 and is included in the category of very high competitiveness. Indramayu Regency has high productivity because it has a total final value including production per area of land obtained, namely 88.78 tons/ha, production per worker 31.85 tons/person, production value for land area 1,382.822.30 rupiah/ha, and the value of production per worker is 496,172.31 rupiah/person.

Table 6. Regency/city competitiveness ranking of West Java province based on main indicators of science and technology

Regency/City	Final Score	Ranked	Competitiveness Category
Depok City	28,192	1	Very High
Indramayu Regency	14,317	2	
Bekasi City	9,155	3	
Bogor City	8,130	4	
Bogor Regency	7,808	5	
Subang Regency	5,574	6	
Cianjur Regency	5,325	7	
Cirebon City	2,514	8	High
Cimahi City	2,474	9	
Sukabumi City	2,224	10	
Bandung City	1,832	11	
Cirebon Regency	1,800	12	
Sukabumi Regency	1,436	13	
Kuningan Regency	1,258	14	
Ciamis Regency	1,014	15	Enough
Majalengka Regency	0,936	16	
Bandung Regency	0,848	17	
Bekasi Regency	0,774	18	
Tasikmalaya Regency	0,746	19	
Banjar City	0,702	20	
Bandung Barat Regency	0,674	21	Low
Tasikmalaya City	0,569	22	
Garut Regency	0,523	23	
Sumedang Regency	0,456	24	
Purwakarta Regency	0,364	25	
Karawang Regency	0,320	26	
Pangandaran Regency	0,036	27	

(Source: Data Processing Results 2021)

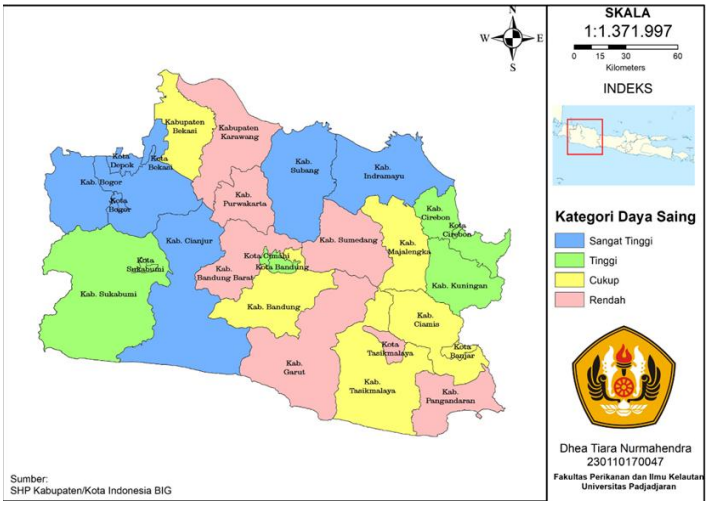

Fig. 7. Profile of science and technology competitiveness in aquaculture in ponds in 2019

Bekasi City is ranked 3rd with a final score of 9,155 and is included in the category of very high competitiveness. The final total value includes production per land area obtained, namely 391.51 tons/ha, production per worker 5.80 tons/person, production value for land area expansion of 7.935.551.16 rupiah/ha, and production value per worker, namely 117,665.06 rupiah/person.

The regency that ranks low is ranked 27th, namely Pangandaran Regency with a final score of only 0.036. The condition of the area that still applies conventional technology, and it is difficult to increase its productivity, is due to low accessibility to capital, technology, information and markets, and low capacity [19].

From the resulting quartiles, it can be illustrated that there are four regencies and three cities in the very high competitiveness category. Then high competitiveness with three regencies and four cities, sufficient competitiveness with five regencies and one city, and for low competitiveness there are six regencies and one city (Fig. 7).

4. CONCLUSION

Based on the results of research that has been carried out obtained several conclusions as follows:

The results showed that the competitiveness profile of aquaculture in ponds in 2019 in West Java Province with the first rank of very high competitiveness was occupied by Ciamis Regency with a final score of 9,235 superior in the main indicators of human resources, facilities and infrastructure, and production. Bogor Regency is in second place with a final score of 7,559, which is superior in the main indicators of production. Indramayu Regency is in third place with a final score of 6,886 superior in the main indicators of science and technology and production. Tasikmalaya Regency is ranked fourth with a final score of 6,346 superior in the main indicators of facilities and infrastructure as well as production. Garut Regency occupies the fifth binder with a final score of 5.987 superior in the main indicators of facilities and infrastructure. Depok City was ranked sixth with a final score of 5,789, excelling in the main indicators of science and technology. Meanwhile, Cianjur Regency is ranked seventh with a final score of 4,376, which is superior in the main indicators of production as well as facilities and infrastructure.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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